

Balneotherapy: from Basic Research to Clinical Challenges

Pedro Cantista

Centro Hospitalar Universitário do Porto, Portugal

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SOME THOUGHTS ABOUT THE SCIENTIFIC “PROOF” IN MEDICINE

When we want to discuss what the “proof” in science consists of, we are automatically transposed into the philosophical field. I’m convinced that when we speak of knowledge we cannot escape from the ancestral dialectic philosophy / science and pass through the successive thoughts and arguments of philosophers and scientists.

There is obviously a historical evolution of epistemology. From Metaphysics to Logic, from Rationalism to Empiricism, from Positivism to Structuralism, human knowledge evolves in a flow of successive acquisitions brought to our minds by diverse methodologies, with which humanity continually seeks the Truth.

Nowadays, thought is closely linked to technological evolution, influencing the scientific method for an ever closer approximation to mathematical rigor and to the utopia of certainty. Far away seems to be the “methodical doubt”. Automatic information (informatics) dominates and constraints thought.

Sometimes we forget that the Scientific Method is not in itself a unique way of proceeding, but rather that a model of thought aims, to guide the investigation, formulated in the hypothesis, by obtaining and discussing experimental data that may lead to possible conclusions. We want exact science. However, in 1927 Werner Heisenberg, introducing the concept of the “uncertainty principle,” sets a limit on the accuracy with which certain pairs of properties of a given physical particle, known as complementary variables (such as position and linear momentum), can be known. Although the principle of uncertainty may have its validity restricted to the subatomic level, by inserting values as indetermination and probability into the field of empirical experiment, this principle constitutes a fundamental epistemological transformation for modern science.

Will there be exact sciences? Is this question wrong because of its apparent contradiction? Or is there really no exact science or absolute certainty?

With regard to the so-called “medical sciences” it seems unquestionable that the infallible determinism of an immutable cause-effect relationship is far from reality. That is why it is so often said: *“death is the only certainty of our life ...”*

Is medicine a science that simply aims and is exhausted in the diagnosis, prevention, treatment and rehabilitation of diseases, through the application of a set of techniques, or still remains an art, as it was considered by many old masters? In Medicine what is more important: the experimental data converted into “knowledge” or the true “wisdom” that includes the very attitude of calling into question the “facts” of “evidence”? Against facts there are no arguments or precisely against “facts” there are arguments?

Carrying these reflections into the daily life of our scientific “production”, I would say that in our time the knowledge in Medicine comes from the so-called “basic sciences”, essentially data from the “laboratory”, which aim at understanding biological, physiological or pathological phenomena. This knowledge allows us to formulate therapeutic hypotheses whose adoption, implementation and regulatory institutionalization follows from a translational scientific process, concluded by pragmatic clinical trials, validated by probabilistic methods (mathematical demonstrations). So we fall into reality and instead of “causality” we stand by “probability”.

In this subject we cite Sir Austin Bradford Hill who in 1965 published a set of criteria to evaluate if an association could be considered as causal. These include strength, consistency (observation at different times), specificity, temporality (cause precedes consequence), biological gradient (dose-response relationship), plausibility (consistent with biological evidence), consistency, experimental evidence, and analogy). The evaluation of the existence or not of association and of causal relation, must comprise two fundamental aspects: the identification of the effect and its quantification.

Several models of study are developed. Studies without control group (individual cases or individual case sets) and studies with control group; case series studies without randomization (case control, cohort) or randomization (clinical trial, community trial). The studies with control group allow a direct and objective comparison between the group under study and another group that will not have the same characteristics in appreciation.

The random distribution of study participants, which we call “randomization”, forms the basis of the trials considered to be of the highest degree of evidence, the so-called randomized

controlled trials. We generally adopt the acronym of the English designation when we intend to refer (RCTs - randomized controlled trials).

In this process, in order to homogenise the groups, each participant should have the same probability of integrating each of the groups formed, trying to isolate the variable that we want to evaluate (in most cases the intervention in question).

In the observational studies we included the cohort methodology studies, which may be prospective or retrospective, where the cause precedes the effect and that starts from the identification of the presence or the absence of exposure to the factor in question. Observational studies are those of case-control methodology. These are retrospective and in them the effect precedes the cause.

Based on the pragmatic studies, there is the challenge of many usual clinical attitudes and interventions, considered to be true and beneficial. The so-called "Evidence-Based Medicine" (EBM) was born, much influenced by Archibald Leman Cochrane (1909-1988), who introduced these "randomized studies", that is, therapeutic trials in which a comparison is made between groups of participants (random), whose results are applied statistical methods. The conclusion will not be 100% accurate, but it tends toward that percentage the stricter the study design and the larger the sample size, which means the number of participants in a given trial.

Depending on the design of the clinical trials (retrospective, prospective, longitudinal, cross sectional, controlled, uncontrolled, single or double blind, randomization, etc.) and their conclusions or, where possible meta-analysis of data from various studies), a "level of evidence" can be established, hierarchically positioned in a graded classification, whose representative image is the well-known "pyramid of evidence".

The level of evidence reached in a given hypothesis determines according to this classification a "degree of recommendation" that guides clinical behaviour, aiming to condition medical performance in an established model of "good practices".

SOME THOUGHTS ABOUT THE SCIENTIFIC "PROOF" IN CRENOTHERAPY

If we want to ask how we can establish a Scientific Evidence in Thermal Medicine, what lessons can we draw from what has been exposed? Should we base our knowledge only on results from clinical trials? Without them can we say that the therapeutic use of natural mineral waters, steam, thermal gases and peloids lacks any scientific basis and as such is only a traditional practice with no place in modern medicine? Should we undergo a thermal treatment such as a drug and submit it to the demanding sieve of a prospective, randomized, double-blind, longitudinal trial with a significance level of at least 95%?

Obviously this is not possible. And it is not possible because this model is not applicable. Do not order an RCT for a surgical, psychotherapeutic, or for many Physical and Rehabilitation Medicine techniques. There are medical procedures for which the same methodology applied to drugs is not possible. How to proceed to establish the therapeutic indications of natural mineral waters? We lack scientifically-developed medical-hydrological studies, of course. Prior to any test, the classification of new natural mineral waters is required. We start from this premise and can investigate in laboratory the influence of physical, chemical and biological factors on the physiological and pathological mechanisms, constructing hypotheses to be demonstrated by the clinical trials. This raises the need to establish appropriate methodologies for the agent or process in question. Given this step, in order to respond to the claim of the dealers to add new therapeutic indications in waters already qualified as natural minerals, I would say that a better definition of these therapeutic indications is necessary. But let's not fall for fundamentalisms. The present non-existence of a test does not mean that a particular practice is invalid or does not act. We should be critical, but use common sense. The proof has not yet been produced, perhaps because we have not yet obtained a method for its demonstration.

Can EBM be applied to crenotherapy? Clinical evidence can only be proven for an agent, an application form or a health condition. However, most therapeutic agents cannot be subjected to double-blind trials. On the other hand, it is necessary to take into account that thermal therapy is usually complex, that is, it adds to the effects of mineral water or other crenotherapy agent, climate, diet, physical and psychological relaxation, physical activity and social interaction. That is: contextual factors (environmental and personal). In the investigation of the medical field in crenotherapy are essential elements:

1) Natural mineral waters (Na, Ca, Mg, Cl, SO₄, H₂S, CO₂), gases (CO₂, H₂S, Rn), peloids, climatic factors and other therapies (massage, diet, physiotherapy, psychotherapy).

2) Modes of application: oral ingestion (hidropinia), baths, showers, ablutions, steam techniques, irrigations, sprays, sprays, inhalations, injections, enemas, etc.

3) Dosage: simple use, series, combinations.

Regarding the type of clinical trial and validation criteria of the studies, much has been discussed. The subject has been the subject of wide international debate. In France, where the production of evidence for a particular therapeutic intervention determines its reimbursement by the state, this problem was studied by the National Academy of Medicine (XII Commission). His conclusions, which were the responsibility of the academics Patrice Queneau, Bernard Graber-Duvernay and Claude Boudène, were presented for the first time on 24 January 2006. Subsequently, the criteria required for a favourable opinion of the French National Academy of Medicine were updated. Because we think that this conclusions should serve as a model we mention them here.

THE UPDATED CRITERIA OF THE FRENCH NATIONAL ACADEMY OF MEDICINE CONCERNING BALNEOTHERAPY

P. QUENEAU, JP NICOLAS, R. TRÈVES, C-F. ROQUES

Commission XII, National Academy of Medicine, Paris

According to the French law, the National Academy of Medicine has to establish the benefit for health of the natural mineral waters.

Therefore, the academy gives advices to the government in different situations concerning balneotherapy such as the authorization of a new resort, a new spring (new water), a new medical orientation, a new thermal care.

- The opinion of the academy will be based on scientific data produced by relevant clinical studies which have to meet recently updated criteria:
- The data produced must be based, at least, on one clinical prospective study.
- The trial has to concern a specific condition with exclusion and inclusion criteria.
- The trial, controlled or uncontrolled, will be implemented according to the rules of the clinical trial good practices (and the legal requirements).
- The number of patients will be determined according to the methodology and the expected outcomes.
- The thermal (and the control) treatments will be clearly established, described, delivered and reported.
- The assessing investigators will be blind of the treatment delivered to the patients.
- The main endpoint will be quantifiable and assessed at least at 6 months; secondary endpoints, eventually medico-economic ones, will be also considered.
- The protocol will be elaborated by a scientific committee including a scholar expert of the condition, an expert in the methodology of clinical investigation, a doctor of thermal resorts; all will disclose their competing interests.
- The advice of an ethic committee is required.

To appreciate the results of the trials provided by the petitioners, the academy will pay a particular attention to the satisfaction of these different criteria in the studies.

In Portugal, with the publication of Law 142/2004, a new Health Ministry Technical Evaluation Committee was created within the scope of its article, which, under the Chairmanship of Prof. Frederico Teixeira, came to establish a Regulation of “Norms and Criteria for Thermal Research” (New Therapeutic Vocations / Evidence of Therapeutic Effect). We had the opportunity to collaborate in the elaboration of this document whose contents do not differ conceptually from the idealized by the French Academy. Both documents appear at the same time and curiously the two have been updated in the same periods. We are of the opinion that these standards provide sufficient scientific basis for a legitimate crenotherapy prescription and for its fair inclusion in our public health system. With this we do not want to dispense

with the thermal activity of better and more thorough scientific and clinical research.

I will conclude with one last thought. Perhaps a much repeated idea but still much forgotten by the undefeatable defenders of EBM. I insist that the Guidelines are for diseases and not for patients. Understanding the individuality of the patient is an integral part of the art of medicine. Already two thousand years ago Aurelius Cornelius Celsius stated that the doctor should apply the general knowledge in his patient, but also attend to their individual characteristics, even if this attitude may be contrary to pre-established principles. Attention to the patient's individuality makes all the difference in the quality of the practice of medicine. EBM data cannot be dogmas. The medical act results from a much wider set of references. It incorporates beyond scientific knowledge, experience, wisdom, common sense, morals, ethics and deontology. I therefore advocate that crenotherapy should remain a Medical Act.

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ADRESS FOR CORRESPONDENCE:

Pedro Cantista

Centro Hospitalar Universitário do Porto, Portugal

Pre-habilitation in Enhanced Recovery After Surgery Programs: A New Potential for Balneology and Physical Medicine to Benefit Patients

Prehabilitacja w programach ERAS (Intensyfikacja zdrowienia po zabiegach chirurgicznych): Nowy potencjał dla balneologii i medycyny fizykalnej zwiększający korzyść kliniczną dla pacjentów

David Ferson

University of Texas, M. D. Anderson Cancer Center, Houston, Texas, USA

SUMMARY

Medicine in the 21st century is becoming more integrated and less episodic. The ERAS programs have demonstrated that developing an organized, multidisciplinary teamwork approach to surgical patient care can significantly improve the quality of care and reduce complications. The next step in further improving the ERAS programs and potentially positively influencing the long-term outcomes for the patients is optimal conditioning and preparation before the surgery.

Key words: patient, ERAS programs, multidisciplinary teamwork

STRESZCZENIE

Medycyna w XXI wieku staje się coraz bardziej zintegrowana i mniej epizodyczna. Programy ERAS wykazały, że opracowanie zorganizowanego, wielodyscyplinarnego podejścia do pracy zespołowej w chirurgicznej opiece nad pacjentem może znacznie poprawić jakość opieki i zmniejszyć odsetek komplikacji. Kolejnym krokiem w dalszej poprawie programów ERAS i potencjalnie pozytywnie wpływającym na długoterminowe wyniki pacjentów jest optymalne kondycjonowanie i przygotowanie przed operacją.

Słowa kluczowe: pacjent, programy ERAS, wielodyscyplinarne podejście

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The Enhanced Recovery After Surgery (ERAS) was introduced into clinical practice in 1997 by Henrik Kehlet and his surgical colleagues [1]. As colorectal surgeons, they focused their efforts on decreasing the incidence of postoperative ileus. By simply asking the question “why is the patient still in the hospital today,” they systematically implemented novel clinical interventions and gradually achieved a faster return of normal physiological gastrointestinal functions after surgery. The end resulted in better surgical outcomes, greater patient satisfaction, reduction in length of hospital stay, and significant cost savings. Kehlet and his colleagues adapted a systematic, scientifically sound approach to their interventions and published their impressive findings, thus quickly receiving the attention of the surgical community [2]. Subsequently, several ERAS programs have been established throughout the world spanning a wide range of surgical disciplines, such as GYN surgery, thoracic surgery, orthopedic surgery, and hepatobiliary surgery, to mention a few

[3]. In 2010 the ERAS Society was created with members from different surgical specialties and from professionals involved in perioperative care, such as anesthesiologists, nurses, nutritionists, and physical therapy experts [4]. The ERAS Society provides a useful platform for publishing and updating a large number of different clinical guidelines developed by experts from around the world. Also, since 2012, the ERAS Society has organized annual international congress, which provide an educational and scientific forum for clinicians and health professionals involved in ERAS programs worldwide. In recent years, the ERAS Society introduced a valuable educational initiative called the “ERAS implementation program” (EIP), which teaches the ERAS methodology (over a period of 8-10 months) in a form of workshops, and provides support and guidance during the implementation of said programs at various medical centers around the world. Although the EIP was initiated in Sweden, the program is now offered in several countries listed on the

ERAS Society website (erassociety.org). The EIP also serves as a depository for data through the ERAS Interactive Audit System (EIAS), which offers real-time quality control of information in a regularly updated database that serves as a powerful tool for clinical research by ERAS Society members (4). Although the ERAS started as a clinical pathway for improving patient care in the postoperative period, the program currently addresses the whole spectrum of care starting with the evaluation and preparation of patients before the surgery, during the surgery itself, and extending into postoperative care, including after discharge care [5]. The key components of ERAS are currently divided into preoperative, intraoperative, and postoperative phases.

In the preoperative stage the focus is on: 1. evaluation and optimization of organ function, especially lungs and cardiovascular system, 2. alcohol abstinence for four weeks, 3. smoking cessation, 4. exercise, 5. weight reduction, and 6. preadmission education and counseling.

During the intraoperative phase, the key elements include: 1. antibiotic prophylaxis, 2. hemodynamically guided fluid therapy, 3. use of multimodal analgesia, including regional anesthesia, 4. normothermia, 5. minimally invasive surgical techniques, and 6. minimal use of drains, nasogastric tubes, and urinary catheters.

In the postoperative phase the focus is on: 1. early mobilization and oral feeding, 2. multimodal pain control to minimize the use of opioids, 3. balanced oral fluids with minimization of iv therapy, 4. thromboembolic and anti-nausea prophylaxis, 5. prevention of hypoxemia and hypothermia, 6. early removal of drains, tubes, and catheters, 7. continuation of the chronic preoperative therapy, and 8. post-discharge instructions and education on at-home care.

Over the years, a multitude of clinical protocols and pathways have been developed, and several studies confirmed that the adherence to these clinical pathways led to a shorter hospital stay and less complications. However, the evidence of ERAS programs on long term outcomes is still lacking. One of the possible explanations is that ERAS programs focus on medical interventions in the perioperative period, but do not explore patient engagement and life style changes that could have positive long-term effects [6].

In a recent publication by Taurchini *et al.*, the authors point out the value of a patient centered approach to ERAS programs and outline the possibility of moving from the concept of “management of disease” to that of “health promotion” by focusing on patient engagement [7]. In fact, there are very few studies that report patients’ perspective with regards to ERAS. Not surprisingly, what is important to researchers, such as measuring clinical parameters, is usually of little importance to patients. As reported by Gilles *et al.*, the patients want to be better informed about the details of what ERAS is and what they can do (as active participants) to improve their recovery [8]. This issue is particularly important to patients after they are discharged from the medical facility. More light on this issue was shed by Thorn *et al.* in a study published in 2016 that defined active and passive elements of ERAS [9]. Passive items do not require patients’ active engagement, such as using

thoracic epidural anesthesia, intraoperative fluid administration, or avoidance of nasogastric tube and urinary catheter. In contrast, the active elements need patients’ engagement to be carried out; for example, early mobilization and incentive spirometry. While passive compliance reported in the study was quite high (93.6%), the active compliance was only 56.5%. More importantly, the authors found that the poor active compliance was associated with increased major morbidity and increased length of stay, therefore having a strong predictive value for surgical outcomes. They also pointed out that active elements are mostly found in the postoperative phase, and they recommended better guidance and instructions for the postoperative care. Surgeons usually tend to concentrate on the preoperative and intraoperative period and only recently are getting involved in planning the postoperative phase [10, 11]. In fact, the modern ERAS programs are evolving from being focused and limited on the perioperative period, to continuum of care that looks more like a journey from diagnosis to complete patient recovery.

Balneology and Physical Medicine are uniquely positioned to bring additional value to ERAS programs because of their focus on balancing and strengthening the physiological functions. Improving the frailty index and, especially, increasing the cardiovascular and respiratory reserves before surgery is gaining more understanding as one of the most important factors in influencing the better recovery process and reducing postoperative morbidity and mortality. In addition, preparation and conditioning of patients before the surgery has very beneficial psychological effects because it allows the patient to feel positive about themselves by being actively engaged in their health care process [12,13]. There are also some exciting research opportunities to study patients’ response to conditioning: 1. it can serve as an objective assay to determine the duration of the conditioning program, and 2. it can be used as a better predictor about the risk for postoperative complications. One could easily build a business scenario of investing in Balneology and Physical Medicine programs for patients scheduled for an elective surgery. This could demonstrate a significant cost reduction, in addition to improving patient outcomes associated with the decision of performing the surgical treatment in the first place.

There is a famous saying: “*an ounce of prevention is much better than a pound of a cure.*” This is particularly important at the time of ever-increasing cost of care; a big portion of which involves not the cost of intended treatment but to cover the expenses of managing complications.

Medicine in the 21st century is becoming more integrated and less episodic. The ERAS programs have demonstrated that developing an organized, multidisciplinary teamwork approach to surgical patient care can significantly improve the quality of care and reduce complications. The next step in further improving the ERAS programs and potentially positively influencing the long-term outcomes for the patients is optimal conditioning and preparation before the surgery. We hope that Balneology and Physical Medicine specialists will seek this opportunity to participate and lead this valuable clinical initiative of moving from the concept of “disease management” to “improving health and wellbeing”.

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ADDRESS FOR CORRESPONDENCE:

David Ferson, M.D.

The University of Texas,
D. Anderson Cancer Center,
Houston, Texas, USA
e-mail: chiferson@gmail.com

The Influence of Age and Gender on Human Organism as a Complex System During Peloidotherapy Procedure

Wpływ wieku i płci na ludzki organizm jako złożony system podczas procedury peloidoterapii

Giedrė Taletavičienė¹, Alfonsas Vainoras², M. Raulinaitis³

¹Medical Resort Upa Druskininkai, Lithuania

²Academy of Medicine, Lithuanian University of Health Sciences, Lithuania

³Ministry of Environment of the Republic of Lithuania

SUMMARY

Introduction: Electrocardiogram (ECG) represents cardiac function in all fractal levels of complexity: regulatory system was evaluated by RR interval and heart supplying system was evaluated by the changes of JT interval. The type and intensity of body's reactions to mud therapy depend mainly on the intensity of the procedure and the responsiveness of the organism that also is influenced by age and gender.

Aim: of this research was to evaluate changes of dynamic concatenations of durational ECG parameters during peloidotherapy procedure in groups of people of various age and sex.

Material and Methods: The 12-lead standard ECG was registered synchronously using computerized ECG analysis system "Kaunas-Load" 1 min before and during peloidotherapy (39–40°C) procedure (mud bath). Three segments were assessed from ECG: 1 min before the procedure (1), 1–10 min of the procedure (2) and 11–20 minutes of procedure (3). Concatenations of ECG parameters were assessed and calculated: RR/JT, JT/dQRS, RR/dQRS. 48 patients (age mean 59.5 ± 11.48) were divided into groups by gender (26 female and 22 male) and age (I gr. (N=24) age ≤ 59 y.), II gr. (N=24) age > 59 y.).

Results: A comparison by gender and age showed that dynamical concatenations of RR/JT, JT/dQRS, RR/dQRS of male patients were significantly ($p < 0.05$) higher than those of female during all stages of the procedure. The complexity of reactions on organism level (RR/JT) during procedure was decreasing only in I age group. The complexity of organism reactions on sub systemic level (JT/dQRS) was decreasing in all groups at the start of the procedure ($p < 0.05$) (stage 2), but was increasing in next half of the procedure (stage 3) ($p < 0.05$). JT/dQRS values of female group and older people (II gr.) at the end of the procedure returned to their initial levels ($p > 0.05$). More pronounced decrease of JT/dQRS concatenations in male and younger (I gr.) patient groups at the first stages of the procedure was observed, so these values don't reach their initial state till the end of the procedure ($p < 0.05$).

Conclusions: 1) pronounced dynamics of organism's processes were observed during peloidotherapy treatment; 2) the most pronounced influence of age and gender on changes of organism complexity reactions was observed on regulatory levels (RR/dQRS); 3) sudden reorganization of organism's state was observed in all studied concatenations during the initial phase of peloidotherapy.

Key words: peloidotherapy, balneotherapy, complex system

STRESZCZENIE

Wstęp: Elektrokardiogram (EKG) reprezentuje czynność serca we wszystkich fraktalnych poziomach złożoności: system regulacyjny był oceniany przez odstęp RR, a system dostarczania serca był oceniany przez zmiany odstępu JT. Rodzaj i intensywność reakcji organizmu na terapię błotną zależą głównie od intensywności zabiegu i reakcji organizmu, na którą wpływa również wiek i płeć.

Cel: Ocena zmian dynamicznych konkatencji parametrów EKG podczas trwania peloidoterapii w grupach osób w różnym wieku i płci.

Metoda: 12-odprowadzeniowe standardowe EKG rejestrowano synchronicznie za pomocą skomputeryzowanego systemu analizy EKG „Kaunas-Load” 1 minutę przed i podczas procedury peloidoterapii (39–40°C) (kąpiel błotna). Trzy segmenty oceniano z EKG: 1 minutę przed zabiegiem (1), 1–10 minut procedury (2) i 11–20 minut procedury (3). Oceniano parametry EKG: RR / JT, JT / dQRS, RR / dQRS. 48 pacjentów (średnia wieku $59,5 \pm 11,48$) podzielono na grupy według płci (26 kobiet i 22 mężczyzn) i wieku (I gr. (N = 24) wiek ≤ 59 lat), II gr. (N = 24) wiek > 59 lat).

Wyniki: Porównanie płci i wieku wykazało, że dynamiczne konkatencje RR / JT, JT / QRS, RR / dQRS pacjentów płci męskiej były istotnie ($p < 0,05$) wyższe niż u kobiet na wszystkich etapach procedury. Złożoność reakcji na poziomie organizmu (RR / JT) podczas zabiegu zmniejszała się tylko w I grupie wiekowej. Złożoność reakcji organizmu na poziomie podsystemowym (JT / dQRS) zmniejszała się we wszystkich grupach

na początku procedury ($p < 0,05$) (etap 2), ale wzrastała w następnej połowie procedury (etap 3) ($p < 0,05$). Wartości JT / dQRS kobiet i osób starszych (II gr.) Na końcu procedury powróciły do początkowych poziomów ($p > 0,05$). Zaobserwowano wyraźniejszy spadek konkatenacji JT / dQRS w grupach cierpkości mężczyzn i młodszych (I gr.) Na pierwszych etapach procedury, wartości te nie osiągnęły stanu początkowego do końca procedury ($p < 0,05$).

Wnioski: 1) wyraźna dynamika procesów zachodzących w organizmie była obserwowana podczas leczenia peloidoterapii; 2) najbardziej wyraźny wpływ wieku i płci na zmiany reakcji złożoności organizmu zaobserwowano na poziomach regulacyjnych (RR / dQRS); 3) nagła reorganizacja stanu organizmu była obserwowana we wszystkich badanych konkatenacjach w początkowej fazie peloidoterapii.

Słowa kluczowe: peloidoterapia, balneoterapia, kompleksowy system

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INTRODUCTION

Balneotherapy and mud therapy have been used empirically since time immemorial to treat a wide range of conditions [1]. The medical application of natural mineral waters, gases and peloids (e.g. Fango), being effective for the prevention or treatment of diseases and for rehabilitation, are the core elements of medicine in health resorts [2]. Balneotherapy and spa therapy are being increasingly considered in evidence-based treatment guidelines for rheumatic diseases, including osteoarthritis, fibromyalgia, ankylosing spondylitis, early arthritis, rheumatoid arthritis, and lower back pain. The studies that investigate the therapeutic effects of balneotherapeutic treatments on cardiovascular, metabolic, neurological, psychiatric, and respiratory disorders have been published recently [3]. Medical peloids require a high specific heat and heat keeping capacity, which are related to the composition of the peloid and the viscosity during application [2]. The main factor that is common to all types of mineral-medicinal waters and muds is heat [1]. Balneology (and peloidotherapy) causes local and generalized physiological effects in the organism, which are exerted through both physical mechanisms – mainly linked to heat therapeutic effects – and chemical and biological properties of the agents [1, 4]. Almost all physiological systems are involved into the general reaction of human organism during peloidotherapy. Reaction type and intensity depends on the intensity of mud procedure - temperature of mud, area of application, duration of the procedure, as well as on the reactivity of the organism, which is quite difficult to determine. In order to evaluate the effects of therapeutic procedures including peloidotherapy on human organism, methods are needed to study not only the functions and dynamics of a single organ or system, but also functional interconnections between major systems, responding to the intervention and to assess overall state of the organism. The human body can be evaluated as a complex system [5] which consists of, at least, three holistic systems, and they were indicated by A. Vesalius in 1548 [6]. Evaluation of changes of complexity (state of the organism) depend on the chosen fractal level (scale) [7] and on the type of concatenations between the elements of the adaptive complex system. The cardiovascular system is one of the holistic systems of the human body why the reactions of cardiovascular system to the constant load test or all-out test allow us to assess the functional peculiarities of the body [8, 9]. Electrocardiogram is a simple non-invasive method which

reflects cardiac function at all organism fractal levels, and represents cardiac function in all fractal levels of complexity: regulatory system evaluated by RR interval (organism level) and the heart as supplying system evaluated with changes of JT interval. Duration of QRS complex (dQRS) characterizes internal regulatory system of the heart (at the organ level). ECG parameters can be used to describe physiological changes in the whole body [8, 10].

The main aim of our investigation was to evaluate changes of dynamic concatenations of ECG parameters – time intervals during peloidotherapy procedure in groups of people of various age and gender.

MATERIAL AND METHODS

The research was carried out in the health care resort center “Druskininkų gydycla”. Procedure – therapeutic peat mud bath (39°C) (peat from “Mašnyčios” peat bog mixed with medium mineralization (~10 g/l) sodium-potassium-calcium chloride mineral water “Sveikata” in 1:2 ratio).

The 12-lead standard ECG was registered synchronously using computerized ECG analysis system “Kaunas-Load” 1 min before and during peloidotherapy (39-40°C) procedure (mud bath). Three segments were assessed from ECG: 1 min before the procedure (1), 1-10 min of the procedure (2) and 11-20 minutes of procedure (3).

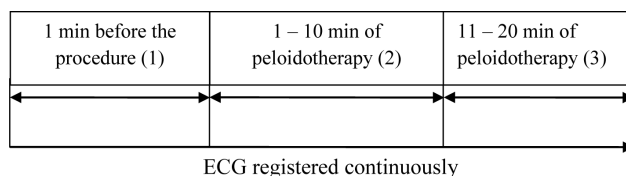


Figure 1. Protocol of peloidotherapy test.

Rycina 1. Protokół testu peloidoterapii.

ECG parameters were assessed and calculated concatenations of: RR/JT, JT/dQRS, RR/dQRS. RR/JT concatenation describes relationship between regulatory and supplying systems (systemic level); JT/dQRS dynamical concatenation describes relationship between supplying system on the organism (systemic) level and regulatory processes on the heart itself (sub systemic level); RR/dQRS dynamical concatenation describes link between regulatory systems on different, organism and heart

levels (intersystemic concatenation between two fractal levels of organism).

To determine the influence of age and sex for adaptive reactions of organism during peloidotherapy, all subjects were divided into groups according to the gender (male and female) and age (age group I: ≤ 59 years, age group II: > 59 years).

Statistical analysis of the data. The following algebraic analysis methods were employed on the computerized ECG analysis system "Kaunas-Load": ECG parameters of each cardio cycle were measured, their averages and dispersion were evaluated. Calculation of dynamical concatenations of two simultaneous signals was performed by creating matrices of the two processes and the discriminant of the matrix was calculated, reflecting interconnection between parameters. Statistical data analysis was performed using SPSS (*Statistical Package for the Social Sciences*) for Windows 17.0 software package. The quantitative variables were presented as a mean (m) and deviation (SD), and standard error of the mean (SEM). Hypothesis about the normality of distribution of the results was estimated using the Shapiro-Wilk test. Hypothesis about normal data distribution was rejected, so ECG parameters measured during tranquility period (1), during the periods (2) (1-10 min) and (3) (11-20 min) of procedure were compared using the nonparametric Wilcoxon test for paired samples. Statistical significance of differences between two independent group parameters (age and sex) was determined by the nonparametric Mann-Whitney test for two independent samples. The study was carried out with the permission of Kaunas Regional Biomedical Research Ethics Committee (permission No. BE-2-50). The research was carried out from June 2010 till May 2013 in Druskininkai

Health Resort Center (VšĮ Druskininkų gydykla (renamed to UAB "Druskininkų sveikatinimo ir poilsio centras AQUA" in 2012)). The data was processed on receipt of the State Data Protection Inspectorate authorization No. 2R-676.

RESULTS

Patients included in this study had no contraindications for peloidotherapy; ECG parameters were within normal limits; subjects who agreed to participate in the study gave their written consent. 48 patients were studied (age mean $\pm$ SD was 59.5 ± 11.48 year). They were divided into groups by gender (26 female and 22 male) and age (I gr. (N=24) age ≤ 59 y.), II gr. (N=24) age > 59 y.).

There were no statistically significant changes in RR/JT discriminant in the women's group ($p \geq 0.05$). A statistically reliable ($p < 0.05$) increase of JT/dQRS discriminant was observed during the first part of the procedure, a decrease was observed during the second part ($p < 0.05$) and a recovery of the discriminant was observed by the end of the procedure with no significant difference ($p \geq 0.05$) between JT/dQRS (1) and JT/dQRS [3].

A significant ($p < 0.05$) increase of (2) RR/dQRS discriminant was detected during the first part of the procedure, some decrease was detected during the second part of the procedure (with no difference ($p \geq 0.05$) between RR/dQRS (2) and RR/dQRS (3)), however the initial values of RR/dQRS (1) were not attained ($p < 0.05$) (Figure 1).

Similarly to the women's group, there were no statistically significant changes ($p \geq 0.05$) in RR/JT discriminant in the men's group. Significant differences ($p < 0.05$) between JT/dQRS (1) and JT/dQRS (2) were detected. During the later stage of the procedure there was a significant decrease in

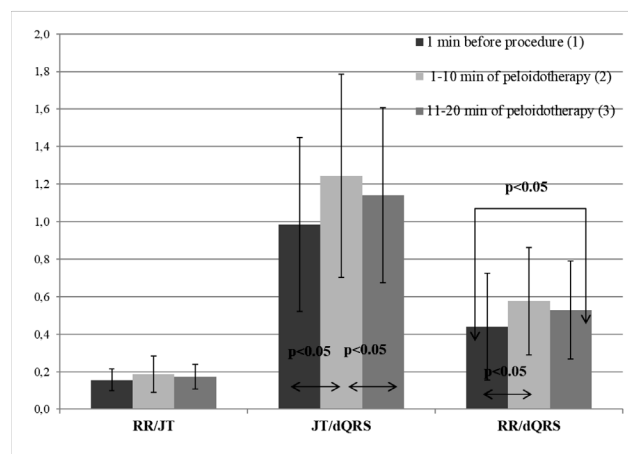


Figure 2. Changes in discriminants of durational ECG parameters representing dynamic concatenations during the peloidotherapy procedure in the women's group.

Rycina 2. Zmiany w wyróżnikach parametrów ciągłego zapisu EKG przedstawiających dynamiczne konkatencje podczas zabiegu peloidoterapii w grupie kobiet.

Note: N=26 (N - number of subjects); results are presented in mean $\pm$ SD (SD - standard deviation); $p < 0.05$ - statistically significant difference between parameters; RR/JT - discriminant value of the matrix of RR and JT intervals; JT/dQRS - discriminant value of the matrix of JT interval and duration of QRS complex; RR/dQRS - discriminant value of the matrix of RR interval and duration of QRS complex.

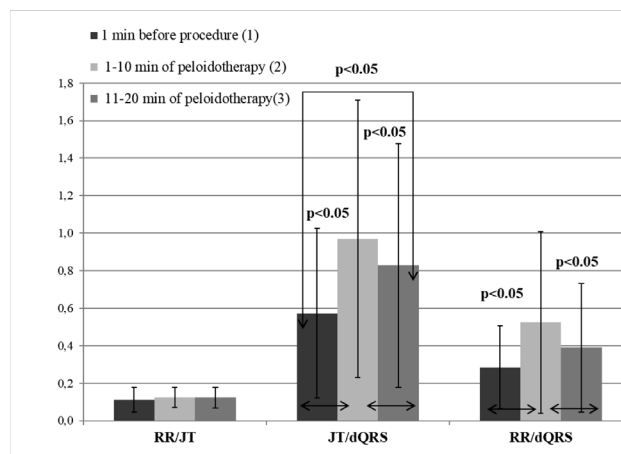


Figure 3. Changes in discriminants of durational ECG parameters representing dynamic concatenations during the peloidotherapy procedure in the men's group.

Rycina 3. Zmiany w wyróżnikach parametrów ciągłego zapisu EKG przedstawiających dynamiczne konkatencje podczas zabiegu peloidoterapii w grupie mężczyzn.

Note: N=22 (N - number of subjects); results are presented in mean $\pm$ SD (SD - standard deviation); $p < 0.05$ - statistically significant difference between parameters; RR/JT - discriminant value of the matrix of RR and JT intervals; JT/dQRS - discriminant value of the matrix of JT interval and duration of QRS complex; RR/dQRS - discriminant value of the matrix of RR interval and duration of QRS complex.

JT/dQRS, however the initial values of were not attained. Statistically significant changes in JT/dQRS values were observed during all stages of the procedure. RR/dQRS discriminant has significantly increased ($p < 0.05$) in the beginning of the procedure with a significant decrease ($p < 0.05$) in the later stage and has attained the initial values (Figure 3.).

Characteristics of changes in discriminants of ECG parameters are presented in Figure 4 for both women's and men's groups. Statistically significant changes in dynamic concatenations of all durational ECG parameters were observed, except for RR/dQRS during the second stage (1-10 minute of the procedure (Figure 4). A comparison by gender showed that dynamical concatenations of RR/JT, JT/dQRS, RR/dQRS of male patients were significantly ($p < 0.05$) higher than those of female during all stages of the procedure (Figure 4). Differences between the speed of changes in JT/dQRS or RR/dQRS discriminants were observed in women's and men's groups.

For both groups JT/dQRS and RR/dQRS discriminants significantly ($p < 0.05$) increased during the first stage of the procedure, however during the second stage JT/dQRS discriminant has faster attained its initial value in women's group, while RR/dQRS discriminant - in men's group (Figure 4).

In group I (age ≤ 59 years) an increase ($p < 0.05$) of RR/JT discriminant was observed in the beginning of the procedure and a statistically significant difference ($p < 0.05$) remained until the end of the procedure. JT/dQRS and RR/dQRS discriminants significantly increased ($p < 0.05$) in the beginning of the procedure, a reliable decrease ($p < 0.05$) was observed during the course of the procedure, however the initial values, measured 1 minute before the procedure were not attained ($p < 0.05$) (Figure 5).

In group II (age > 59 years) there were no statistically significant changes ($p \geq 0.05$) in RR/JT discriminant during the peloidotherapy procedure. There was an increase ($p < 0.05$) of JT/dQRS and RR/dQRS in the beginning of the procedure with a decrease ($p < 0.05$) in the second part of the procedure down to the initial values, measured 1 minute before the procedure ($p < 0.05$) (Figure 6).

Dynamics of the changes in discriminants of durational ECG parameters in subject age groups I and II are illustrated in Figure 7.

There were no statistically significant changes ($p \geq 0.05$) of these parameters between the two age groups (Figure 7), however these diagrams reveal some specific trends of these changes. RR/JT discriminant fluctuated similarly during the whole peloidotherapy procedure in both age groups (Figure 7). Initial values of JT/dQRS discriminants, measured 1 minute before the procedure (i. e. in the resting state) were lower in group I, have reached similar levels in the beginning of the procedure and almost no changes between JT/dQRS values were observed until the middle of the peloidotherapy procedure. Trends in differences started to appear after the 10th minute of the procedure, when the curves have diverged - values of JT/dQRS discriminant were decreasing faster in younger subjects (group I). Values of RR/dQRS discriminant in the resting state were somewhat lower ($p \geq 0.05$) in subjects

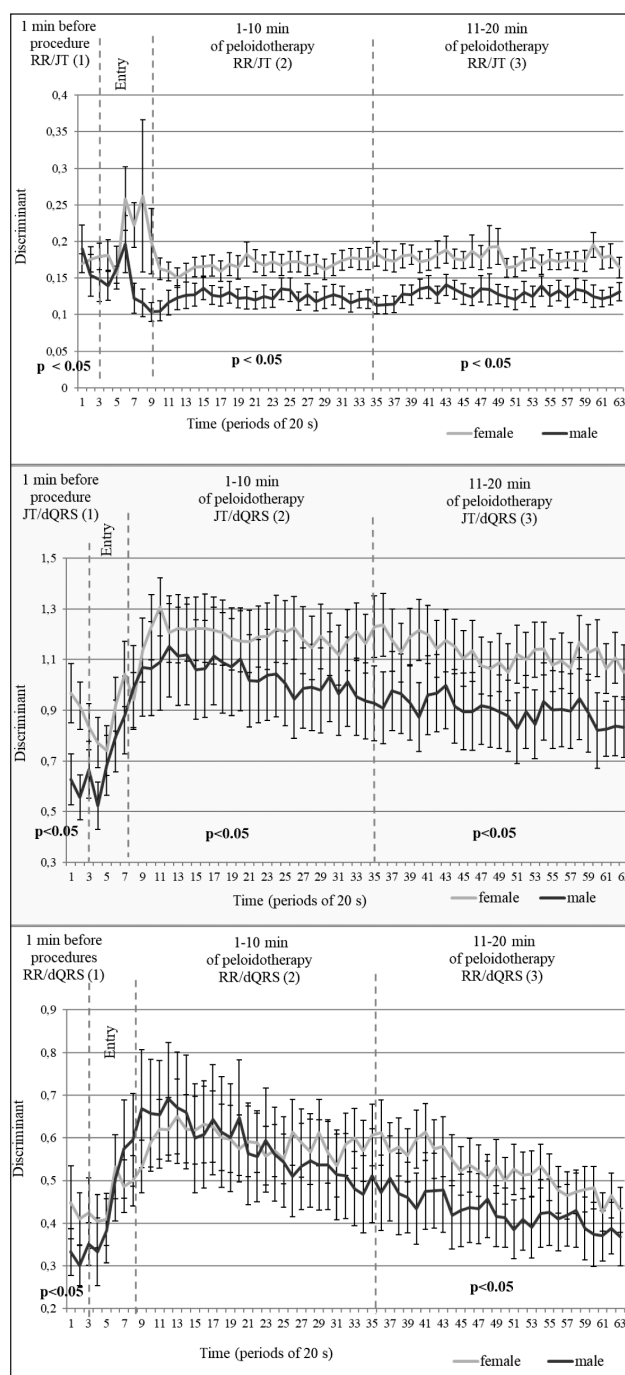


Figure 4. Changes in RR/JT, JT/dQRS and RR/dQRS discriminants during peloidotherapy procedure.

Rycina 4. Zmiany w wyróżnikach RR/JT, JT/dQRS oraz RR/dQRS podczas zabiegu peloidoterapii.

Note: female N=26, male N=22; results are presented in mean $\pm$ SEM (SE - standard error of mean); $p < 0.05$ - statistically significant difference between RR/JT, JT/dQRS and RR/dQRS discriminants in females and males during the same stage of the procedure.

of group I and have significantly increased ($p < 0.05$) in the beginning of the procedure (Figure 5), while a more rapid decrease in the values of this parameter comparing with subjects of group II was observed during the 10-11 minute of the procedure (Figure 7).

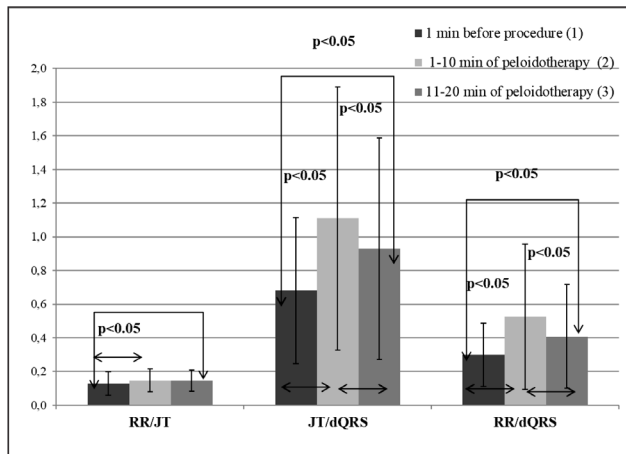


Figure 5. Changes in discriminants of durational ECG parameters representing dynamic concatenations during the peloidotherapy procedure in group I (age ≤ 59 years).

Rycina 5. Zmiany w wyróżnikach parametrów ciągłego zapisu EKG przedstawiających dynamiczne konkatencje podczas zabiegu peloidoterapii w grupie I (wiek ≤ 59 lat).

Note: N=24 (N - number of subjects); results are presented in mean ± SD (SD - standard deviation); $p < 0.05$ – statistically significant difference between parameters; RR/JT - discriminant value of the matrix of RR and JT intervals; JT/dQRS - discriminant value of the matrix of JT interval and duration of QRS complex; RR/dQRS - discriminant value of the matrix of RR interval and duration of QRS complex

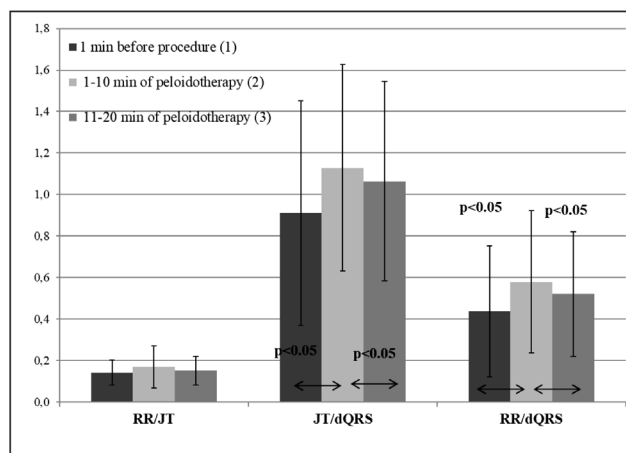


Figure 6. Changes in discriminants of durational ECG parameters representing dynamic concatenations during the peloidotherapy procedure in group II (age > 59 years).

Rycina 6. Zmiany w wyróżnikach parametrów ciągłego zapisu EKG przedstawiających dynamiczne konkatencje podczas zabiegu peloidoterapii w grupie II (wiek > 59 lat).

Note: N=24 (N - number of subjects); results are presented in mean ± SD (SD - standard deviation); $p < 0.05$ – statistically significant difference between parameters; RR/JT - discriminant value of the matrix of RR and JT intervals; JT/dQRS - discriminant value of the matrix of JT interval and duration of QRS complex; RR/dQRS - discriminant value of the matrix of RR interval and duration of QRS complex.

DISCUSSION

In the recent decades, more and more studies (including high-quality meta-analysis and systematic reviews) have reported the beneficial effects of balneotherapy, including mud therapy, on different clinical outcomes in patients with osteoarthritis (OA) [11-13], rheumatoid arthritis [13], fibromyalgia [14], and other rheumatic conditions [15]. The main clinical parameters improved by balneotherapy and mud

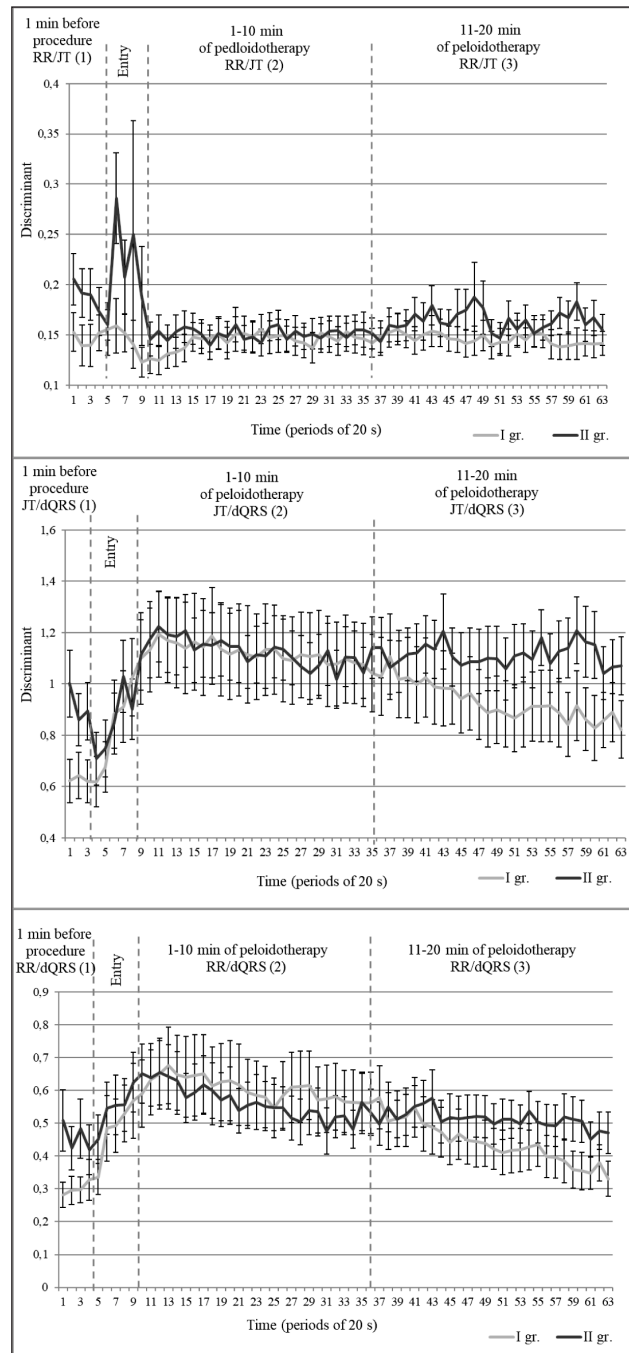


Figure 7. Changes in RR/JT, JT/dQRS and RR/dQRS discriminants during peloidotherapy procedure.

Rycina 7. Zmiany w wyróżnikach RR/JT, JT/dQRS oraz RR/dQRS podczas zabiegu peloidoterapii.

Note: I gr. (age ≤ 59 years) N=24, II gr. (age > 59 years) N=24; results are presented in mean ± SEM (SE - standard error of mean).

therapy in OA and other rheumatic conditions are analgesic drug consumption, function, stiffness, pain, and quality of life [1,14,15,]. The main objective of our study was to analyse the “behaviour” of human organism as a complex system during the whole duration of peloidotherapy procedure. Peloidotherapy induces significant changes in the organism

and adaptive body response depends on the reactivity of the individual and its adaptive reserves [1]. Therefore we were aiming to investigate if age and sex have an effect on the type of adaptive reaction of a human organism. The mechanisms of adaptation are complex and influenced by changes in multiple other mechanisms regulating activation and suppression. These mechanisms are not operating separately but rather in an aggregated synergistic interaction [16].

Analysis of changes in discriminants of durational ECG parameters during the peloidotherapy procedure reveals an increase in concatenations of all observed systems. The results show statistically significant differences in changes of discriminants of ECG parameters between men and women (except RR/dQRS parameter during the 1-10 minutes of the procedure). The diagrams clearly illustrate stronger and more rapid dynamics of interparametric concatenations in men both 1 min before the peloidotherapy procedure and during the procedure itself. Although there were no observed statistically significant differences in values of selected parameters between the different age groups, analysis of the dynamics of changes has revealed stronger concatenations between regulatory elements of both fractal levels (RR and dQRS) in the middle of the procedure (approximately 10-11th minute) in younger subjects (group I) compared to older subjects (group II).

New methods of analysis for assessing synergistic characteristics of human organism and dynamics of parameters defining its complexity expand the opportunity to analyse new, previously unexplored features and to use them for evaluating functional state of the body in order to manage duration and intensity of physical or other type of stimulus (in this case - peloidotherapy) searching for optimal conditions and the effect of adaptation [16].

This innovative study has revealed relatively small inter-group differences between the concatenations of the activity of different functional systems and regulatory mechanisms. Methodology of this research can be used to evaluate changes in the functional state of the organism during various effects through the introduction of new, unstudied therapeutic procedures, the determination of optimal conditions for performing the procedures and the duration of the treatment course.

CONCLUSIONS

- 1) pronounced dynamics of organism's processes were observed during peloidotherapy treatment;
- 2) the most pronounced influence of age and gender on changes of organism complexity reactions was observed on regulatory levels (RR/dQRS);
- 3) sudden reorganization of organism's state was observed in all studied concatenations during the initial phase of peloidotherapy.

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ADDRESS FOR CORRESPONDENCE:

Giedrė Taletavičienė
Medical Resort Upa Druskininkai, Lithuania
e-mail: g.taletav@gmail.com

Analysis of Physical Therapy in Psoriasis

Analiza postępowania fizykalnego w łuszczycy

Włodzisław Kuliński^{1,2}, Barbara Zielińska¹

¹Faculty of Medicine and Health Science, Jan Kochanowski University, Kielce, Poland

²Department of Rehabilitation, Military Institute of Medicine, Warsaw, Poland

SUMMARY

Introduction: Psoriasis is one of the most common skin diseases. It is a chronic and recurrent disorder that constitutes both a clinical and a social problem. Psoriasis can be effectively treated with comprehensive balneophysiotherapy (sulphide/hydrogen sulphide baths, PUVA therapy, cryotherapy).

Aim: To analyse physical therapy in patients with psoriasis treated at a thermal resort.

Material and Methods: The study was conducted at the "Jasna" thermal resort in Solec-Zdrój. The patients underwent balneophysiotherapy in the form of sulphide/hydrogen sulphide baths, PUVA therapy, and cryotherapy. The study group consisted of 40 subjects (28 females and 12 males) with psoriasis. The mean age was 43 years (range: 21 to 65 years). Subjective (a 21-item questionnaire) and objective assessment of the patients' status was performed both before and after a series of physical therapy procedures.

Results: After 3 weeks of treatment, the patients' physical status was remarkably improved; skin lesions, pain, and burning resolved. The mental status of the subjects was improved as well. The results confirm that physical therapy is highly effective in psoriatic patients.

Conclusions: The procedures performed at the thermal resort had a beneficial influence on the subjects' health. Remarkable improvements were found using both subjective and objective methods of assessment. Thermal hospital treatment is an optimal form of management in psoriatic patients.

Key words: psoriasis, physical therapy

STRESZCZENIE

Wstęp: Łuszczyca należy do najbardziej rozpowszechnionych chorób skóry, jest chorobą o przewlekłym, nawrotowym charakterze, stanowi problem kliniczny i społeczny. W leczeniu skuteczną formą jest kompleksowa terapia z wykorzystaniem zabiegów balneofizykalnych: (kąpiele s-sw, naświetlania metodą PUVA, krioterapia).

Cel: Celem pracy była analiza postępowania fizykalnego u chorych na łuszczycę w warunkach sanatoryjnych.

Materiał i metody: Badanie zostało przeprowadzone w sanatorium „Jasna” w Solcu-Zdroju, gdzie pacjenci zostali poddani zabiegom balneofizykalnym: kąpiele siarczkowo-siarkowodorowe, naświetlania PUVA i krioterapia. W badaniach wzięło udział 40 osób, 28 kobiet oraz 12 mężczyzn chorych na łuszczycę. Wiek chorych wynosił od 21 do 65 lat (średnia 43 lata). Przed i po zabiegach oceniano stan podmiotowy (kwestionariusz – 21 pytań) i przedmiotowy.

Wyniki: Po 3 tygodniach leczenia stan pacjentów wybitnie się poprawił, uzyskano ustąpienie zmian skórnych, bólu i pieczenia. Zauważalna była również poprawa stanu psychicznego pacjentów. Uzyskane wyniki potwierdzają wysoką skuteczność fizjoterapii w łuszczycy.

Wnioski: Zabiegi zlecone i realizowane w uzdrowisku korzystnie wpłynęły na poprawę stanu zdrowia pacjentów. Uzyskano istotną poprawę w stanie podmiotowym i przedmiotowym chorych. Leczenie w szpitalu uzdrowiskowym jest optymalną formą postępowania u tych chorych.

Słowa kluczowe: łuszczyca, postępowanie fizykalne

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INTRODUCTION

Psoriasis is a chronic, inflammatory, multiorgan disease found in 2% of the population. The main symptoms of the disease are skin and joint abnormalities. In Poland, psoriasis affects approximately one million people. Psoriasis is a chronic, recurrent skin disease characterised by increased epidermal

proliferation and the presence of desquamative papular lesions. The disease is an important social problem, particularly due to its prevalence, but also due to its chronic and recurrent nature, which makes the treatment difficult. According to the statistics, psoriasis develops in 1 out of every 50 people and its symptoms usually appear between the age of 10 and 30 years (1-4).

Psoriasis is associated with genetic factors, which condition its development, but also with immune and often autoimmune factors. The role of T cells in the pathogenesis of psoriasis was first discovered and appreciated quite recently. T cells migrate to the skin and the epidermis. To date, the cause of their activation (autoantigens or superantigens, such as bacterial proteins) remains unknown. Activated T cells cause the release of cytokines (IL-2, IFN- γ , TNF- α), which, in turn, stimulate keratinocytes. It should be noted that psoriasis changes not only the epidermal structure, but also the activity of keratinocytes, which cause the release of cytokines. Some cytokines, such as IL-8, are strong chemoattractants for neutrophils; their migration is a typical histological finding in psoriatic lesions. Such collections of neutrophils present in superficial epidermal layers are called Munro's microabscesses (5, 6).

Treatment of psoriasis includes sulphide/hydrogen sulphide baths, 311-nm UVB radiation, and cryotherapy (7-16).

The literature describes the benefits of 311-nm UVB radiation therapy, which has a good safety profile. The exact mechanism of 311-nm UVB radiation treatment in psoriasis has not been fully elucidated. The beneficial influence of this type of radiation is believed to be associated for instance with specific immunosuppression, increased T cell apoptosis in the skin, and restoration of a normal cytokine profile. Recently, a growing number of studies have been conducted to assess the effects of sulphur compounds on skin pathophysiology in psoriasis. The main mechanism of action of sulphide/hydrogen sulphide baths consists in interactions with cysteine and the products of cysteine catabolism. At low concentrations, sulphur has keratoplastic effects on the skin; it remodels the epidermis, removes dead stratum corneum cells, and leads to the development of a new, elastic epidermis. At higher concentrations, it has keratolytic effects; it softens calloused epidermis and dissolves the extracellular matrix, facilitating epidermal desquamation. Moreover, sulphur has immunomodulatory effects, inhibiting Langerhans cell activity in the skin and T cell proliferation; the higher the hydrogen sulphide concentration, the stronger the inhibition. Gobbi G. et al. showed that exogenous H₂S reduces clonal growth, cell proliferation, and cell adhesion of human keratinocytes in psoriatic skin (17-30).

AIM

This study was aimed at assessing the efficacy of physical therapy in the process of treatment administered to psoriatic patients at a thermal resort. The question was as follows: do sulphide/hydrogen sulphide baths, cryotherapy (cryosauna), and PUVA therapy used at the Solec-Zdrój thermal resort:

- Contribute to a lower frequency of psoriatic symptoms?
- Contribute to a reduction in signs and symptoms (pruritus and pain)?
- Constitute a more effective method of treatment as compared with other therapies?

The following hypotheses were formulated:

- ☞ All types of procedures had a similar influence on the resolution of pain.
- ☞ The procedures had a similar influence on the resolution of pruritus.

- ☞ The frequency of the procedures had an influence on their efficacy in pain reduction.
- ☞ The frequency of the procedures had an influence on their efficacy in pruritus reduction.
- ☞ Sulphide/hydrogen sulphide baths effectively improved the condition of the skin regardless of the onset of psoriasis.
- ☞ PUVA therapy effectively improved the condition of the skin regardless of the onset of psoriasis.

MATERIAL AND METHODS

The study enrolled 40 patients staying at the "Jasna" thermal resort in Solec-Zdrój. The patients were treated during a 21-day thermal resort stay (between 2 and 23 September 2016). The patients completed an anonymous survey. They underwent the following physical therapy procedures: sulphide/hydrogen sulphide baths, PUVA therapy, and cryotherapy (cryosauna).

- Sulphide/hydrogen sulphide baths were used as full (immersion) baths; bath temperature was 33°C to 38°C.
- PUVA therapy was conducted with a WALDMAN lamp; patients received Oxoralen (*methoxsalen*) 1-2 hours before the procedure.
- Cryotherapy was administered with the use of a cryosauna, where cryogenic temperatures reached -146°C and procedure duration was 2-3 minutes.

The data obtained in the patients were statistically analysed with the following statistical methods:

p – significance level, $p = 0.05$, which means that correlations found in the data may be accepted with a 95% confidence level;

df – degrees of freedom; it is the number of independent values that influence the outcome (number of values in the final calculation of a statistic that may vary);

χ^2 test (distribution) is a test that checks whether the observed values (actual data) vary significantly from the expected values;

chi-square independence test, which is used to study non-measurable (qualitative) variables. This test is also used to study the independence of a qualitative variable with respect to a measurable, quantitative variable.

The age and sex of study patients are presented in Figures 1 and 2.

The largest age group consisted of patients aged 40 to 59 years (22 patients, almost 55% of study patients). 15%

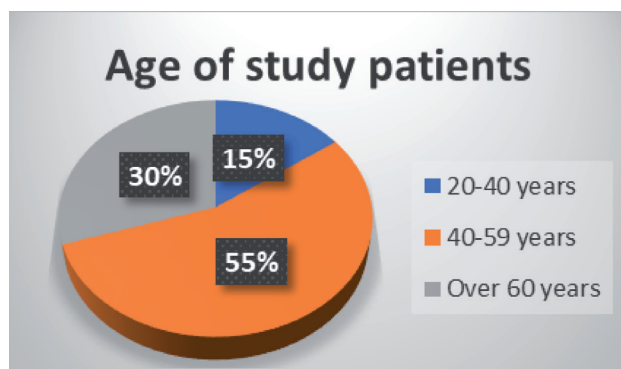


Figure 1. Age of study patients

Rycina 1. Wiek pacjentów objętych badaniem

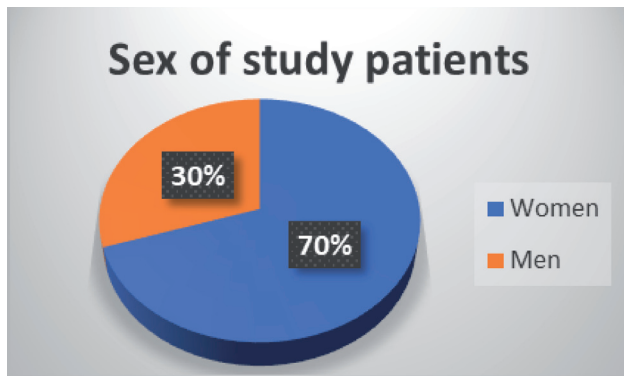


Figure 2. Sex of study patients

Rycina 2. Płeć badanych pacjentów

(6 patients) were aged 20 to 40 years and 30% were patients over the age of 60. 28 out of 40 patients were female; men constituted 30% of the study group (12 males).

Figures 3 and 4 present the place of residence and level of education of study patients.

Almost half (47%) of study patients were individuals living in rural areas. The smallest group of patients were people from towns with more than 50 000 residents. Most psoriatic patients studied (45%) had secondary education, with primary and higher education reported by a similar (27% and 28%, respectively) number of patients.

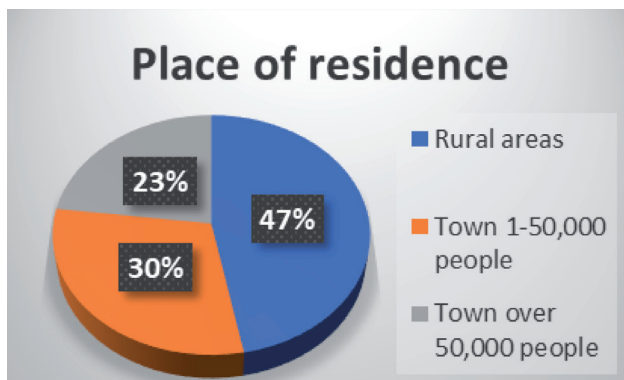


Figure 3. Place of residence

Rycina 3. Miejsce zamieszkania

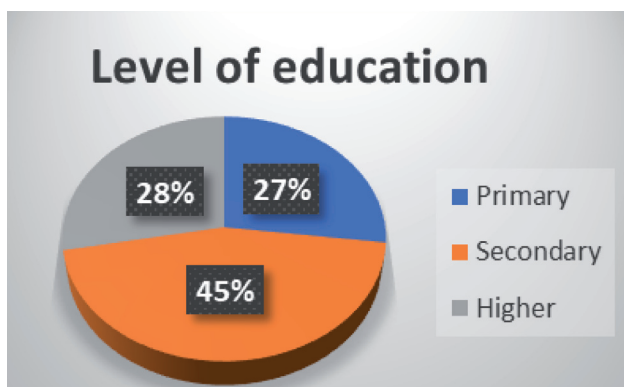


Figure 4. Level of education

Rycina 4. Poziom edukacji

Next questions provided information about work. 60% of study patients had a job, 7% were unemployed, and 33% were pensioners or were drawing disability pensions. 35% of study patients worked in farming, 30% did manual labour, and 27% reported intellectual labour.

The survey revealed that 53% of study patients developed psoriasis as adults and 32% as adolescents.

It is important to determine whether psoriasis is a genetic disease. The study showed that 55% of patients had no family history of psoriasis; family history of this disease was reported by 45% patients. The answers are presented in Figure 5.

Therefore, it can be assumed that genetic factors are one of the main causes of psoriasis. 55% patients had other aetiological factors, such as mechanical damage to the skin, sunburns, thermal burns, chemical burns, and infectious disease.

The location of psoriatic lesions is presented in Figure 6. Psoriatic lesions were usually present on elbows and knees (32%), on the head (21%), on the thighs and lower legs (19%), on the back (16%), and on the hands and feet (8%).

63% of study patients reported pain that was fairly severe, which made everyday activities difficult. The answers can be seen in Figure 7.

After treatment, study patients were asked to assess their discomfort and pain levels again. The results are presented in Figure 8.

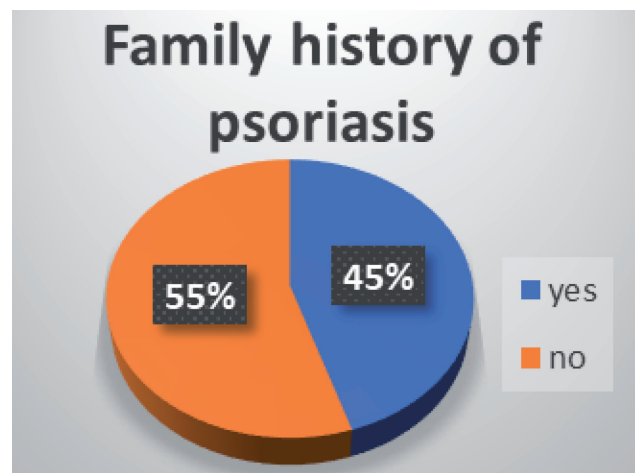


Figure 5. Family history of psoriasis

Rycina 5. Historia rodzinna łuszczycy

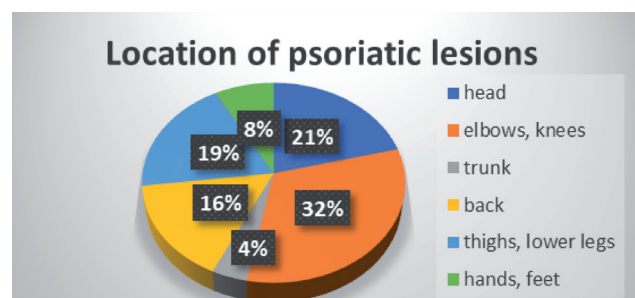


Figure 6. Location of psoriatic lesions

Rycina 6. Lokalizacja zmian łuszczykowych

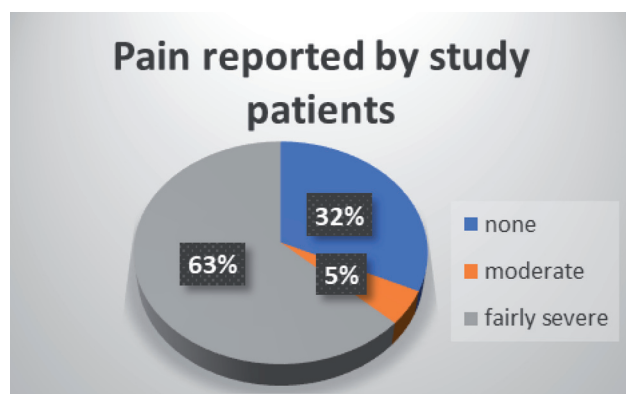


Figure 7. Pain reported by study patients
Rycina 7. Ból zgłaszany przez badanych pacjentów

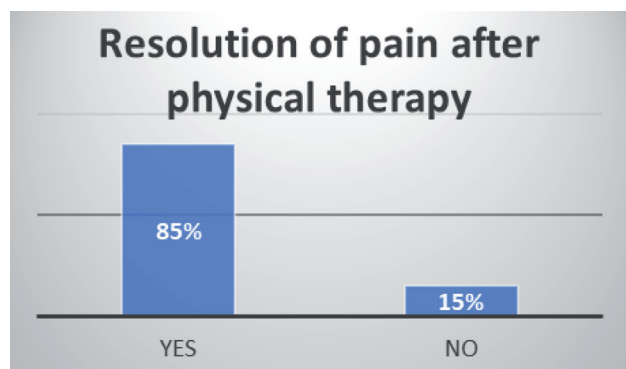


Figure 8. Resolution of pain after physical therapy
Rycina 8. Rezultaty po fizykoterapii

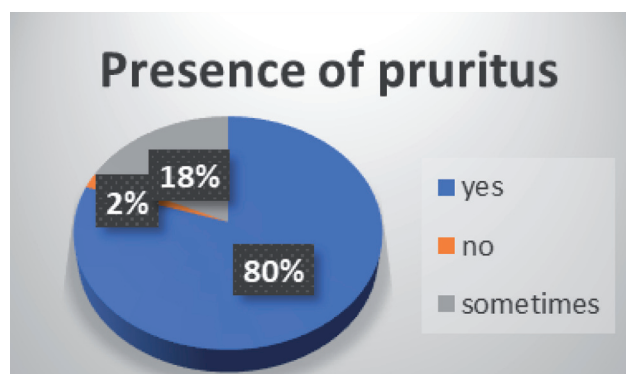


Figure 9. Presence of pruritus
Rycina 9. Obecność świądu

Out of 40 study patients, 34 (85%) reported elimination of pain after treatment.

Apart from pain, study patients suffered from pruritus. The results concerning pruritus are presented in Figure 9.

80% of study patients reported bothersome pruritus; 18% suffered from it almost constantly. After treatment, pruritus was eliminated in 87.5% of patients.

Out of 40 study patients, 35 reported elimination of pruritus after the procedures, which constitutes 87.5% of the study group.

Assessment of the skin lesions before the procedures revealed that they varied in location. This can be seen in Figure 11.

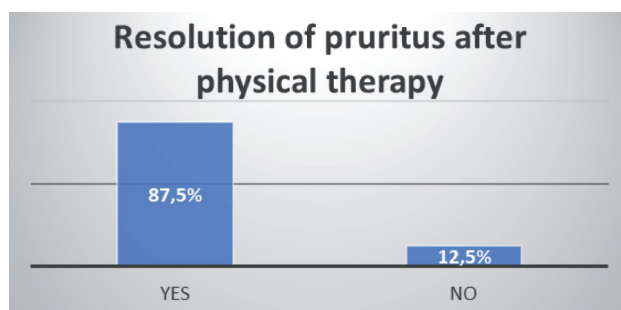


Figure 10. Elimination of pruritus after physical therapy
Rycina 10. Eliminacja świądu po fizykoterapii

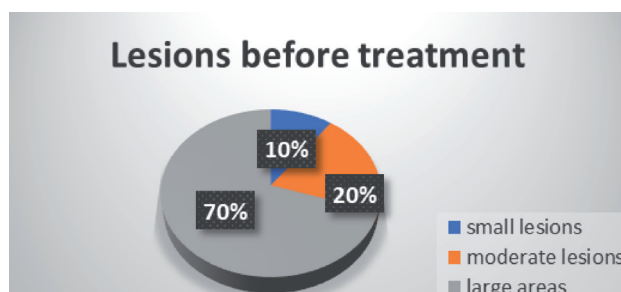


Figure 11. Lesions before treatment
Rycina 11. Zmiany przed leczeniem

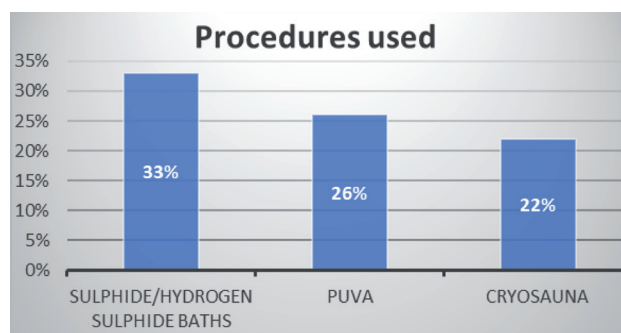


Figure 12. Procedures used in study patients
Rycina 12. Procedury stosowane u badanych pacjentów

70% of study patients described their skin lesions as large areas of psoriatic eruptions, 20% as moderate lesions, and 10% as small lesions.

The present study aimed to find out what physical therapy procedures were the most popular among patients. The results are presented in the figure below.

All types of physical therapy procedures (i.e. sulphide/hydrogen sulphide baths, PUVA therapy, cryotherapy) were very popular among study patients.

87% of study patients reported that sulphide/hydrogen sulphide baths helped eliminate their psoriatic skin lesions. Partial improvement was noticed by 8% of study patients.

82% of study patients saw beneficial effects of PUVA therapy and 75% reported symptom resolution and an improved condition of the skin after cryotherapy.

Figure 13 presents the assessment of the efficacy of the procedures.



Figure 13. Efficacy assessment of physical therapy procedures
Rycina 13. Ocena skuteczności zabiegów fizjoterapii

Almost all study patients described the efficacy of physical therapy in symptomatic treatment of psoriasis as “very good” (90%) and 7% considered it to be “good”. The results of statistical analysis are presented below.

Hypothesis 1: All types of procedures had a similar influence on the resolution of symptoms (burning, pain).

Table 1. Test results for Hypothesis 1

Tabela 1. Wyniki testu dla hipotezy 1

Symptom elimination (burning, pain)	Type of procedure			Test result
	Sulphide/hydrogen sulphide baths	Cryotherapy (cryosauna)	PUVA therapy	
symptoms eliminated	82.0%	86.0%	84.0%	$\chi^2 = 0.595$ df = 2 p = 0.743
symptoms not eliminated	18.0%	14.0%	16.0%	
Total	100.0%	100.0%	100.0%	

Table 2. Test results for Hypothesis 2

Tabela 2. Wyniki testu dla hipotezy 2

Elimination of pruritus	Type of procedure			Test result
	Sulphide/hydrogen sulphide baths	Cryotherapy (cryosauna)	PUVA therapy	
pruritus eliminated	80.0%	87.0%	82.0%	$\chi^2 = 1.843$ df = 2 p = 0.398
pruritus not eliminated	20.0%	13.0%	18.0%	
Total	100.0%	100.0%	100.0%	

Table 3. Test results for Hypothesis 3

Tabela 3. Wyniki testu dla hipotezy 3

Symptom elimination (burning, pain)	Frequency of procedures				Test result
	Less than 4 times a week	4 to 5 times a week	6 times a week	7 times a week	
yes	78.0%	83.0%	89.0%	92.0%	$\chi^2 = 9.437$ df = 3 p = 0.024
no	22.0%	17.0%	11.0%	8.0%	
Total	100.0%	100.0%	100.0%	100.0%	

Two variables were analysed: type of procedure and symptom resolution.

A chi-square test was used. The abbreviations used in the description of the result are as follows: χ^2 – test statistics, df – degrees of freedom, p – significance (significance level 0.05).

82% of study patients undergoing sulphide/hydrogen sulphide baths declared that their symptoms had been eliminated; improvements were reported by 86% of patients after cryotherapy and 84% of subjects treated with PUVA therapy. The efficacy of all three methods was similar with respect to pain.

Hypothesis 2: All procedures had a similar influence on the resolution of pruritus.

There was no statistically significant correlation between the variables. All procedures reduced pruritus in a similarly effective manner.

Hypothesis 3: The frequency of the procedures had an influence on their efficacy in symptom reduction (burning, pain).

The test result ($p < 0.01$) shows that there is a statistically significant correlation between the variables. The more frequent the procedures, the faster the reduction of symptoms (burning, pain).

Hypothesis 4: The frequency of the procedures had an influence on their efficacy in pruritus reduction.

The frequency of procedures influenced their efficacy when it came to reducing pruritus. The more frequent the procedures, the more often patients reported improvements. Pruritus was eliminated in 93% of study patients undergoing the procedures 7 times a week.

Hypothesis 5: Sulphide/hydrogen sulphide baths effectively improved the condition of the skin regardless of the onset of psoriasis.

Regardless of the onset of psoriasis, sulphide/hydrogen sulphide baths had a beneficial influence on the skin. 80% to 89% of study patients reported symptom resolution; the lowest number of patients reporting elimination of symptoms were individuals who had developed psoriasis as adults and the highest number were subjects who developed

psoriasis as children. The differences were not statistically significant.

Hypothesis 6: PUVA therapy effectively improved the condition of the skin regardless of the onset of psoriasis.

The test result was not statistically significant ($p > 0.05$), which means that onset of disease did not have an influence on the perceived efficacy of PUVA therapy in improving the condition of the skin.

DISCUSSION

Psoriasis is a clinical and social problem, affecting approximately a million people in Poland. As psoriasis has complex etiopathology and clinical course, its treatment is planned individually for each patient (2-5).

The chronic and recurrent nature of the disease is particularly bothersome for patients. Psoriasis markedly deteriorates the quality of life. The appearance of psoriatic lesions and the related discomfort affect the mental state and social life of patients. Psoriasis treatment increasingly often utilises balneophysiotherapy (5-9).

Table 4. Frequency of procedures and pruritus reduction

Tabela 4. Częstotliwość zabiegów i zmniejszenie świądu

Elimination of pruritus	Frequency of procedures				Test result
	Less than 4 times a week	4 to 5 times a week	6 times a week	7 times a week	
pruritus eliminated	81.0%	82.0%	92.0%	93.0%	$\chi^2 = 10.787$ df = 3 p = 0.013
pruritus not eliminated	19.0%	18.0%	8.0%	7.0%	
Total	100.0%	100.0%	100.0%	100.0%	

Table 5. Test results for Hypothesis 5

Tabela 5. Wyniki testu dla hipotezy 5

Effects of sulphide/hydrogen sulphide baths on the skin	Onset of psoriasis			Test result
	Childhood	Adolescence	Adulthood	
symptoms resolve	89.0%	86.0%	80.0%	$\chi^2 = 4.754$ df = 4 p = 0.313
symptoms partially resolve	8.0%	7.0%	10.0%	
symptoms do not resolve	3.0%	7.0%	10.0%	
Total	100.0%	100.0%	100.0%	

Table 6. Test results for Hypothesis 6

Tabela 6. Wyniki testu dla hipotezy 6

Effects of PUVA therapy on the skin	Onset of psoriasis			Test result
	Childhood	Adolescence	Adulthood	
symptoms resolve	83.0%	81.0%	82.0%	$\chi^2 = 0.698$ df = 4 p = 0.952
symptoms partially resolve	6.0%	9.0%	8.0%	
symptoms do not resolve	11.0%	10.0%	10.0%	
Total	100.0%	100.0%	100.0%	

Balneophototherapy is administered in many countries and uses various natural resources (11-18). The majority of studies evaluate 311-nm UVB radiation with bathing in the Dead Sea, Dead Sea salt solutions, or brine baths with parameters similar to those of the Dead Sea water.

In a prospective, open, non-randomised study, Peroni et al. (16) assessed the efficacy and safety of combination therapy consisting of balneotherapy using Comano thermal waters and 311-nm UVB radiation as compared with Comano water monotherapy in 300 adult patients with moderate to severe psoriasis. Two-week therapy showed better results in the case of balneophototherapy than balneotherapy alone. The treatment was well tolerated. Most patients experienced recurrence of psoriatic lesions after 4 months.

In the present study, 70% of study patients (28 out of 40 subjects) were female and 30% were male (12 subjects). Psoriatic lesions were usually found on elbows and knees (32% of patients), on the head (21%), and on the thighs and lower legs (19%). 68% of study patients experienced pain, which was severe in 65% of cases and moderate in 5%. Bothersome pruritus was reported in 80% of study patients. The study showed high treatment efficacy; 85% of study patients reported elimination of pain and 87.5% declared that pruritus had resolved as well. As many as 90% of study patients described the efficacy of the physical therapy procedures as "very good". 77% of study patients described the appearance of skin lesions after the physical therapy procedures as very good. The research showed that the most effective methods were PUVA therapy (82% of patients described it as effective) and sulphide/hydrogen sulphide baths (87% of patients reported satisfactory improvements in the condition of the skin).

This is consistent with the findings of Stefania Jabłońska and Sławomir Majewski. These authors showed that *photochemotherapy was the most effective, but it did not prevent recurrence*. Every method of treatment used in the patients was safe. Side effects were occasional and similar to those reported in the literature (24-27). In most cases, patients developed side effects in the form of skin discoloration and dryness; erythematous symptoms were minimal and transient. Based on the results of the present study and the studies conducted by the authors mentioned above, it can be concluded that physical therapy procedures are highly effective in the treatment of psoriasis.

Treatment at a thermal hospital allows for using natural sulphide/hydrogen sulphide waters and PUVA or SUP therapy and is an optimal form of treatment in psoriatic patients.

CONCLUSIONS

1. Psoriasis is a difficult social and clinical problem.
2. Psoriasis usually affects women.
3. Most psoriatic patients are adults between the age of 40 and 59 years.

4. After balneophysiotherapy, most patients showed resolution of lesions or remarkable improvements in both subjective and objective assessments of their health status.
5. Sulphide/hydrogen sulphide baths, PUVA therapy, and cryotherapy belong to the most effective methods of psoriasis treatment.
6. Treatment at a spa hospital is an optimal form of treatment in psoriatic patients.

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ADRESS FOR CORRESPONDENCE:

Włodzisław Kuliński

01-496 Warszawa

ul. K Miarki 11 B

phone +48 22 638 51 34

e-mail wkulinski52@hotmail.com

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**STRESZCZENIA REFERATÓW
SUMMARY OF PAPERS**

INTERNATIONAL SESSION I

SESJA I MIĘDZYNARODOWA

**THE DEVELOPMENT OF THERMALISM
AND METHODOLOGY OF RESEARCH IN BALNEOLOGY
ROZWÓJ LECZNICTWA UZDROWISKOWEGO
I METODOLOGIA BADAŃ NAUKOWYCH W BALNEOLOGII**

**DRINKING NATURAL SULFUROUS MINERAL WATER;
A SYSTEMATIC REVIEW OF *IN VIVO* ANIMAL STUDIES**

Mufit Zeki Karagulle

Department of Medical Ecology and Hydroclimatology, Istanbul Faculty of Medicine, Istanbul University, Turkey

Introduction: Natural sulfurous mineral water or hydrogen sulfide (H_2S) water is a ground water originally containing H_2S with an S^{2-} level at least 1mg/L. Hydrogen sulfide (H_2S) water based balneological treatments are baths; „sulfur balneotherapy”, drinking cures; „sulfur hydropinic therapy”, inhalations and Politzer therapies, irrigations and showers or sprays. Last decade there have been intensified efforts for experimental, *in vitro* and *in vivo* and clinical studies investigating the biological and clinical effects of balneological treatment modalities with natural H_2S waters and exogenous delivery of several H_2S compounds.

Objectives: A systematic review is aimed to evaluate *in vivo* experimental studies investigating the biological effects of natural H_2S water drinking (hydropinotherapy) in laboratory animals, healthy or with disease models. A comprehensive databases search was performed and all relevant studies were identified and included in the review.

Results : A total of 10 articles were included in the review. In general, they reported biologic effects similar to the physiological functions of endogenously produced H_2S and beneficial effects of exogenously administered H_2S . These effects can be summarized as 1. gastroprotection; observed in improvement in the intestinal physiology and beneficial effects on colitis, 2. improvement in lipid metabolism and biliary functions; lipid-lowering effect and interfering with the entero-hepatic cycle of the bile acids and ameliorating the effects of hypercholesterolemia, 3. improvement in glucose metabolism; shown in decrease glycemic values, reduction in hyperglycemia and level of haemoglobin A1c (HbA1C), increases in serum levels of insulin, insulin-like growth factor 1 (IGF-1), C-peptide, improvement in level of testicular glutathione (GSH) and testosterone, anti-fibrogenic and anti-apoptotic effects and 4. improvement in anti-oxidant status; shown in increase superoxide dismutase (SOD) concentration, decrease in plasmatic levels of malondialdehyde (MDA) and carbonyl and advanced oxidation protein product (AOPP) and increment in plasmatic levels of total thiols and total antioxidant capacity.

Conclusions: The evidence obtained actually shows that natural sulfurous mineral water drinking or hydropinic therapy can exert similar physiological effects of those of endogenous H_2S and beneficial effects of several exogenous H_2S compounds. Sulfurous natural mineral waters may be effectively used as an excellent H_2S donor and drinking of these waters may be a potential dietary H_2S supplementation or exogenous administration of H_2S . A systematic review of similar *in vivo* human studies is recommended and would most probably yield similar results.

**THALASSOTHERAPY AND THERMAL MEDICINE: A STRATEGIC ASSOCIATION FOR HEALTH CARE,
WELL-BEING, AND LOCAL ECONOMIC DEVELOP**

Umberto Solimene

President of FEMTEC, State University of Milan, Italy

Ever since its foundation, 81 years ago, FEMTEC (www.femteconline.org) has been introducing innovative topics for discussion and practical solutions. We believe that only a strategic alliance – competitive, yet not hostile, between different

medical treatments, evidence scientifically based, – can lead to a successful outcome. On this point of view we can see the proposal concerning the thalassotherapy and balneology.

We propose: Thalassotherapy and Thermal Medicine as strategic association for health care, well-being, and local economic development.

Identify the possible synergies between two major therapeutic traditions (thalassotherapy and thermal medicine); propose a shared and scientifically, economically, and socially integrated action plan for health care, wellbeing, and local development; review the new, actual scenarios resulting from climate and environmental changes connected with health tourism: these are some of the main goals, themes, and objectives addressed during the 72nd Annual Congress of FEMTEC which will take place.

KHALKIDHIKI (Greece), October 16-20, 2019 Miraggio Thermal Spa Resort – www.miraggio.gr

Thermal medicine, whose origins are at the very basis of human civilization, and the use of the marine environment for therapeutic purposes (thalassotherapy) developed in different ways. The former derived from the Greek-Roman culture as an organized approach, the latter from the 18th-century Anglo-Saxon one, even if Euripides (*The Trojan Women*) was the first to claim that “the sea washes away all men’s illnesses”.

However, in time and until this day several socioeconomic and cultural events have brought to confrontations, competition, and sometimes, misunderstandings between them. This era of social networks and over-digitalization (smart watches, cyber-economy, health algorithms, etc.) has produced the so-called “Metric Society”, according to German sociologist Steffen Mau, where everything is measured and assessed. Life has been reduced to a checkbox, and people are assessed according to data, rather than as individuals. The Economist (<https://www.economist.com>) nicely describes this situation (Life and Society are increasingly governed by numbers). The States themselves use such methods to present their performance to major international organizations in the best possible way.

If our Society is actually what it looks like, is there a role for therapies based on the scientific use of natural treatments?

And, if so, what are the proposed interventions and the possible solutions?

Facing these spreading phenomena, what can we expect for their future, also within national Health Systems, and with respect to their need for technological updates, human resources, research methodologies, data collection and analysis, the organization of hospitality, etc.?

The challenge will call for a reconciliation of new global socioeconomic and environmental conditions with the unique specificity of the thermal and thalassotherapeutic tradition defined by the therapeutic and environmental characteristics of the “genius loci” and by the concept of the patient at the heart of care and “of recovery of the lost body.” And, moreover, how can the growing demand for health be integrated with infrastructures allowing sustainable development and tourism?

Like for Society, skills and capabilities will have to change for Thermal Medicine and Thalassotherapy as well: while problem-solving will still be the most sought-after soft skill in 2020, critical thinking and creativity will also be important. The present challenges of modern and advanced societies can be summarized as development, environmental, human, and personal sustainability.

BALNEOTHERAPY IN RHEUMATOID ARTHRITIS. A SYSTEMATIC REVIEW

Isabel Santos, Pedro Cantista, Carlos Vasconcelos

Institute of Biomedical Sciences Abel Salazar University of Porto, Portugal

Introduction: The aim of this review is to summarize the available evidence on the effects of balneotherapy on patients with Rheumatoid Arthritis (RA).

Methods: We have made a systematic search of the articles published from 1980 to 2014 on this topic in PubMed, Scopus, CRD, PEDro, Web of Science and Embase databases. We have followed the method set by the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA). These that have compared balneotherapy with other therapeutic modalities or with no intervention were considered. The inclusion criteria of these papers were: Randomized Control Trial (RCT); Languages: English, French, Spanish, Italian and Portuguese; Evaluation of efficacy (analysis of outcomes); Use of natural mineral water baths; Participants with Rheumatoid arthritis. **Discussion:** Our tables summarize the published papers about this topic. Different authors emphasize the same problems: methodologies differing from study to study; treatment modalities; outcomes and their analysis. On the one hand it is particularly difficult to have homogeneity on this population in all the parameters (patient’s clinical heterogeneity, diverse clinical course of the disease, variety of 2 the drugs), and on the other hand natural mineral water composition is always unique with potential specific biological effects.

This comprehensive review has revealed that there are very few published studies about the use of natural mineral water in RA. International multicentre studies, using the same methodologies, could be achieved by carrying the scientific arguments to support our clinical practice.

MICROBIOME AND BALNEOTHERAPY

Tamas Bender, Tamas Gati

Hospitaller Brothers of St John of God. Budapest, Hungary

Microbiome is an ecosystem of commensalism, symbiotic and pathogenic microorganisms living in the human body and skin. Shotgun metagenomic sequencing allows a comprehensive examination of all genes of any microorganism present in complex samples. The full-length 16S rRNA assays have already allowed different species to be isolated. Until now it was difficult to examine how balneotherapy influence human skin's microbiome system. Mud therapy can affect the microbiology of the skin and it has a beneficial effect on immune function (so far, five in vitro microbiome tests were analysed). The bacterial and fungal nature of the skin has been studied in healthy volunteers at the Dead Sea Climatherapy Center. The diversity of the bacterial community remained the same before and after treatment, while the diversity of mycobiome decreased significantly after treatment. Microbial communities of patients with psoriasis vulgaris were analysed before and after a 3-week balneotherapy treatment at the spa town La Roche-Posay. In psoriatic patients, a poor bacterial biodiversity was tested and the bacterial communities were the same on unaffected and affected skin. Similar analysis showed, for the first time that Xanthomonadaceae, belonging to Proteobacteria phylum and known to be keratolytic was associated with the clinical improvement. Microbiome examinations are very important and very exciting research topic and could provide help to understand the basic mechanism of balneotherapy.

BIBLIOMETRIC INDICATORS AND EVALUATION OF ABSTRACTS BOOKS OF THE ISMH CONGRESSES (2014-2018)

Francisco Maraver, Carla Morer

Investigation Group UCM-911757 Medical Hidrology, Faculty of Medicine, Univerdidad Complutense, Madrid, Spain,
Institut Català de la Salut (CAP Rio Janeiro, EAP Porta), Barcelona, España

A study of the bibliometric indicators of the scientific production collected in the Abstract Books of the last five ISMH Congresses held since May 2014 in Kyoto (Japan) until June 2018 in Amarante (Portugal) has been carried out. We have followed the criteria of LOPEZ PIÑERO and TERRADA, globally defining the main characteristics of the abstracts books published during the five years selected, in relation to: types of published works (lectures, oral communications, posters), productivity of the authors, Bradford area, Lotka equation, collaboration index, geographical and institutional origin and subjects studied.

A SHORT THERMAL THERAPY DOES NOT IMPROVE PATIENTS WITH CHRONIC LOW BACK PAIN – DATA FROM A RANDOMIZED CONTROLLED TRIAL

Christian Francois Roques, C. Nguyen, K. Sanchez, F Rannou, S. Poiraudau

Association Francaise pour la Recherche Thermale (AFRETH), Paris, France

Short thermal-therapy programs could be, if efficient, a relevant way to provide the benefits of spa therapy to patients with professional or familial burden who cannot attend an usual 2 or 3 weeks spa-therapy program.

A randomized controlled study enlisted sick leave chronic low back patients to assess the benefit of a five-days spa therapy program. This randomized study compared to usual care a 5-days program made of hydrothermal cares (six different cares: 2 hours every day), exercise (30 mn per day) and validated education based on the „back book” (45 mn per day).

The main endpoint was the return to work of the patients, the secondary endpoints were i) pain (NRS 0-100), ii) disability (Quebec questionnaire), quality of life (SF 12), iii) number of sick leave days after randomization.

88 patients were enrolled in the study: less than 20% of the beforehand calculated population – (700 patients to enrol).

The results showed a non-significant increase of return to work at one year: + 13.9 % observed (relative +32.8%) vs 10% (relative +14.2%) expected; p=0.32.

Pain, function, quality of life, mood, fear and beliefs were non-significantly improved in the treatment group compared to controls at 3, 6 and 12 months.

Literature provides data from studies showing a significant improvement of low back pain usual outcomes on populations of similar size but with longer durations of the spa treatment (two or three weeks). This one-week spa therapy program although associated with exercise and education, appears unable to improve significantly pain, function and quality of life in sick-leave patients with chronic low back pain. Short (one week) spa-therapy programs would not be recommended.

ANTI-INFLAMMATORY AND ANALGETIC EFFECTS OF MINERAL WATERS RICH IN SODIUM CHLORIDE

Mine Karagulle

Department of Medical Ecology and Hydroclimatology, Istanbul Faculty of Medicine, Istanbul University, Turkey

GRADUAL PROGRESSION OF SMALL VASCULAR DISORDER EVALUATED BY RESPONSE TO THERMAL STIMULUS IN CONNECTIVE TISSUE DISEASES

Shigeko Inokuma, Yoshimasa Goto, Satoshi Miike, Manami Kato, Minako Uchida,

Chiba Central Medical Center, Chiba, Japan

Introduction and objectives: Response to thermal stimulus from outside the body is a principal physiology in human body. In some disease statuses including connective tissue diseases (CTD), it may gradually become out of order, resulting in ischemia or increasing vascular resistance. To catch its early sign, and to search how it develops, we have adopted the evaluation of nailfold temperature change after a cold soak of hands.

Patients and methods: CTD patients having possible peripheral perfusion disturbance judged by doctor in charge underwent thermographic observation of nailfold temperatures from before to 30 min. after cold load, hands immersion in 10°C water for 10 sec. Patterns of nailfold temperature change were grossly classified referring to the pattern of normal controls, in that at baseline, the temperatures were equally around 34°C, once decreased by 10°C, recovered promptly to those at baseline within 5 min, and no temperature dispersion among fingers was.

Results: Forty-seven patients were included. The changing pattern of nailfold temperature was grossly classified into nearly normal (n=12), rebound (8), delayed recovery (17), persistently low/decline (10). In 'rebound', temperatures even overwhelmed the baseline level after the load; in 'delayed', temperatures recovered slowly to baseline level or only to under it; in 'decline', temperatures showed even additional decreases; in 'persistently low', almost no temperature recovery was after the load throughout. In patterns except for 'nearly normal', temperatures were dispersed among fingers. Some patients with 'persistently low' showed scarce temperature disparity among fingers.

Discussion: The most major pattern observed was 'delayed recovery'. If assuming gradual or step-by-step progression, 'rebound' might show an early phase, because that low temperature does not sustain, and the case number was small suggesting a transient phase. 'Persistently low' might be a late phase with remodeling of vasculature.

Conclusion: Response to thermal stimulus that varies from that in normal individuals would suggest a progression of peripheral vascular diseases. Evaluation of the pattern of nailfold temperature change and of temperature dispersion after cold load might show the stage of the disease.

THE ROLE OF THE *IN VITRO* STUDIES TO UNDERSTAND THE MECHANISM OF ACTION OF BALNEOTHERAPY

Antonella Fioravanti, S. Tenti, I. Gallo,

Cheleschi S. Rheumatology Unit-Azienda Ospedaliera-Universitaria Senese, Siena, Italy

One of the reasons for skepticism towards balneotherapy is the lack of knowledge about the mechanism by which balneotherapy may work.

In fact, the action mechanism of thermal baths and/or mud packs is not fully understood and the net benefit is probably the result of a combination of mechanical, thermal and chemical factors.

Furthermore, it is difficult to distinguish the non-specific mechanisms due to the physical properties of the mineral water from the specific mechanisms, which depend on the chemical properties of the water used.

Finally, it is very hard to separate the effects of balneotherapeutic treatment from the benefits that could be derived from a stay in a spa environment.

In this context we can obtain new important scientific evidence using preclinical models considering that these studies allow us to exclude the influence of psychological factors.

However, few studies have been performed on animal models because a lot of technical difficulties.

In vitro studies on different cell cultures are simplified biological systems which allow us to evaluate the effects and/or the mechanism of action of mechanical factors (such as hydrostatic pressure, mechanical compression, ultrasound, magnetic or electromagnetic fields, etc) or chemical factors (cytokines, growth factors, drugs, mineral elements, etc) on cell morphology and function.

In the last years, a number of studies using *in vitro* models to investigate the potential effects of either a single mineral element or a mineral water as a whole were performed.

Hydrogen sulfide (H_2S), among mineral elements, is attracting a strong scientific attention due to its potential therapeutic applications.

Sulphurous waters are natural sources of H_2S and sulphurous balneotherapy have beneficial effects in the treatment of skin, respiratory and rheumatic diseases. H_2S being a gas is able to penetrate the skin. Finally, the physiological action of H_2S can be mimicked in cell-based studies using a wide range of available H_2S donors.

In vitro studies performed in different cell cultures demonstrated the immunosuppressive, anti-inflammatory, antioxidant and chondroprotective effects of H_2S at low, micromolar, concentrations.

But probably, the efficacy of balneotherapy is due to a complex synergistic action among a number of different mineral components; this consideration induced various Authors to elaborate new *in vitro* models investigating the possible effects of a mineral water as a whole.

These pilot studies support a positive effect on keratinocytes and chondrocytes cultures of some waters with different mineral composition.

Then, in this presentation we summarize the recent evidence about the *in vitro* studies in the field of balneotherapy.

CURRENT SITUATION AND TRENDS IN CHINA HOT SPRING INDUSTRY

Jie Wang

Asia-Pacific Institute for Hydrotherapy and Climatotherapy Tourism, Hakone Spring&Spa Group Chongqing, China

Although China has a long tradition in exploiting hot spring water for bathing and healing purpose, the modern industry development has started about 20 years ago.

Balneotherapy was firstly introduced to China in 1910s by Russians followed by Japanese, and in its heyday in early 1960s, there were over 200 hot spring sanatoria all over China. Nowadays, only about 30 traditional sanatoria have been survived. They are still a part of the national healthcare system and are far behind the international standard in terms of both technology and management.

In China there are 2,145 discovered hot spring resources almost all over the country. According to the latest statistics report released by China Hot Spring Tourism Association, by the end of 2017, there were 2,538 hot spring enterprises in operation across the China. The number of people received in the hot spring tourism industry in 2017 was 769 million.

While the economic scale of hot spring tourism in China continues to grow at a high speed, the shift to a quality-oriented development model has become a hot topic and new trend in the industry. One of the most important directions is rediscovering the hot spring as health and wellness destinations which becomes a new trend of the industry development. Combination of hot springs usage with traditional Chinese medicine as well as with medical treatment is becoming one of the most promising trends of development and attraction point for domestic and foreign customers. It influences also the customers profile, so the market demand of hot springs in China is becoming more and more diversified and targeted. Although the private consumption, especially family-based parent-child consumption, has become the dominating force, it is observed that some hot spring projects especially around the municipal areas are targeted at women. The industry has begun to attach importance to the international wellness and health tourism market. At present the total proportion of foreign tourists in China's hot spring enterprises may be less than 1% but initiatives to increase this number have already begun. The integrated development of hot spring industry together with cultural and creative industry is observed and strongly supported. Similarly as whole around the world also in China the climatic and environmental factors become important factors that influence the hot spring industry. Climatotherapy and "forest bathing or forest wellness" becoming integrated with hot springs, in 2018 Asia-Pacific Institute for Hydrotherapy and Climatotherapy Tourism was launched in Chongqing to promote and support this direction. Another very important trend is integrating hot springs with the pension industry. At present, there are more than 200 million people over the age of 60 in China. In recent years, some hot spring enterprises

cooperate with real estate developers and commercial insurance companies to develop the elderly market featured by hot springs. Energy-saving and green technology development are very important issues for all Chinese industries and it is not surprising that this technology develop together with the hot spring industry. China Hot Spring Tourism Association aware of the importance of the international and professional cooperation, continues and strengthens the cooperation with relevant foreign and international organizations. At the same time the academic study and hot spring education have been grounded on the the university level and academic studies based on evidence have been conducted in medical universities. All mention above shows that in China becomes a new era for hot spring industry

CANDIDATE SIGNALLIN PATHWAY ACTIVATED BY H₂S IN BALNEOTHERAPY MANAGEMENT OF OSTEOARTHRISIS

Marco Vitale, Gullia Pozzi, Prisco Mirandola, Valentina Presta, Laura Galuppo

Department of Medicine and Surgery University of Parma, FoRST Foundation, Rome, Italy

Introduction: Osteoarthritis (OA) is a multifactorial, age-related, joint degenerative disease characterized by progressive cartilage degradation, subchondral bone remodelling, and synovial membrane inflammation and functional impairment. The pathogenesis of OA is not completely understood but it has been widely demonstrated that oxidative stress, chronic inflammation and chondrocyte altered metabolism compromise cartilage homeostasis and induce chondrocyte hypertrophic differentiation. Sulphurous balneotherapy is largely employed in the management of OA. Several studies have described that sulphurous waters can relive OA symptoms and improve function in OA patients.

Objective: H₂S is the active compound of sulphurous mineral waters with anti-inflammatory properties, anti-catabolic and/or anti-oxidant effects in rodent models and in human synoviocytes and articular chondrocytes from OA. However, the underlying mechanism of H₂S action is still largely unknown.

Results: We demonstrated that protein kinase C epsilon (PKCε), a serine/threonine kinase, is modulated during chondrogenesis and that its down-regulation induces the hypertrophic OA chondrocyte phenotype via HDAC-mediated pathway, suggesting that the induced activation of PKCε prevents the phenotypic progression of OA. Of note, exogenous H₂S has been reported to induce PKCε activation and translocation to cell membrane also in vivo. H₂S is known to activate Nrf2, a key transcription factor that regulates antioxidant and anti-apoptotic genes. Nrf2 has chondroprotective functions, suppressing inflammatory mediators and inhibiting the cartilage damage in experimental models of OA. Several studies demonstrate that PKCε and HDAC modulate Nrf2 by its phosphorylation and acetylation.

Conclusion: Beneficial effects of sulphurous balneotherapy in OA patients are likely based on the crosstalk between signalling cascades activated by H₂S and operated via PKCε-Nrf2 axis, able to restore cartilage homeostasis.

INTERNATIONAL SESSION II

SESJA II MIĘDZYNARODOWA

CLINICAL BALNEOLOGY BALNEOLOGIA KLINICZNA

INTRODUCTION TO THE KNOWLEDGE OF STANDARDS FOR QUALITY MANAGEMENT IN HEALTH RESORTS

Gianni Gurnari

FEMTEC, San Marino

Everywhere we see the growth in the demand for wellness. In particular, the aquatic structures specialized in this type of offer are generally set on architectural criteria based on aesthetic appeal and on the sensations that the various types of

emotional contents arouse. In thermalism in general – especially in the resorts dedicated to health prevention and care – these contents are only a corollary to the health quality proposals that characterize the different conditions and specific treatments.

What does “quality in healthcare” mean? Quality is the final point of reference and the guarantee tool so that everyone can be sure of receiving services and attention that will preserve – or improve until recovery – the health of each person. Therefore, this aspect assumes a priority role in all the phases of planning, realization and management of every intervention aimed at the use of natural resources for the well-being of the people.

In these specialized fields, thermal medicine and clinical experience must merge in the history and tradition of care and natural prevention by using natural resources whose benefits are scientifically proven, using the best of medical practice and the most up-to-date and modern tools to support different treatment needs. In this regard, in the last two decades a continuous process has started, aimed to standardize the conditions of the offer through the application of specific standards and the necessary application protocols. The purpose is to provide the criteria that can guarantee the safety of users and operators and at the same time reduce the subjectivity in the choices for designers, installers, managers, health workers and staff assigned to the various necessary functions.

Many different countries have adopted numerous standards, guidelines and regulations, even based on reference documents that the WHO itself has formulated in order to create a common platform for health decisions. However, to date, the countries that have adopted specific standards are not aligned and many others do not adopt them at all. In any case, the control bodies are inadequate and the necessary control instruments are insufficient, often resulting in a high inhomogeneity that disorients users. Since in many countries spa resorts are considered – correctly – “Healthcare Facilities”, it is believed that it is necessary and urgent to establish shared, effective, verifiable and sufficiently clear guidelines that can be applied everywhere, starting from the top of the functional organization chart of each structure: the Management.

Too often, in fact, this role ends up being only of an administrative nature (financials must be ok) and representing the reference for the operators (problems of the personnel, of the purchases, of the tariffs, etc.), while it should be inclusive of all activities in order to guarantee the quality of the services provided in compliance with protocols and standards.

From this point of view, it is not without reasons that the design and construction of a health resort (hospital, medical spa and even health and wellness integrated resorts) requires the presence of its future manager (individual or group) from the definition of the concept. Since the figure of management of this type is very complex it is necessary to create specific schools which – together with the teachings on the economic financial and / or medical and specialized disciplines of health treatments – provide the elements of knowledge to understand how a technological system – that must guarantee the safety and health of its users – works.

It is essential to know not only the laws of the sector, but also the knowledge of the standards relating to technological systems, to the different electro-medical devices, to the necessary quality of the various services essential to the proper functioning of the equipment. For example: hygiene & health prevention, maintenance, attention to energy consumption, to water saving, use of chemical products for health, for the quality of the water present, for the proper functioning of all the necessary services, from the hygienic to the warehouses for consumables and to support the different needs. Too often, this knowledge is totally delegated to makeshift maintenance workers or to all-around personnel lacking the necessary specific knowledge of the health sector.

If today we ask the tens of thousands of health resort managers the number of fresh air renewals per hour we have to guarantee within a compartment with a rehabilitation pool, it would be very difficult – and only rarely – to have adequate answers. Yet air treatment and air conditioning in the more specialized sections of the structures not only determine the quality of the service (and therefore the well-being of patients and users as well as the operators), but they contribute to rationalizing – and optimizing – the costs of exercise. Therefore, we are talking about patient well-being, closely related to the facility's economic financial profitability.

That is a fundamental node in the search for the success of the intervention considered as a whole.

The expected results include the clear difference between an aquatic offer for wellness (the wellness-waterpark resorts, without the presence of medical personnel and without the adoption of official rules) and an integrated offer of health services for psychophysical well-being according to spa medicine protocols.

A new interdisciplinary approach that responds to modernization and that refers to international standards in the field of quality measurement (and we are talking about human health!). A further challenge for the future not only in socio-economic terms, but also for the image and credibility of an offer that concerns the entire society, with a real prospect of being able to guarantee non-conventional medical services in a context of measurable – and objectively detectable – quality.

These similar criteria – applied everywhere, even in different contexts and situations – which lead to a real difference in terms of perceived quality and allow comparison with other therapeutic proposals, which are also irreplaceable in preventive and maintenance medicine.

BALNEOTHERAPY AND RHEUMATOID ARTHRITIS: A RANDOMIZED CONTROLLED TRIAL

Isabel Santos, Pedro Cantista, Carlos Vasconcelos, Joao Amado

Institute of Biomedical Sciences Abel Salazar, University of Porto, Porto, Portugal

Background: The effects of balneotherapy on rheumatoid arthritis (RA) are still controversial partly due to poor methodology used in randomized controlled trials, as reported in the international medical literature.

Objectives: To determine whether spa therapy plus pharmacological treatment offers any benefit in the management of RA as compared to pharmacological treatment alone.

Methods: We conducted a prospective, controlled, unblinded randomly assigned study of patients with RA according to American College of Rheumatology criteria. Following the 2007 recommendations of AFRETH, the method designed for this study was “immediate treatment versus delayed treatment.” All patients were followed at the Centro Hospitalar do Porto and each physician observed the same patients throughout the study. Patients continued with their usual medications and maintained their daily life activities at home, at leisure and/or in the workplace. The spa therapy group received spa treatments for 21 days at S. Jorge Spa-Santa Maria da Feira. The main outcome measure was the HAQ-DI; the moderated regression analysis, together with the Johnson-Neyman technique, was used for statistical analysis.

Results: HAQ-DI at the end of treatment (21 days) and at the 3 month follow-up was improved in the spa group (odds ratio 0.37, confidence interval 0.09–0.64, $P = 0.01$ at 21 days, and 0.44, 0.15–0.72, $P = 0.004$ at 3 months).

Conclusions: In individuals in whom pain (physical and psychological) predominates, any complementary gain in function is beneficial. The main goal is to enhance quality of life.

RISK OF LEGIONELLOSIS FOR PATIENTS TREATED WITH BIOTHERAPY AND SPA TREATMENT. PROPOSAL FOR RECOMMENDATIONS FROM FRENCH SOCIETY OF MEDICAL HYDROLOGY

Allain Francon, Araceli Muela Garcia, Fatma Begum, Erol Forestier, Isabel Santos, Romain Forestier

Centre de Reserche Rhumatologique et Thermal, Aix-Les Bains, France

Background: Nowadays, more and more patients are treated with both crenobalneotherapy and biotherapy for inflammatory diseases. Biotherapy induces an immune deficiency that increases the risk of infection. Crenobalneotherapy also may increase the risk of infections related to contact with other patients (especially seasonal infections) or to certain bacteria potentially present in hot mineral waters such as pseudomonas and legionella. Since especially the mortality of Legionnaire's disease is about 15%, recommendations about the use of spa treatment in patients under biotherapy seem necessary. However, we must not forget that the mineral waters now have extremely strict quality controls and therefore have less infection risk.

Bibliographic data:

Legionellosis risk and spa exposure in France: The risks of legionellosis have dramatically decreased in France since the introduction of drastic hygiene measures in spa centres in the early 2000s (French legislation imposing the absence of legionella in spa waters). In 2017, the incidence of legionellosis after a spa exposure was less than 1% of all the reported legionella cases (French National Legionella Reference Centre 2018).

Legionellosis risk and biotherapy: A national registry axed on tolerance of biotherapies (RATIO) was performed among French patients receiving TNF α antagonists. The overall standardized incidence ratio (SIR) of legionellosis was 13.1 (95% CI, 9.0-19.1; $P < 0.0001$) (Lanternier 2013).

Infection risk and biotherapy for spa patients: A comparative prospective study did not find any difference in the risk of infection between 22 spa patients treated with TNF α antagonists and 22 control spa patients. No legionella case was reported. However the low sample size does not allow any robust conclusion (Forestier 2008).

Proposals of recommendations of the French Society of Medical Hydrology

For patients under biotherapy the prescription of spa care must be performed individually by the spa practitioner taking into account the cumulative risk factors for legionellosis: 1°) the general risk factors: high age, male gender, tobacco use, diabetes, cancer, cardiorespiratory decompensation, haemodialysis 2°) the risk factors related to biotherapy: biotherapy started since less than 2 months, type of biotherapy (Remicade, Humira), association with high dosage corticosteroids(or/

and additional immunosuppressor drugs (MTX, others), 3°) risk factors related to spa treatment: steam, shower, whirlpool, 4°) other risk factors: accommodation (hotel, furnished rentals, camping), season (summer).

As its acceptance, the refusal of prescription of the spa treatment is an option. In case of its acceptance, patients should be informed about the risks and monitored carefully.

STROKE TREATMENT IN A HEALTH RESORT

Carla Morer, Francisco Maraver

Investigation Group UCM-911757 Medical Hydrology, Faculty of Medicine, Universidad Complutense, Madrid, Spain, Institut Català de la Salut (CAP Rio Janeiro, EAP Porta), Barcelona, Spain

Introduction: Stroke is the main cause of acquired disability. Its planning and management (health and social) varies and, although prevention is crucial, it is no less important to have better treatments and strategies to reduce disability.

Objective: To analyze the efficacy of an intensive thalassotherapy and aquatic therapy program in patients with stroke, assessing clinical parameters and validated functional scales. Patients and methods A prospective, quasi-experimental study was carried out with 26 post stroke patients with mild-moderate disability. Patients were evaluated with the following scales: Berg equilibrium, dynamic equilibrium/Timed Up & Go, 10-meter walk, six minutes walking and visual analog scale of pain, before and after performing three weeks of treatment.

Results: After the programmed treatment, significant differences were obtained for all the variables studied.

Conclusion: An intensive program of thalassotherapy and aquatic therapy helps to improve balance, walking and perception of pain in these patients.

CRENOTHERAPY IN RHEUMATOID ARTHRITIS, A SYSTEMATIC REVIEW

Romain Forestier, Erol Forestier, Araceli Muela Garcia, Allain Francon

Centre de Reserche Rhumatologique et Thermal, Aix-Les Bains, France

Objective: To find and summarize the best evidence for Crenobalneotherapy in rheumatoid arthritis (RA).

Method: Bibliographic analysis. Performed by 2 reviewers (RF, AF), on PUBMED and PEDRO databases with: "rheumatoid arthritis" OR "arthritis" AND keywords to identify comparative studies on crenobalneotherapy. Inclusion criteria: comparative studies evaluating intervention programs of 1 to 6 weeks, trials performed after 1989, no restriction in the length of follow up, studies in English and French.

Methodological analysis: *Internal validity is estimated by CLEAR NTP (10 items): evaluating selection bias, performance bias, detection bias & attrition bias. External validity & Statistical validity are estimated by personal checklists. We checked the quality of evaluation of side effect. We also performed an empirical analysis of publication bias by the graphical test proposed by Sutton (Sutton BMJ 2012).*

Results: We found 9 trials representing 537 patients: 3 have high internal validity and appropriate statistical power (n=292). Two have middle internal validity (one with appropriate statistical power). Franke et al published 3 trials based on the same design: natural carbon dioxide and radon bath compared with artificial carbon dioxide and radon bath in RA patients who are already involved in a multicomponent rehabilitation program. Two of these studies found a difference while one found no difference. With good internal validity and low statistical power, the study of Santos shows that bath in mineral water + water exercise is more efficient than no treatment for RA patients. With median internal validity and high statistical validity, the study of Codish et al. shows the superiority of mineral mud over depleted mud applied at home in RA. The other studies have low internal validity and most of them have inappropriate statistical power. Some of the studies report the side effect evaluation.

Synthesis: Effect of radon is uncertain since some trials with good methodology found no difference. Bath in mineral water seems more effective than no treatment and mineral mud more effective than depleted mud. We need more trials with better methodology and higher statistical power to confirm the effect of Crenobalneotherapy in RA.

GLUCOSE LOWERING EFFECTS OF AN ACIDIC HOT SPRING AND AN OILY HOT SPRING FOR ATOPIC DERMATITIS IN HOKKAIDO, JAPAN

Yoshinori Otsuka

Department of Sports and Human Studies, Sapporo International University, Sapporo, Japan

There are 3,038 hot spring resorts in Japan, among them 245 areas are in Hokkaido. The number of hot spring resources is 2,230 and 27,421 in Hokkaido and in Japan, respectively. Because of abundant hot spring resources, not only Japanese but also many foreign people visit and enjoy hot spring bathing in Hokkaido.

In Hokkaido, one of the unique hot springs is Kawayu Onsen (55.0 pH=1.98 Na=366.8 Ca=164.0 Mg=60.0 Al=136.7 Fe²⁺=61.6 Fe³⁺=18.2 Cl=619.4 HSO₄=608.1 SO₄=1724.0 H₂S=2.0, total=4,193mg/kg), which shows extremely low pH level at 1.98. After immersing iron nails in the spring water for 11 days, they almost melted. Drinking spring water has a blood glucose lowering effect and blood total cholesterol levels decreased after 3-week balneotherapy.

In addition, Toyotomi Onsen (18.0 pH=7.9 Na=4,116 K=21.0 Ca=19.8 Mg=11.2 NH₄=16.0 Cl=4,536 HCO₃=3,121 I=11.4, total=12.37g/kg) has uncommon and curious characteristics, which spring water contains crude oil and the surfaces of the bathtubs are covered with crude oil. Patients suffered from such as atopic dermatitis or psoriasis vulgaris take a bath 2-3 times a day for several weeks. Improvement of skin condition can be obtained.

REHABILITATION IN AN ITALIAN THERMAL SETTING: A NEW THERAPEUTIC STRATEGY FOR PATIENTS WITH MUSCOSKELETAL DISABILITY

Stefano Masiero, Francesco Agostini

Rehabilitation Unit, Department of Nuerosciencie, General Hospital of Padova, Padova, Italy

Physical Medicine and Rehabilitation. The survey requested information from 174 centers but, only 132 responded by returning the completed questionnaire. Eighty-nine percent of the Centres offered a rehabilitative therapy for orthopedic-rheumatology diseases including post-surgery conditions (after hip o knee replacement or politrauma), 37% offered rehabilitative therapy for neurological diseases, and 10% rehabilitation for lympho-vascular conditions. Seventy-one percent employed a multidisciplinary team (that included a physiatrist, a physiotherapist and other figures such as a hydrologist or rheumatologist). The rehabilitative approach usually included therapeutic exercises (land- or aquatic therapy), physical therapies (ultrasound, electrotherapy, LASER-therapy, and others), less frequently health education and preventive measure. The survey did not inquire about respiratory or nasopharyngeal diseases. In conclusion, this survey shows that rehabilitation performed in the Spa setting may be a new opportunity to treat many musculoskeletal disabilities.

EVOLUTION OF THE ISMH WEBSITE

Araceli Muela Garcia

Thermal Medicine Aix-les Bains, France

Introduction: The purpose of the International Society of Medical Hydrology and Climatology (ISMH) is to design, plan, and co-ordinate scientific research in the fields of Health Resort Medicine and Spa Therapy for prevention, treatment, and rehabilitation programs. A major objective of ISMH is the preparation of international monographs for the continued establishment of guiding principles, directives, and standards in Health Resort Medicine and Spa Therapy.

Since its foundation in 1921, the way of transmitting and developing its work has been evolving. From the Internet appearance the panorama of the communications has reached a global dimension that favours the exchange of ideas and the diffusion of the knowledge practically of instantaneous form. The Medical Hydrology and Climatology and the ISMH have not been foreign to such a development and from the year 2004 the ISMH created and put his website at the disposal of the partners and all that persons been interested in the matter. The development and the evolution the website of the ISMH demonstrate the enormous acceptance, reception and follow-up that has had and appearing as a very powerful way for the spreading and development of our speciality.

Methods: There was studied the information obtained thanks to the book-keeper of the web page www.ismh-direct.net lodged at the direction <http://analytics.google.com/analytic/web>.

Results: On going indexes.

Conclusions: The website of the ISHM has been revealed how an indispensable instrument for the spreading of knowledge, contact between professionals, expansion and development of our medical speciality, must promote his utilization to continue advancing to all the levels and areas of the knowledge.

PRE AND POST-SURGERY PROGRAMS THAT COULD BE PERFORMED IN THE SPA CENTERS

Romain Forestier, Erol Forestier, Araceli Muela Garcia, Allain Francon

Centre de Reserche et Thermal, Aix-Les Bains, France

Objective: To find and summarize the best evidence for pre and post-surgery water exercise programs that could be performed in spa centers.

Method: Bibliographic analysis. Performed by 2 reviewers (RF, AF), on PUBMED and PEDRO databases with keywords: "surgery" OR "arthroplasty" AND others to identify water exercises.

Inclusion criteria: comparative studies evaluating pre & post-surgery water exercise programs of 1 to 6 weeks, trials performed after 1989, no restriction in the length of follow up, studies in English and French.

Methodological analysis: *Internal validity is estimated by CLEAR NTP (10 items): evaluating selection bias, performance bias, detection bias & attrition bias. External validity & Statistical validity are estimated by personal checklists. We checked the quality of evaluation of side effect. We also performed an empirical analysis of publication bias by the graphical test proposed by Sutton (Sutton BMJ 2012).*

Results: We found 11 trials representing 1066 patients: 7, have median internal validity and 4, low internal validity. Only 4 of the studies have appropriate statistical power (Harmer2009, n= 102; Rahman 2009, n=65; Lieb 2012, n=465; D'Lima 1995, N=60).

After arthroplasty of hip or knee Harmer et al. shows that after hip or knee arthroplasty, a water rehabilitation program in a swimming pool (25°) provides similar improvement to a land based rehabilitation program.

Rahmann et al. found no differences at middle term (180 days) between two hydrotherapy programs and land based rehabilitation program.

Stockton et al. found that the physiotherapy twice daily is more effective than once daily and improvement with physiotherapy is similar to hydrotherapy.

McAvoy et al. found no difference between land based and water exercises.

Lieb et al. shows that early water exercises (J+6) are not superior to standard water exercises (J+14). Giaquinto et al. found a superiority of water exercises over land based exercises.

Before arthroplasty of hip or knee Gill et al. compare water exercises and land based exercises. There is a significant improvement from baseline in both groups, but no difference between groups. Water exercises are better tolerated.

Synthesis: Most of the trials were performed after arthroplasty. Most of the time, the effect of water exercise is similar to land based exercises. Water exercises are sometimes better tolerated. It is not meaningful to perform an early water exercise program. Before hip arthroplasty, water exercise program appears to have similar improvement to land based exercise program but it is not clear if the improvement is the result of the exercise program or the surgery itself.

SPA RESORTS MEDICINE: A GOOD WAY TO LOSE WEIGHT EAT BETTER AND MOVE MORE. THE AFRETH EXPERIENCE

Christian F. Roques-Latrille , T.Hanh, H.Gin, Y-J Bignon, J-M Lecerf, T. Pailard, M. Duclos

Association Francaise pour la Recherche Thermale (AFRETH), Paris, France

Overweight and obesity, poor diet, lack of physical activity, alcoholism and smoking are the major risk factors of chronic non-communicable diseases (NCD), such as diabetes, chronic vascular diseases, cancers, chronic obstructive pulmonary diseases. The reduction of obesity and physical inactivity is a peculiarly crucial issues for a good health as well the prevention of NCD. 3 controlled studies enrolling 847 patients and 1 uncontrolled interventional study enrolling 97 patients have showed that in patients with overweight or obesity, at one year, a lasting and significant weight reduction could be observed. The efficacy of

the spa treatment appeared significantly enhanced by the association of spa therapy with a well designed and implemented patient education program. Two of these studies allowed also to observe a lasting better diet for lipids' and fish' consumption. 4 studies enrolling 865 patients (of which 3 controlled studies enrolling 825 patients) showed that physical activity could be, lastingly and significantly, increased after spa therapy in patients participating in an education program addressing diet and physical activity. 2 of these studies showed also that the spa resort stay was a relevant time to increase physical activity in patients who didn't reach the WHO recommended physical activity level. These last results were observed with a program based on human coaching as well with a program based on the use of connected devices. It would be relevant for public health in our different countries that spa therapy got more involved in addressing such metabolic issues.

RECRUITED 473 VOLUNTEERS RANDOMIZED CONTROLLED TRIAL OF HOT SPRING HYDROTHERAPY IN CHONGQING P.R. CHINA

B. Yang, Q. Qin, L. Han, L. Jing, Yu Chen

Chongqing Medical University, P.R. China

Objective: To investigate the effects of hot spring hydrotherapy on human health. **Methods:** There were 473 volunteers recruited from main city zone of Chongqing and they were randomly divided into intervention group (n=268) and control group (n=205). The intervention group underwent hot spring hydrotherapy for 5 months, while the control group did not. The two groups took questionnaire investigation and physical examination before and 5 months after the intervention, respectively. The interventional effects were analyzed with the use of multiple logistic regression analysis. **Results:** Before intervention, sleep disorder (difficult sleep, dreaminess, nightmare suffering, and restless sleep), mental stress, and problems of general health condition (head pain, joint pain, dizziness, limb numbness, leg or foot cramps, skin allergy) were worse in the intervention group than in the control group ($P < 0.05$), while other indicators showed no statistically significant difference between two groups $P > 0.05$. After intervention, mental stress and joint pain were relieved significantly in the intervention group, as compared with the control group ($P < 0.05$), while other indicators did not show significant difference $P > 0.05$. The above three indicators and woman's health problems were relieved significantly in the self comparison of the intervention group before and after intervention ($P < 0.05$), while those indicators in the control group did not significantly change $P > 0.05$. Multiple logistic regression analysis showed that the frequency, length, and location of hot spring hydrotherapy in the intervention group were the factors influencing emotion, sleep, and health condition.

METEOPATHIC REACTIONS STUDY HEALTH CARE NEEDS DEPENDING ON WEATHER CONDITIONS

N.G. Badalov, M.Yu. Yakovlev, A.A. Mukhina, I.V. Borodulina, I.P. Bobrovniksky

National Medical Research Center for Rehabilitation and Balneology Ministry of Health Russia, Center for Strategic Planning and Biomedical Risk Management Ministry of Health Russia, Moscow, Russia

To determine the meteopathology of patients suffering from chronic diseases of the cardiovascular system, studies have been conducted to investigate the dependence of the patients' appealability for emergency medical care from weather conditions. During the reporting period (01/01/2018-31/12/2018), in two cities of the Russian Federation (Gelendzhik and Novorossiysk, Krasnodar region), data on the number of referrals for emergency medical care were analyzed in the following cases: ischemic heart disease, a heart rhythm disorder, acute myocardial infarction, acute cerebrovascular accident. Subsequently, the dependence of turnover on the influence of geo-heliophysical factors was determined: ambient temperature, atmospheric pressure, wind speed, humidity, and oxygen content in atmospheric air.

According to the correlation analysis, it was revealed that the most significant changes were noted in July 2018. Low atmospheric pressure was associated with an increase in the number of calls for emergency medical care on the occasion of acute myocardial infarction ($r = -0.706$, $p < 0.05$) and coronary heart disease ($r = -0.721$, $p < 0.05$) in patients of the age of over 50 years old. During periods of low atmospheric pressure, there was an increase in appeals on the occasion of an acute violation of cerebral circulation in patients over 50 years old ($r = -0.740$, $p < 0.05$).

The dependence of wind speed with the frequency of appealability for emergency medical care on the occasion of acute myocardial infarction in men ($r = -0.754$, $p < 0.05$) was revealed. Such dependence, in our opinion, was associated with the temperature factor. At the same time, this fact is confirmed by the fact that the values of the ambient temperature in July 2018

had a correlation dependence with the frequency of appeal for emergency medical care on the occasion of a hypertensive crisis in over 50 years old patients ($r = -0.712$, $p < 0.05$).

In our further studies, we are planning to develop individual programs to prevent the development of meteopathic reactions in individuals with increased meteosensitivity.

BALNEOTHERAPY IN THE PREVENTION OF CARDIOVASCULAR RISK

N.G. Badalov, T.V. Marfina, A.L. Persyanova-Dubrova

National Medical Research Center for Rehabilitation and Balneology Ministry of Health Russia,
National Medical Research Center for Preventive Medicine Ministry of Health Russia, Moscow, Russia

The purpose of this work was to study the effectiveness of carbon dioxide baths and water training (aquatherapy) in the program of primary prevention in people with risk factors for cardiovascular diseases, increasing patient adherence to physical activity.

By the method of randomization, patients were divided into two groups of 10 patients each. For three weeks, patients of the first group received a complex of aerobic training in the pool and a course of carbon baths. Patients in the control group received recommendations for lifestyle changes. Patients in both groups were monitored for 3 months.

The preventive aerobic exercise program in the pool and taking carbon baths led to an increase in the patient's level of exercise tolerance, aerobic endurance, physical performance (increase in time given to physical activity of medium intensity and time spent walking) ($p < 0.05$). There has been an improvement in the quality of life associated with the state of health, a tendency to increase patient adherence to physical activity.

An assessment of exercise tolerance conducted in the control group revealed approximately the same level of physical performance in relation to the original. In contrast to the main group, the volume of oxygen consumed at the peak of the load decreased ($p > 0.05$). The dynamics of the body's aerobic performance was also statistically insignificant. The same dynamics was observed according to methods that assess the quality of life associated with the state of health of patients.

Thus, preliminary results indicate that a comprehensive program, including aquatic therapy and total carbon dioxide baths, is effective in combating the risks of developing cardiovascular diseases, and increasing patient adherence to preventive programs.

CRENOTHERAPY IN HAND OSTEOARTHRITIS, A SYSTEMATIC REVIEW

Romain Forestier, Erol Forestier, Araceli Muela Garcia, Allain Francoin

Centre de Recherche et Thermal, Aix-Les Bains, France

Objective: To find and summarize the best evidence for crenobalneotherapy in hand osteoarthritis (HOA).

Method: Bibliographic analysis. Performed by 2 reviewers (RF, AF) on PUBMED and PEDRO databases with: "hand osteoarthritis" AND keywords to identify comparative studies on crenobalneotherapy.

Inclusion criteria: comparative studies evaluating interventions of 1 to 6 weeks, diagnostic of HOA with ACR classification criteria, trials performed after 1990, no restriction in the length of follow-up, studies in English and French.

Methodological analysis: Internal validity is estimated by CLEAR NTP (10 items): evaluating selection bias, performance bias, detection bias & attrition bias. External validity & Statistical validity are estimated by personal checklists. We checked the quality of evaluation of side effect. We also performed an empirical analysis of publication bias.

Results: We found 6 trials representing 385 patients. 4 have median internal validity (2 with appropriate statistical power) and 2 have low internal validity (1 with appropriate statistical power). There are not enough trials to estimate the publication bias and the heterogeneity between trials. The Horvath study ($n=63$), with good internal validity, has a high type 1 statistical error and a lack of sample size calculation that results in doubtful evaluation of differences between mineral water 38°, mineral water 36° and pulsed electromagnetic field (Horvath 2011). With median validity and a waiting list design that may overestimate the treatment effect, the study of Fioravanti ($n=60$) shows a better improvement for the balneotherapy group than the control group (Fioravanti 2014). With median validity, the study of Gyarmati et al. ($n=47$) shows an improvement from baseline in both mineral mud and covered mud groups in HOA. There is no between group difference (Gyarmati 2017). With median validity, the study of Kovaks et al. ($n=45$) shows that mineral water bath is superior to tap water bath (Kovaks 2012). With median validity, the study of Graber-Duvernay et al. ($n=107$) shows a superiority of mineral water cloud (Berthollet) over NSAID topic.

Synthesis: Most of the studies report positive effects on pain, some of them on function, grip strength, and quality of life. Only a few of them have appropriate statistical power and that may overestimate the treatment effect. External validity is usually low, so the applicability of the results is uncertain. Studies with better methodological design and appropriate statistical power are needed to support these results.

CHAIR OF TOURISM OF HEALTH AND WELLNESS IN CUBA. INTERNATIONAL COLLABORATION FOR TECHNICAL AND INNOVATIVE SCIENTIFIC DEVELOPMENT IN LATIN AMERICA AND THE CARIBBEAN

Florana Menéndez, Umberto Solimene

CEO Solymed Events Director Tourism and Health Agency, La Habana, Cuba State University of Milan, Italy

The first Chair of Tourism, Health and Welfare in America and the Caribbean, an initiative fruit of the collaboration between FEMTEC, the Ministry of Public Health of Cuba, Society of Medical Hydrology and National Directorate of Physical Medicine and Rehabilitation is created with the objective of contribute to the study and development of these sectors at the regional level, with training scientific-technical programs, current methods of activities and business innovation tools. Its inauguration in Cuba has strong institutional support and recognized professionals. The scope of action of the unique Chair with these characteristics is international and includes activities, new challenges and future perspectives related to segments of the important market that generates specialized alternatives, wealth and employment, that complements and enhances conventional tourism products. The FEMTEC reinforces its important role of professional training and updated information at the international level, proposing the training of the sector, the whole region from an area known for its uncontaminated beaches, nature, climate, historical and cultural heritage, thermal waters, optimal sanitary system and professional level, to consolidate as a reference of a Wellness destination

INTERNATIONAL SESSION III

SESJA III MIĘDZYNARODOWA

CLINICAL BALNEOLOGY

BALNEOLOGIA KLINICZNA

PRE-HABILITATION IN ENHANCED RECOVERY AFTER SURGERY PROGRAMS: A NEW POTENTIAL FOR BALNEOLOGY AND PHYSICAL MEDICINE TO BENEFIT PATIENTS

David Ferson

Anderson Cancer Center, Houston, Texas, USA

Medicine in the 21st century is becoming more integrated and less episodic. The ERAS programs have demonstrated that developing an organized, multidisciplinary teamwork approach to surgical patient care can significantly improve the quality of care and reduce complications. The next step in further improving the ERAS programs and potentially positively influencing the long-term outcomes for the patients is optimal conditioning and preparation before the surgery. We hope that Balneology and Physical Medicine specialists will seek this opportunity to participate and lead this valuable clinical initiative of moving from the concept of “disease management” to “improving health and wellbeing”.

ALGERIA – AT THE STARTING LINE OF THE INTERNATIONAL BALNEOLOGY

Olga Surdu, Djamel Alili, Zoubir Med Soufiane, Hadia Chenit, Ahmed Belaitar, Traian Virgiliu

Balneal and Rehabilitation Sanatorium Techirgiol, Algerian Ministry of Tourisme and Handcraft, Romania, Algeria

Introduction: The People's Democratic Republic of Algeria is preparing intensely to take the start in the international competition of balneology, in order to value the tradition and outline the current governmental vision, namely balneal tourism as a pole of sustainable development. Balneal and well-being tourism is an economic priority in Algeria.

Materials and Methods: The strategy of the Algerian Gouvernement through Ministry of Tourism and Handcraft for sustainable development of thermalisme. Analysis of thermal sources, distribution over national territory and clasification of thermal mineral waters. Plan of developement of thermalisme and hydrotherapy.

National and international meetings organised under the hight patronage of Mr. Minister of Tourism and Handcraft with the participation of all actors involved.

Results: Algeria has a considerable thermal potential of thermo mineral waters, distributed overall national territory. This potential, of which a large part of the sources constituting it is still in its natural state, is characterized by the diversity of proven therapeutic virtues and represents a solid base for the development of "thermal tourism, care and well-being" in a competitive manner, offering huge investment opportunities. The study of updating of the thermal balance sheet realized in 2015, on the whole national territory, allowed to identify two hundred eighty two thermal springs (natural emergence and drilling). Besides the already granted concessions, and taking into account physico-chemical characteristics and therapeutic values of thermal waters, there are at present one hundred thermal springs that can be exploited for the realization of new projects. Among these 100 thermal springs that can shelter investment projects, more than thirty sources are currently exploited in traditional thermal baths and are a priority for investment given their proven therapeutic virtues.

Conclusions: 1. The development plan was conceived according to the strong will of the State to diversify the economy. 2. The development of thermal tourism is a priority of the economic sector considering the available thermal potential and multiform demand of the population in search of relaxation, care and fitness. 3. The strategy of thermal tourism in Algeria proposes a development plan which spreads on the short, medium and long term containing well defined objectives, the axes of strategic orientations, the priority actions according to their importance and their implementations as well as the stakeholders for the realization of these actions.

AGEING PROCESS UNDER THE ACTION OF SAPROPELIC MUD FROM TECHIRGHIOL LAKE

Liliana Elena Stanciu, Olga Surdu, Traian Virgiliu Surdu, Monica Surdu, Daniela Profir,

Balneal and Rehabilitation Sanatorium Techirgiol, Romania

Introduction: Aging represents the expression of a progressive functional imbalance of the neuroendocrine system and antioxidant status. The objective of this study was to investigate some determining factors: insulin 1 growth factor (IGF-1), serum cortisol, dehydroepiandrosterone-sulfate (DHEA-S), glutathione-peroxydase (GPx), that seem to play a major role in the beginning and evolution of the biological ageing process and their behaviour under the effect of peloidotherapy.

Material and Method: This research is a prospective clinical study, developed between July 2013-February 2016 and included a total number of 1377 patients but only 52 patients of this group met the inclusion and exclusion criteria. They were evaluated at admission, at the end of treatment, one and 4 months after the treatment. The batch was divided in two groups, the first one with 37 patients underwent mud bath at thermoneutral application and 15 patients underwent old mud ointment. All patients received 3 additional electric procedures, one regional massage and kinetotherapy session per day.

Results: For the group who received cold mud ointment, the results showed a statistically significant increase ($p=0.044$) of IGF-1, the variation of this hormone demonstrating the positive effect of the balnear treatment with contrasting factors in the biological ageing process. For the group who received mud bath, the results showed an increase of IGF-1 close to the statistical significance ($p=0.067$). Increasing tendency at the end of treatment, shows, as a whole, the general positive effect of the balnear treatment in the ageing process.

Conclusion: The IGF-1 low activity is associated with a significant morbidity in adults, with a high risk of cardiovascular diseases, diabetes, osteoporosis and neurodegenerative diseases, with certain implication in ageing modulation. There is one hypothesis that maximum human life expectancy depends on the strict regulation of the GH-IGF axis and on maintaining the optimal action of IGF-11. The optimal activity of this hormonal axis is involved both in the extension of life expectancy and in the increased resistance to the oxidative stress.

TREATMENT PROGRAMS IN THERMAL RESORTS BASED ON EUROPEAN EXPERIENCE AND CHINESE TRADITION

Jolanta Zegarska, Jacek Chojnowski

Department of Balneology and Physical Medicine, Nicolaus Copernicus University in Torun, Poland

Collegium Medicum in Bydgoszcz, Poland, Hakone Spring & Spa Group, Chongqing, China

It is clearly understood that exploring thermal waters for health purpose has a long tradition all over the world and has been growing together with the history of human being. Through the ages treatment based on water was continuously developed together with other treatment methods based on the nature and tradition. Nowadays although therapies based on the nature can vary in many details in different part of the world, still the background seems to be similar. As in Europe balneotherapy became one of the most important treatment method based on natural and cultural background and finally become a scientific proved method with famous spa towns and doctors, in China European model of balneotherapy starts at the beginning of 20 century and till now is neither popular nor common. Natural medicine in China developed in it's own fabulous direction well known all around the world as a Traditional Chinese Medicine (TCM). TCM is rooted in the ancient Chinese tradition connected and infiltrated with all aspects of Chinese culture and life. Furthermore in China, based on it's reach tradition, culture and history, have developed also many another techniques of meditation, relaxation, physical activity and finally treatment.

What is very interesting but not surprising on the background of balneotherapy as well as Traditional Chinese Medicine, is the concept of holism and unity. Both of these treatment concept and directions regards the human body as an organic whole, closely related to the nature and society. Both of them also point out the most important role of diseases prevention and stimulation the self-defencing strength of the human body. For both mind is as well important as body and both understand that climate, food, society have great impact on our wellbeing. Nowadays as world is getting „smaller” and Europeans are seeking for TCM treatment and Chinese hot spring centers may become also the balneotherapeutical destinations, it seems to be kind of natural direction of development to combine both words and methods. It seems to be interesting, logical and what is the most important beneficial for humans health. Although it is obvious that scientific researches are needed to prove some therapeutical methods and suggestions, some of the techniques have been already scientifically investigated, and others can be just easily added to the therapeutical programs in thermal resorts. The most important issue is that we should stop thinking about TCM as something completely different and together with TCM doctors combine and amplify advantages of both.

MANAGING A NATURAL HEALTH RESORT

Alexandar Jokic

Specialized Rehabilitation Hospital, Banja Koviljaca, Serbia

Introduction: Specialized rehabilitation hospital Banja Koviljača is in many ways a unique health resort in Serbia and in the region. During its 160-year-long tradition, Koviljača was given the title and status of banja (spa resort) by one Serbian Royal family, and it was built from the ground up by another. Koviljaca is the only health resort which healing peloid and sulphuric water have a scientifically proven effect. And only Koviljaca has its own ISMH representative. This is a state-owned hospital which generates 70% of its income on the commercial market, it operates following strict international standards and it is the first rehabilitation center in Serbia which was officially accredited.

Objectives: The objective of the case study is to show how a state-owned hospital can achieve the benefits of a privately-run company, with experienced methods of doing business, smart human resources management and relevant strategic decisions.

Methods: The main resource of a company is its employees, and realizing that human factor is the one that is in control of company success, there is a variety of methods that can be applied in order to achieve professional victory. Management of this hospital realized that investing in human resources is the best investment there is.

Results: For the last three years it persistently achieves record-breaking professional results, it accommodates over 22000 patients which stay over 150000 nights per year. In the last four years, number of balneo-procedures increased dramatically, namely peloid by 33%, which is around 290 tons of mud. Both sulphuric baths in bathtubs and pools increase by 30 and 36%. Number of employees grew by over 100 and it now employs around 390 during main season. It offers a team of 50 medical doctors, including 16 PRM specialists. This health resort was awarded numerous national and regional awards for quality of medical and wellness tourism.

Conclusions: In addition to balneo-physical therapeutic procedures for children and adults, this hospital also offers diagnostic procedures, a wellness center, several restaurants and a castle, offering hospitality services as well as event planning and wedding venue options. Our goal is to further expand our capacities and variety of services and to transform into the first officially titled Health resort in Serbia. Our motto is that the power of the waterfall lies in the multitude of drops working together. Be one of them.

TWO MONTHS CLIMATOTHERAPY PROGRAMME FOR PHYSICAL AND MENTAL HEALTH IMPROVEMENTS: A PILOT STUDY

Hitomi Kanayama, Yukinori Kusaka, Hiroyuki Inoue, Gisela Immich, Yuko Agishi, Angela Schuh

Faculty of Medical Sciences, University of Fukui Japan, Japan

Introduction: In Japan, the percentage of having regular exercise habits of middle-aged people is remarkably lower than that of elderly people. In addition, more than half of them are under considerable job stress. Based on the methods of Ludwig-Maximilians-University Munich, we had devised the short-version climatotherapy programme for people with no enough time to improve their physical and mental health.

Objectives: Our purpose of this pilot study was to evaluate what extent can be improved the physical and mental status among the small group of Japanese workers after two months' climatotherapy programme.

Methods: The participants were recruited from certain manufacturing company in Echizen city. Before and after the two months' climatotherapy programme, they took physical fitness test and answered the questionnaires on their present illness, medication, ADL, exercise habits, work style, job stress, and QOL. In our programme, a half-day's climatic terrain cure was repeated frequently during two months at least once a week. The terrain cure path, total length of 2,500 m and altitude difference of 150 m, was located in the moderate mountain area in the northwest part of Japan.

Results: All participants (3 males and 2 females, mean age was 42.0 years) had no exercise habit. There was almost no problem on their health status, work style, job stress and QOL, except for 1 participant sorted into high strain group of 'Job Demand-Control' model. The records of one leg standing test, time up-and-go test, pulse rate under ergometer exercise, and EuroQOL VAS were improved shortly after the programme finished, however one month after, only the record of time up-and-go test was conserved.

Conclusions: Our programme appears to be of potential value and continuous necessity for the physical and mental health of busy workers when exercising in mountain areas. Further studies should be done with sufficiently enough sample size.

STATISTICAL ANALYSIS OF THE PATIENTS DISEASES IN BALNEAL AND REHABILITATION SANATORIUM TECHIRGHIOL (S.B.R.T.) IN 2018

Mihaela Minea, Daniela Profir, Demirgian Sibel, Traian Virgiliu Surdu, Diana Radiunea, Ioana Craciun, Olga Surdu

Balneal and Rehabilitation Sanatorium Techirghiol, Romania

Introduction: S.B.R.T. is known by our patients as a whole complex of medical rehabilitation where, through its' modern treatment base, it provides high standard treatments, combining natural environmental factors with electrotherapy, kine therapy and massage. Every step is supervised by a team, including well theoretical and practical trained medical doctors, nurses, physiotherapists, all understanding the necessities of the patients with neuro-motor disabilities.

Materials and Methods: We have retrospectively evaluated the patients, who have been hospitalized between the 9th of January and the 16th of December 2018. Demographic data and information about the diseases that had determined the hospitalization were registered. The Sanatorium is divided in four departments as it follows: two Rehabilitation units for adults with one hundred seventy and one hundred seventy five beds, one sanatorium department with four hundred ten beds and the children's rehabilitation department having one hundred eighty beds.

Results: During the year 2018, there were fourteen thousands one hundred eighty seven patients assigned this way: 92,35% adults and 7,65% children. Patients between 3 and 16 years old have been hospitalized in Children's Neuro-Psychomotor Rehabilitation Unit, most of them presenting central neurological disorders (59.01%) followed by growth

disorders (16.90%). Most were aged between 10 and 14 years (42.26%). Adult patients hospitalized in S.B.R.T are between 16 and 90 years. In the third quarter of the year (July, August, September) there was the highest number of hospitalizations (32,54%). Degenerative rheumatoid diseases (49.77%), inflammatory rheumatoid diseases (3.07%) and posttraumatic injuries (7.59%) were ranked first. 40.30% of the patients presented with neurological disorders, of which 12.59% central and 27.71% peripheral. The patients came from forty two counties of fifty two of Romania, mostly from Constanta (29.83%) and Bucharest (16.69%), while (0.15%) foreigners were hospitalized. During the year, eighty two thousands consultations of Rheumatology and two thousands five hundreds fifty one at the emergency room, six hundreds twenty four psychological counseling sessions and one thousand three hundreds thirty seven speech therapy were performed. **Conclusions:** S.B.R.T. is a medical unit where approximately fourteen thousands patients, children and adults, are annually hospitalized, the pathology being varied. Adults present mainly degenerative pathology, but there is a large number of patients with central and peripheral neurological disorders, but also with post-traumatic lesions. Children are admitted in order to manage secondary motor deficits from congenital or acquired central neurological diseases.

EFFICIENCY OF HALOTHERAPY ACCORDING TO CLINICAL RESEARCH DATA

Alina Chervinskaya

Central State Medical Academy of Administration of the President of the Russian Federation, Russia

Halotherapy belongs to non-drug therapies based on the use of the salt air environment in the room that is close in the parameters of the conditions of underground salt speleoclinics.

Halotherapy technology has been known and used in medical practice since the beginning of the 90s of the last century (about 30 years). Therapeutic properties of the atmosphere of underground caves lie at the heart of halotherapy. These caves are now used in the resorts of Poland, Austria, Germany, Slovakia, Hungary and other countries; the method is called speleotherapy, subterraneoterapia (Pol.). The main factor that has a therapeutic effect for respiratory diseases is respirable particles of natural rock salt suspended in the air.

Halotherapy is widely used in Eastern and Western Europe, USA, Canada, Australia, New Zealand, China, Cyprus, India, Turkey and other countries. There are numerous sites on the Internet offering services of halotherapy in medical and health centres (keywords: «галотерапия», «соляная терапия», «halotherapy», «salt therapy», «salt room», etc.).

The method of halotherapy is officially authorized by Ministry of Public Health of Russian Federation, Lithuania Republic. Many years of experience in the development and implementation of the salt air microclimate in the premises (salt rooms, halochambers) allowed improving the method of halotherapy and equipment for its realization. In 1991 the concept of controlled halotherapy was developed. To improve the efficiency and safety of the treatment, it was considered appropriate to carry out an aerosol dispensing and management level of concentration of salt aerosol per cubic meter of air. Devices were created for controlled halotherapy – dosing halogenerators – ASA- 01.3, ASG-01 (“Aeromed” Russia, St. Petersburg) and GDA-01.17 (“Halomed” UAB, the Republic of Lithuania, Vilnius). In these devices, the same medical factor is used for treatment – dry salt aerosol of sodium chloride with the same parameters that is confirmed by the specifications and conditions for the use of devices.

Halotherapy technology have been presented as repeatedly at scientific forums: at the Russian Respiratory Society, the Russian Society of Pediatricians, The International Congresses on Medical Rehabilitation, the All-Russian Congresses “Zdravnica”, the European Respiratory Society (ERS), the International Society of Medical Hydrology, Balneology, and Climatology (ISMH, International Society ‘Interasma’, the Polish Association of Balneology and Physical, at leading Russian and international exhibitions of medical and health equipment in Moscow, St. Petersburg, many other Russian cities, Richmond, Hannover, Dusseldorf, Stuttgart, Bologna, and others.

To summarize the clinical data on the method of halotherapy and their evaluation, a search using a number of sources was conducted. The following electronic databases were used: the Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, MEDLINE, EMBASE, CINAHL, ERS-education.org, clinmedlibrary.com, balneologia.pl, fizioterapiya.info, scientiapress.com, nb.nsmu.ru, scholar.google.com, nlr.ru, Pedro. The keywords used: halotherapy, halochamber, haloroom, speleotherapy, salt therapy, dry sodium chloride aerosol. For thematic samples, reference lists found in the articles were used. More than 400 articles and essays on the subject were found. Information about the method of halotherapy, mechanism of its action, results of the research and efficiency are presented in a number of scientific reviews. This analysis includes publications of original researches that meet the requirements for clinical studies in accordance with Good Clinical Practice rated under Strength of Recommendation. The generalized analysis of the efficiency and safety of the method of halotherapy included 17 selected publications on the results of clinical studies. The data allowed the study to evaluate the effect of halotherapy on clinical symptoms of various respiratory diseases and ENT pathology, quality of life, use of medication, respiratory function, immunological, biochemical and bacteriological tests.

These studies provide evidence of the effectiveness of halotherapy in adults and children with asthma, acute and chronic bronchitis, COPD, cystic fibrosis, frequent acute respiratory viral infections and ENT pathology. Application of halotherapy increases efficiency of treatment and rehabilitation, quality of life, allows reducing drug burden, and increase the remission period of disease. The main acting factor of halotherapy – dry salt aerosol of sodium chloride has an anti-inflammatory and antimicrobial activity in the respiratory tract, mucoregulatory effect, enhances drainage function of bronchus, improves local immunity and restores biocenosis. Halotherapy has an effect on various parts of the defence system, stimulates mechanisms of sanogenesis of the respiratory tract.

The impact of dry salt aerosol on various pathological processes in the respiratory tract and human organism as a whole and a possibility of selecting the parameters in controlled halotherapy ensure the method adaptability to the conditions of different areas of rehabilitation medicine and balneology.

EXPLORING THE REVENUE GENERATING POTENTIAL FROM HOT SPRING TOURISM (BALNEO-TOURISM) IN NIGERIA

K'tso Nghargbu, Rifkatu Nghargbu

Department of Geology and Mining, Nasarawa State University Keffi, Nigeria

Nigeria is one of the naturally endowed nations of the world with many varieties of resources in land and water as well as good climate, vegetation and rich culture. With this, Nigeria is qualified to be one of the best tourist destinations of the world. Among many others, solid minerals and hot-springs are part of resources that have not been harnessed. Geological research shows that there are over 9 unutilized hot springs in Nigeria with great economic potential, some of the best in Africa. On the other hand, Poland, Japan, and China have harnessed their hot springs which provides for more than 10% of government revenue. This paper proposes the introduction of hot spring tourism to Nigeria as a means of economic diversification and as treatment procedure. Hot springs in Nigeria are one of the best in West Africa and have similar properties with that of Europe which can be harnessed for medical treatment as well as tourism. Also, Nigeria meets conditions required for starting Balneo-tourism industry and has the prospects to be the first of its kind in West Africa.

THE EFFECT OF BALNEOTHERAPY ON CHANGES IN THE FUNCTIONAL STATE OF PATIENTS WITH KNEE JOINT OSTEOARTHRITIS

Lina Varzaityte, Raimondas Kubilius, Arvydas Balcius, Kestutis Ramanauskas

Lithuanian University of Health Sciences, Department of Rehabilitation, Kaunas, Lithuania

Introduction: The treatment of knee joint osteoarthritis (OA) using pharmaceutical and non-pharmaceutical measures remains a topical subject. The purpose of this study is to assess the effect of natural factors (mineral water and mud) on changes in the functional state of patients with knee joint OA. Methodology: 92 adult people with grade I–III knee joint OA according to the Kellgren and Lawrence scoring system participated in the study. The subjects received 10 mineral water bath or mud application procedures and physical therapy every other day. The control group got physical therapy every other day. The effectiveness of the treatment was assessed on the basis of anthropometric changes of data, VAS, SF-36, KOOS questionnaire indicators.

Results: Significantly greater walking speed, test of 5 sit downs/stand ups, circumference of a knee joint and calf, flexion and extension range, flexor and extensor strength after treatment lasting 1 month were obtained in the intervention group. After 1 month after treatment pain intensity scores over the past month and when changing position were significantly higher in the control group. The most significant changes in SF-36 were identified after 1 month after treatment: physical activity increased and pain decreased in the intervention group. There was no significant difference between the averages of any KOOS subscale in groups. However, average percentages of symptoms, stiffness and pain in the intervention groups were significantly better and lasting 1 month. Conclusion: in the intervention group, where natural factors were applied (mineral baths and mud applications), after treatment and after one month after treatment anthropometric data significantly improved, pain intensity and joint stiffness decreased, physical activity increased compared to the control group. Future randomized controlled studies are needed to confirm these results. Moreover, further studies involving a higher number of participants with a longer period of observation are encouraged to shed more light on this subject.

INDICATIONS, CAUSIONS AND LIMITS OF BALNEAL-PHYSIO-THERAPEUTICAL INTERVENTIONS IN PATIENTS WITH POST ARTHROSCOPIC STATUS

Sibel Dermigian, Olga Surdu, Traian Virgiliu Surdu, Monica Surdu, Liliana Elena Stanciu

Balneal and Rehabilitation Sanatorium Techirghiol, Romania

Introduction: Knee arthroscopy is a minimally-invasive technique that allows intra-articular assessment and treatment of knee joint pathology. It has proven benefits of reduced patient morbidity, earlier recovery and mobilisation, and it is cost-effective. Arthroscopic technique like lavage, debridement and abrasion has been used in many studies evaluating role of arthroscopy in knee osteoarthritis. Probable explanation for relief of patient's symptoms after arthroscopic lavage is that it removes cartilaginous debris and inflammatory factors.

Materials and Methods: • Review – international data base using keywords: knee arthroscopy, arthroscopy with lavage and/or debridement, osteoarthritis and arthroscopy • Retrospective study upon inpatients' of TBRS (Jan 2015 – Dec 2015); • Medical records from Archive of SBRT; • Statistical analysis of registered data using Excel table and functions. All patients were subjected to complex balneal treatment for 10 or 15 days.

Results: The search identified 9 trials assessing the benefits of knee arthroscopic surgery in middle aged and older patients with knee pain and degenerative knee disease. No study to evaluate the hydrotherapy or balneotherapy after knee arthroscopy were found. Total number of patients – 9102 from which with knee pathology (first diagnosis) – 1155, from which knee arthroscopy 65 patients, from which post-traumatic conditions 26 pts (diagnosis, meniscectomy, ligamentoplasty); rheumatologic conditions – 39 patients lavage and/or debridement.

Conclusions: Limitations of arthroscopy are generated by technique itself (soft tissue around joint: capsule, enthesis, tendons, fascia) +/- osteophyte induce symptoms that cannot be solved) and by other situations (residence of patient (adresability), lack and/or deficiency of recommendation: GP, rheumatologist, specialist in rehab; age of patients; distance in time up to BFT). The study do not revealed important limitation from comorbidities, side affected, and/or range of motion.

CLIMATOLOGY: POSITIVE EFFECTS OF SUNSHINE EXPOSURE

Albrecht Falkenbach

Bad Ischi, Austria

In recent years the risk of UV exposure, in particular skin cancer development, has been widely discussed in literature. On the other hand, there is growing evidence of beneficial effects, e.g. in oncology, osteology, angiology and cardiology.

Most benefits from sunshine exposure result from the UV-induced stimulation of vitamin D-precursors. After isomerisation of previtamin D in the skin, 25-hydroxylation in the liver and 1 α -hydroxylation in the kidney, the active form 1,25-dihydroxycholecalciferol may exert the beneficial effects in the prevention and treatment of several diseases, namely in rickets, osteomalacia and osteoporosis. Recent epidemiological studies point at benefits in colon-, breast- and prostate-cancer and arterial hypertension. Many more positive effects of UV-exposure and higher vitamin D levels are under discussion, eg. an improved muscle function and a risk reduction of falls, improved fetal brain development and cognitive function in the elderly. Also, a risk reduction for metabolic diseases is being discussed.

An UV-induced increase of vitamin D can be achieved by exposure to suberythemal doses of UVB-light, which, however, is deficient in northern Europe during wintertime. Humans at risk of vitamin D deficiency may benefit from winter sojourns in countries with abundant sunshine or exposure to artificial UV-light.

THERAPEUTIC AND BIOLOGICAL EFFECTS OF CARBONATED MINERAL WATER AND MOFFETE IN BAILE TUSNAD

Gabriela Dogaru, Constantin Munteanu, Marieta Motricala,

Clinical Rehabilitation Hospital "Luliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

Introduction: Mixed natural carbonated mineral waters and mofettes in Băile Tușnad are used for their vasodilator effects in the prevention and therapy of cardiovascular patients. Some springs are indicated as drinking treatment in chronic digestive disorders.

Objectives: To evaluate the efficacy of natural therapeutic factors in Băile Tușnad with the aim of continuing rehabilitation treatment in a spa and climatic resort for cardiovascular diseases.

Methods: A number of studies were conducted at the Tușnad Spa Complex Treatment Facility in the period 2014-2019. Prospective longitudinal clinical studies on post-stroke and chronic occlusive arterial disease patients, as well as studies on experimentally induced alcoholic liver injury and ischemic heart disease were carried out. The studies were approved by the Ethics Committee of the University of Medicine and Pharmacy Cluj-Napoca.

Results: At the end of treatment, an improvement in the walking speed with an increase in the walking distance and amelioration of pain were found in patients with arterial disease. In the study on experimentally induced alcoholic liver injury, optical and electron microscopy evidenced differences between animals that drank tap water and those that consumed mineral water from spring no. 3 in Băile Tușnad, after cessation of alcohol administration; there was an increase in the number of lysosomes, showing a mobilization of the defense capacity of hepatocytes against alcohol intoxication. Anti-inflammatory effects were observed following determination of cytokines and matrix metalloproteinases, there were changes in oxidative stress markers, and biological effects on the heart were evidenced by structural optical microscopic studies of carbonated mineral water and mofette in experimentally induced ischemic heart disease in Wistar rats.

Conclusions: Baths with natural carbonated mineral water and mofette can be an effective therapeutic method in the treatment of cardiovascular diseases, but the periodic analysis of their physical and chemical properties is important. Further studies regarding their therapeutic efficacy and mechanism of action are required.

THE RELEVANCE OF KNEIPP THERAPY IN GERMANY

Urszula Smorag

Physical Medicine Rehabilitation Center, Munich, Germany

Introduction: In the 19th century the Bavarian priest Sebastian Kneipp, discovered the healing benefits of water and wrote „My Water Cure“. He developed an entire system of healing, which rests on five pillars: herbal medicine, exercise, balanced nutrition, lifestyle (regulative therapy) and especially hydrotherapy. In 2015 “The traditional Knowledge and Practice According to Sebastian Kneipp” was recognized by UNESCO as an intangible cultural heritage.

Objectives: Kneipp has described more than 100 methods of water applications. Very typical are applications of cold water or alternating cold and warm water treatment. A few examples for water therapy with different stimulus strengths are: partial washing (weak), treading water (medium), ascending cold water showers (strong). Today the methods continue to be learned in medical studies, in the specialization of physicians for PMR and as an additional qualification for almost all medical and medical assisting professions.

Methods: The publications confirm the effectiveness of Kneipp therapy, also with children and seniors: „Applied Paediatric Integrative Medicine: What We Can Learn from the Ancient Teachings of Sebastian Kneipp in a Kindergarten Setting” Eckert M., Anheyer M, Childern (Basel) 2018 Jul 26;5(8). pii: E102. doi: 10.3390/children5080102. „Changes of cognitive brain functions in the elderly by Kneipp therapy“. Doering TJ et al. *Forsch Komplementarmed Klass Naturheilkd* 2001 Apr;8(2):80-4.

Results: The last evaluation of German spa facilities was made in 2015. In that year more than 2,3 million people visited German Kneipp health resorts.

Conclusions: The legacy of Kneipp is still practiced in modern medicine in Germany. The method of modern therapy according to Kneipp has developed from the treatment of acute diseases to a supportive therapy for the treatment of chronic diseases of civilization. The focus of modern Kneipp therapy is on prevention, health preservation and rehabilitation.

INTERNATIONAL SESSION IV

SESJA IV MIĘDZYNARODOWA

CLINICAL BALNEOLOGY
BALNEOLOGIA KLINICZNAUNDERWATER TRACTION THERAPY IN CHRONIC LOW BACK PAIN,
A MULTICENTRIC RANDOMIZED CONTROLLED FOLLOW UP STUDY

**Tamas Bender, Eva Czimer, Gyorgyi Cserhati, Judit Feher, Mihaly Olah,
Agota Kulisch, Zuzanna Mando, Tamas Gati**

Policlinic of the Hospitaller Brothers of St. John of God, Budapest, Hungary

Background: Chronic low back pain is one of the most common problems in the world. The prevalence could reach the 33%. About 84% of people have at least one episode of low back pain during their lifetime.

Objectives: Our aim was to investigate the effects of underwater traction therapy on chronic low back pain. The primary objective was to prove the hypothesis that underwater traction therapy has favourable effect of LBP using the change in the clinical parameters. Our secondary objective was to evaluate whether it also leads to the improvement in the quality of life.

Methods: A prospective, multicenter, comparative (intervention arm vs. control arm), randomized follow-up study. Participants are aged between 18 and 85 years with more than 3 months low back pain and were selected from outpatient clinics.

The participants were randomized to three groups: underwater weight bath traction therapy, weight bath and non-steroidal anti-inflammatory drugs (NSAIDs) medication and only non-steroidal anti-inflammatory drugs (NSAIDs) medication. During the traction therapy there were uses with ankle weights. The following parameters were measured before, right after, and nine weeks after the three-week therapy: the level of low back pain in rest, and the level during activity are tested using the Visual Analog Scale (VAS); specific questionnaire on the back pain (Oswerty); and a questionnaire on quality of life (EuroQual-5D) and clinical parameters.

Results: 141 participants aged 57.67 mean (± 13.04) years were.

All of the investigated parameters improved significantly ($p < 0.001$) in the underwater weight bath traction therapy groups by the end of the treatment compared to the base period, and this improvement was persistent during the follow-up period. There were no significant changes in the measured parameters in the control group except for the Oswestry Disability Index, which may also be the result of that group receiving pain-relieving drug therapy.

Conclusion: Based on our results, underwater weight bath traction therapy, might have favourable impact on the clinical parameters and quality of life of patients suffering from chronic low back pain.

THE INFLUENCES OF HOT-TUB BATHING ON METABOLIC PARAMETERS
IN PATIENTS WITH TYPE 2 DIABETES

**Hisayuki Katsuyama, Mariko Hakoshima, Yoshinori Masui, Hiroki Adachi,
Akahito Sako, Shigeko Inokuma, Hidekatsu Yanai,**

Department of Internal Medicine, National Center for Global Health and Medicine Kohnodai Hospital, Japan

Hot-tub bathing is one of the most common life habits in Japan. Previous reports indicated the possibility that hot-tub bathing could have beneficial effects on metabolic disorders such as diabetes, dyslipidemia and hypertension. We examined the actual situation of habit of hot-tub-bathing in Japanese patients with type 2 diabetes (T2D) and its influences on various metabolic parameters. We obtained the information about habits of hot-tub-bathing from patients who regularly visited our

hospital by using the original questionnaires, and investigated the influence of such data on metabolic parameters obtained from the medical chart. One thousand sixty-two patients (male 580 / female 482) were eligible. The mean age of patients was 67.3 ± 13.3 year old, the body mass index (BMI) was 25.8 ± 5.4 kg/m² and glycated hemoglobin was $7.2 \pm 1.1\%$. The mean frequency of hot-tub-bathing was 4.1 ± 2.7 times a week. The frequency of hot-tub bathing was negatively correlated with body weight, BMI and diastolic blood pressure, whereas it was positively correlated with age. The BMI and diastolic blood pressure were significantly lower, and the age was higher in patients who take a bath 5 per week or more compared to other groups. No significant differences were observed in plasma glucose levels or glycated hemoglobin. A stepwise multiple regression analysis identified the frequency of hot-tub-bathing as a significant determinant of diastolic blood pressure in the whole group as well as in the subgroup of female, obese (BMI $\geq$ 25), and younger.

THE IMPACT OF HUMIC WATER ON ENDOTHELIAL CELLS CULTURED UNDER CONDITIONS OF HYPERGLYCEMIA

Katarzyna Szot, Krzysztof Góralczyk, Małgorzata Michalska, Barbara Góralczyk, Natallia Veryho, Jacek Chojnowski, Mariusz Dubiel, Danuta Rość

Department of Pathophysiology, Nicolaus Copernicus University in Toruń, Collegium Medicum in Bydgoszcz, Poland

Introduction: The endothelium plays many important functions in the human body. Growth factors as vascular endothelial growth factor (VEGF), produced by the endothelial cells, take an essential part in pathological and physiological angiogenesis. Humic waters (HW) containing humic acids with sources in Poland are originally bacteriologically pure, physically and chemically stable. Because of the physicochemical properties they present numerous therapeutic activities.

Aim of the study: The aim of the study was to investigate the influence of humic water on the proliferation of endothelial cells, secretion of VEGF-A and presence of soluble VEGF receptor (sVEGFR-1) in the medium after in vitro culture.

Material and methods: Endothelial cells (HUVEC line) were derived from human umbilical veins and cultured in accordance the standard methods. The study was conducted in four groups: 1- control; 2 – an appropriate volume of humic water was added to obtain its 1% solution in the culture medium; 3- (30 mM/L) glucose added to the culture medium to imitate hyperglycemic condition; 4 – glucose, HW in the medium. At the end of experiment, conditioned medium from each well of culture plates was collected and the concentration of VEGF-A, and sVEGFR-1 in the supernatant were measured by ELISA test.

Results: The lowest number of HUVECs was observed in group 3 cultured under hyperglycemic conditions. While the number of cells in group 4 reached the level similar to the control group. The level of VEGF-A was notably lower in the group 3. The concentration of sVEGFR-1 increased after the addition of glucose to the culture medium in group 3. Adding of humic water to the culture medium with glucose causes decrease level of sVEGFR-1 in group 4 to the level similar to group 2.

Conclusions: The lowest number of endothelial cells cultured under hyperglycemic condition indicates the negative impact of high glucose concentration on the cells culture. It appears that the adverse effects of hyperglycemia on vascular endothelial cells may be reduced by adding of humic water which enhance of the cell proliferation. Adding of humic water also led to a significant decrease of the concentration of soluble VEGFR-1. The possibility of angiogenesis modulation by application of humic water may contribute to the improvement of its use in the therapy of diseases whose also base is the process of blood vessels formation.

IL-8 AND TGF-B SERUM CONCENTRATIONS CORRELATE WITH CLINICAL IMPROVEMENTS IN OSTEOARTHRITIS PATIENTS UNDERGOING PELOThERAPY

Isabel Galvez, Silvia Torres Piles, Eduardo Ortega Rincon

Biotechnology, Spain

BREAKTHROUGH IN EVIDENCE-BASED BALNEOLOGY: ORGANIC COMPOUNDS OF MEDICAL WATER CAN BE RESPONSIBLE FOR HEALTH EFFECTS

Adrienn Hanzel, Katalin Szedni, Balazs Nemeth, Karoly Berenyi, Csaba Varga

Department of Environmental Health Institute of Public Health Medicine, Medical School University of Pecs, Hungary

The therapeutic effects of mineral waters have been attributed to the inorganic components alone. However, biologically active organic components are also present. We aimed to investigate whether the healing effect of Szigetvár thermal mineral water could relate to the organic matter in patients suffering from osteoarthritis of the hips and the knees. XAD macroreticular resins were used to prepare the organic fraction from Szigetvár mineral water. After randomization, patients were divided into three groups according to the water type: tap water, mineral water and diluted organic fraction group. Patients received a 30-min-long thermal water (34 °C) treatment in a bath tub, five times a week for 3 weeks.

All experimental circumstances had to be the same to prove our hypothesis that the beneficial effects of medicinal waters originate from their organic components. To minimize the differences between mineral water, tap water and diluted organic fraction water, they were coloured by commercially available water colouring tablets. Moreover, the treatments were performed in the same room; therefore, the odour of the thermal water was detected by all patients. The pH of the waters was also adjusted. All patients were treated in individual tubs with 34°C warm water. The type of water filled into the tub was only known to the study assistant. Primary outcomes were range of movement (ROM), Western Ontario, McMaster University Osteoarthritis Index (WOMAC), visual analog scale (VAS) for pain severity, the Short Form 36 (SF-36) questionnaire was used. All patients were suffering from hip osteoarthritis. Seventy-four patients were enrolled: tap water n = 24, mineral water n = 26, and organic fraction n = 24. Treatment with the redissolved organic fraction significantly improved ROM, WOMAC, and SF-36 scores compared to the tap water. To confirm this observation we started another study only with the salt content of the same water. Once it is confirmed in numerous other investigations, our theory can change of paradigm in the science of balneology. The presented concentration method also provides the opportunity to produce medicinal water-based products with therapeutic effects, which can be used both bedside and homeside.

DESCRIBING SPAS – THE LONG TRADITION OF BALNEOLOGICAL ANALYSES AND DESCRIPTIONS

Sonia Horn

Department of Physical Medicine and Rehabilitation, Kaizer Franz Josef Hospital, Vienna, Austria

It is well known that Balneology has a very long tradition and can be traced back in Europe at least to antiquity. However the way such sites were described is not common knowledge in the field of Balneology as “basic research” including scientific analyses and detailed therapeutic advice is broadly seen as a result of investigations starting in the (late) 18th C.

In my paper I want to introduce the long tradition of scientific Balneological analyses and descriptions taking the example of the spa at Bad Deutsch Altenburg in Lower Austria. This spa, containing sulfur and iodine, was part to the Roman metropolis “Carnuntum” that flourished between 40 and 400 CE and is still in use today. Descriptions of this site go back to antiquity, however expert opinions, comprising detailed reports on the location itself, the geological aspects and chemical analyses as well as advice on the therapeutic use were published by the medical faculty of the University of Vienna in 1548 and 1634, in a medical dissertation in 1710 and later in the well propagated book on spas in the Habsburg countries “Gesundbrunnen der Österreichischen Monarchie” of 1777, though the latter text contains is by far not that detailed information as the earlier publications.

These documents start out by describing the region including the geological properties, the climate, as well as flora and fauna, especially referring to the use as food for humans and animals, which is typical for scientific writing in the 15th – 17th C. As this is a region where wine is cultivated since antiquity, the quality and therapeutic usefulness of regional wine was mentioned too. The physical and chemical analyses that were carried out with the available technological methods, which should not be underestimated, are explained in detail, the results were carefully listed. Following this, the way the waters should be used for medical treatments of specific conditions are carefully examined and explained, including advice on nutrition, rest and exercise during the cure.

Considering the fact that the University of Vienna was a centre of (medical) Humanism in the 15 – 16th C that strived to find “the roots” not only in texts but also in descriptions of nature, no references to magical or non-scientific aspects can

be found in these extensive reports. Remarkably the recent physical and chemical analyses are structured in the same way as the mentioned texts and end up with the same results.

Referring to the question of “basic research” in Balneology these expert opinions show the long lasting tradition and continuity of basic research and scientific analyses in Balneology.

MOFFETTE – AS AN UNDISCOVERED MEDICINE

Krisztina Parma-Gyergyoi

Parafurdo State Hospital, Hungary

Introduction/Background: Mofette is a naturally occurring treatment with carbon dioxide and radon gas. According to our current knowledge, the application of carbon dioxide dry bath is has a history of 2000 years. In Hungary, there is natural volcanic carbon dioxide evaporation only in the Mátra Hills that is beneficial to the human body. The vasodilator effect of the natural carbon dioxide-based dry bath is particularly effective in arterial diseases (lower limb constrictions of different origin and severity, leg ulcers), lymphatic disorders, vascular complications of diabetes, certain rheumatic disorders, reconstructive vascular surgery, catheter dilatation and after stent implantation. Some success was also achieved in the treatment of Raynaud's syndrome. Our objectives is to demonstrate the beneficial effects of Mofette treatment, which may even prevent surgical interventions.

Methods: Mofetta treatment is a local (specific vasodilator effect – arterial, venous, lymphatic) and general effects of our patients of out- and in-patient care. In my presentation, I present the treatments – proposed by the specialist twice a year – to whom, what diseases are recommended, and what diseases are not recommended for mofetta treatment. We analyze the distribution of patients using the treatment in the Parádőfürdő State Hospital among out- and in-patient patients and the duration of the cure.

Results: Study results from patients treated with carbon dioxide dry baths show that the quality of life among repeatedly treated patients has improved significantly; the use of treatments for out-patient and in-patient care has decreased (hospital admissions, number of infusion courses); drug use decreased (painkillers and sedatives); decreased pain; walking distance increased; nearly 40% of chronic leg ulcers difficult to heal have healed or improved.

Conclusion: The improvement of our patients' condition and the results of the measurements show that it is worthwhile to use the unique mofetta carbon dioxide gas bath as a complementary treatment for curing the above mentioned diseases and also for prevention.

EFFECTS OF A SINGLE CARBON DIOXIDE (CO₂) TREATMENT ON ARTERIAL STIFFNESS

Balazs Nemeth, Adrien Hanzel, Bella Ajtay, Zita Kreska, Ivan Peter

Zsigmondy Vilmos SPA Hospital, Harkany, Hungary

We aimed to investigate the effects of a single carbon dioxide (CO₂) treatment on arterial stiffness by monitoring the changes of aortic pulse-wave velocity (PWV) and aortic augmentation index (AIXao), which are indicators of arterial stiffness. Patients and Methods: PWV and AIXao were measured by an invasively validated oscillometric device. The measurements of stiffness parameters were performed before the CO₂ treatment, and at 1, 4 and 8 h after the first treatment. Results: Thirty-one patients were included. No significant changes were found in PWV. AIXao decreased significantly 1 h and 4 h after CO₂ treatment compared to baseline values (p=0.034).

WELL-BEING IN SPA TREATMENT: COULD SEROTONIN BE A GOOD BIOMARKER? A REVIEW

Silvia Torres Piles, Isabel Galvez, Eduardo Rincon

Biotechnology, Spain

Introduction: The links between the serotonin (5-HT) system and mood are well-known; in fact, serotonin is called “the happiness hormone”. Moreover, the pathophysiology of several pathologies, such as fibromyalgia and anxiety-depressive disorders, is associated with a dysregulation of the serotonin system. Although the beneficial effects of spa treatments

(including balneotherapy and mud therapy), including feelings of increased well-being and mood, have been widely investigated, the biological mechanisms underlying these clinical benefits are not well understood.

Objectives: The objective of this review was to examine recent publications assessing the effect of spa interventions on the serotonin system and whether serotonin could be a good mediator reflecting the biological effects of spa therapy on well-being and mood.

Methods: The search was performed during March 2019 in the scientific databases Scopus and PubMed using the keywords: “hydrotherapy” OR “spa therapy” OR “balneotherapy” OR “mud therapy” OR “pelotherapy” AND “serotonin” OR “5-HT” OR “SERT”. Initial results showed 41 documents, which were reduced to 24 after delimiting to only original articles and reviews after the year 2000. After selecting only those documents in English related to balneotherapy and the determination of serotonin in this context, the final result was 5 documents.

Results: Subjects evaluated in these studies were heterogeneous in age, sex, and pathologies (fibromyalgia, dorsopathy, and anxiety-depressive disorders), in fact 2 studies were conducted in healthy volunteers. The spa treatments were also diverse, the most frequent being balneotherapy and mud therapy. Patients improved their general well-being as measured by different questionnaires. As an objective biological biomarker, serotonin was measured either directly or indirectly through the serotonin transporter (SERT). Serotonin levels increased after the intervention in 4 of the analysed studies, while one showed no significant changes.

Conclusions: Despite being a relevant biomarker in several pathologies and being related to the sense of well-being and mood status, in this review we have found that there is a small number of studies (with heterogeneous experimental design and methodology) evaluating this mediator in the context of balneological treatments. Although from these studies, it seems that serotonin increases after spa interventions, which could constitute a potential physiological mechanism underlying the proven beneficial effects of this therapies in terms of increased well-being, mood, and quality of life; it also seems clear that more studies of higher methodological quality with the aim of evaluating serotonin levels and its correlation with physiological parameters, with special emphasis in psychological evaluation, are needed.

BALNEOLOGICAL METHODS AS COMPLEMENTARY TREATMENT OF SINUSITIS – THE ROLE OF IONOPHORESIS

Jolanta Gawlik, Remigiusz Ziarno, Aleksandra Grudzień- Ziarno, Anna Pełkowska,
Lidia Kościelny, Jacek Składzień

Kliniczny Oddział Otolaryngologii Szpitala Uniwersyteckiego w Krakowie, Poland

Introduction: Chronic sinusitis is one of the most common diseases of the upper respiratory tract. Endoscopic surgery and pharmacotherapy form the basis of contemporary treatment of sinusitis. The Otolaryngology Clinic in Cracow together with „Wieliczka” Salt Mine Health Resort use balneological methods for treatment and rehabilitation of upper respiratory tract. Ionophoresis, a noninvasive form of treatment using direct current for transdermal or transmucosal drug administration, can be used further as preliminary or postoperative treatment in patients with chronic sinusitis.

Aim: The aim of this study was the evaluation of effectiveness of ionophoresis as complementary treatment of the improvement of nasal ducts permeability in chronic sinusitis.

Material and Methods: Between 2018 and 2019 25 patients with newly diagnosed or operated in the past sinusitis were referred to the „Wieliczka” Salt Mine Health Resort for 2% calcium chloride ionophoresis. Rhinomanometry was performed in each patient before and after the ionophoresis treatment to evaluate the permeability of nasal ducts. Moreover, the patients underwent rehabilitation in subterranean salt chambers of Wieliczka

Results: After the treatment in Wieliczka’s subterranean salt chambers the results of rhinomanometry before and after ionophoresis were compared. The improvement of nasal flows was observed in all patients. No pharmacotherapy or surgery was used in the study.

Conclusions: The study revealed that ionophoresis efficiently improves permeability of nasal ducts in patients with chronic sinusitis. It is recommended to use this method as preliminary treatment in patients with chronic sinusitis, where there are no urgent recommendations for surgical operation.

THE WATER MOLECULES FROM YOUR SPA ARE OLDER THAN EARTH

Iciar Vazgues Garranzo

Labolatorio de Analisis de Aguas, Madrid

THE WATER MOLECULES FROM YOUR SPA ARE OLDER THAN EARTH

Francisco Armijo, Icíar Vázquez Francisco Maraver

Escuela de Hidrología Médica, Facultad de Medicina, Universidad Complutense, Madrid España

Introduction The water as a substance is essential for life and it has been proved to be necessary for the development on Earth. It has already been in existence before our Solar System began to emerge 4,600 million years ago. Spas waters are the result of the water substance interaction as time passes with the aquifers materials where water is contained.

Objectives: To know when and how the water molecule is formed, from where the water on Earth comes and how did it come right here.

Method: Heuristic method based on literature review has been used.

Results: George Gamow in 1948 proposed the Universe was created from the Big Bang as a hot and dense point. 13,800,000,000 (13.8 Gyr) years ago one second after the Big Bang, the universe was filled with neutrons, protons, electrons, anti-electrons, photons and neutrinos. About 400 million years after the Big Bang, the universe began to emerge from the cosmic dark ages.

According to the standard cosmology, hydrogen was formed immediately, only a few 380000 years after the Big Bang. Around 300000000 years from the Big Bang the first stars were formed. Heavier atoms including oxygen were produced much later in the evolution of the universe (at least a few 10^8 yr), by nuclear fusion of H and He in the central parts of massive stars. When these stars have exhausted their supply of nuclear fuel, explode as a supernova and enrich the space with heavy elements. Since water it is made of two of the most abundant elements, H and O, its formation is inevitable. Water could have been abundant in the first mil millions years.

According to a recently published research article, the water on our planet is not the same water that was spread out in ice-form over the whole Solar System in the course of its formation, so that it came much later from the asteroid belt, between Mars and Jupiter.

Conclusions: Water was already in existence mil millions of years ago, from the Big Bang origin. Part of water of the Solar System has been inherited from the environment from which the Sun emerges. This is a common element during the development of the whole planetary systems. That means that, the mineral water bottle that is in our fridge and the medicinal mineral water of our spa, are real relics.

INTERNATIONAL SESSION V

SESJA V MIĘDZYNARODOWA

CLINICAL BALNEOLOGY
BALNEOLOGIA KLINICZNA

BIOLOGICALLY ACTIVE SUBSTANCES IN THE PEAT BOG OF SUPRAŚL SPA, POLAND

Robert Latosiewicz, Dorota Skrodzka

Medical University of Lublin, Poland

Introduction: The Supraśl thermal station (NE of Poland) uses for therapeutic purposes the “Podsokołda 2” peat bog. The deposit with the area of 1.42 ha contains peat of low tape with estimated reserves of 33.5 thousand m³.

Aim: of the study was to determine the degree of humification and content of biologically active substances – humic acids, tannins and polyphenols – in samples of peat collected from the “Podsokołda 2” peat bog.

Methods: Peat samples were taken from 8 different places of the bog from a depth of 0.5 to 1.5 m. The degree of degradation (humification) was assessed using the von Post scale (H). The content of humic acids, tannins and polyphenols after the appropriate extraction was assessed by spectrophotometric methods at wavelengths of 420 nm, 760 nm according to FP VIII and 752 nm according to Folin-Ciocalteu.

Results: Humification of the deposit was dependent on the depth of material collection and ranged from H3 at a depth of 0.5 m to H5-6 at a depth of 1.0-1.5 m. The content of humic acids was relatively constant, independent of location and depth of sampling and ranged on average from 32.28 to 41.72 mg/g of dry matter (d.m.) The tannin content was depended on the place, but not on the depth of the collection, and varied on average from 164.3 to 1370.0 µg/g of d.m. The polyphenol content was clearly dependent on the depth and location of the collection – 32.3 µg /g d.m. at a depth of 0.5 m and from 483.6 to 9270.0 µg/g d.m. at a depth of 1.0-1.5 m.

Conclusions: 1. The “Podsokołda 2” peat bog of the Supraśl spa is characterized by a high content of biologically active substances, and especially a high content of antioxidants (polyphenols). 2. For therapeutic purposes, peat should be dug from a depth below 1 m from the surface.

THE INFLUENCE OF SULFURIC MUD ON THE REVASCULARIZATION AND RECOVERY
OF NECROTIC BONE IN CHILDREN WITH LEGG-CALVE-PERTHES DISEASE**Jasmina Milovanovic-Arsic, Alexandar Jokic, Nada Jevtic, Bozana Markovic**

Specialized Rehabilitation Hospital, Banja Koviljaca, Serbia

Introduction: The basis of Legg-Calve-Perthes disease (LCPD) presents an ischemic osteonecrosis of the head of the femur of an unknown origin. The aims of physical therapy are to provide a full range of motion of the hip and improve muscle strength and vasodilatation in the region of the femoral head so as to accelerate the removal of the necrotic bone and the creation of a healthy one.

Objectives: The aim of the study is to examine the effects of physical therapy (kinesiotherapy, hydrotherapy, electrotherapy and mud) on the recovery of femoral head in children with LCPB and to determine which of these physical therapies contribute the most to the acceleration of the healing process.

Methods: This was prospective study which included 40 children, aged 3-11 of both genders. The first group of examinees was treated with kinesiotherapy, hydrotherapy and mud therapy, and the other had the same therapies with the addition of interferential current. The patients were observed from 2001- 2005. Clinical assessment included measuring range of motion of the hip, circumference of the limbs and evidencing duration of period while unsupported standing wasn't allowed. All patients went through radiographic testing as well (Catterall, Herring, Mose , Wiberg angle).

Results: The average duration of rehabilitation was 37.1 days (min 20, max. 80 days). Comparativ statistical analysis of descriptive, clinical and radiographic parameters at the beginning of the rehabilitation showed that there wasn't statistically significant difference between the groups (gender, age, the affected side, radiographic criteria of the degree of damage, clinical findings) . At the end of the rehabilitation both groups achieved statisstically significant decrease in pain level, increase in limb circumference , range of motion of the hip and improvement in radiographic criteria. Also, the time needed to reach the phase of unsupported standing shortened. The comparison between groups showed no difference in the final result.

Conclusions: Physical therapies (mud, kinesiotherapy and hydrotherapy) have contributed to the acceleration of the recovery process of necrotic bone in children treated for LCPD which was confirmed by clinical and radiographic tracking parameters. The application of electrotherapy had no statisstically significant influence on the outcome of the treatment.

INFLUENCE OF AGE AND GENDER TO COMPLEXITY OF ORGANISM DURING PELOIDOTHERAPY PROCEDURE

Giedre Taletaviciene, Alfonsas Vainoras

Upa Medical Druskininkai, Lithuania

ECG represents cardiac function in all fractal levels of complexity: regulatory system evaluated by RR interval and heart supplying system evaluated with changes of JT interval. The type and intensity of body's reactions to mud therapy depends mainly on intensity of the procedure and the responsiveness of the organism that also depends on age and gender. The aim: to evaluate changes of dynamic concatenations of durational ECG parameters during peloidotherapy procedure in groups of people of various age and sex. Method. The 12-lead standard ECG was registered synchronously using computerized ECG analysis system "Kaunas-Load" 1 min before and during peloidotherapy (39-40°C) procedure (mud bath). Three segments were assessed from ECG: 1 min before the procedure (1), 1-10 min of the procedure (2) and 11-20 minutes of procedure (3). Concatenations of ECG parameters were assessed and calculated: RR/JT, JT/QRS, RR/QRS. Results: 48 patients (age mean 59.5 ± 11.48) were divided into groups by gender (26 female and 22 male) and age (I gr. (N=24) age ≤ 59 y.), II gr. (N=24) age > 59 y.). A comparison by gender and age showed that dynamical concatenations of RR/JT, JT/QRS, RR/QRS of male patients were significantly.

THE EFFECTS OF COMPREHENSIVE BALNEOTHERAPY ON PSORIATIC ARTHRITIS OF THE SPINE

Jan Lidaj, Korencikova Alena, Lalisova Maria

Natural Health SPA Smrdaky, Slovakia

Authors processed work on theme comprehensive balneotherapy. The aim of the thesis was to examine the effect of complex balneotherapy on psoriatic arthritis of the spine in the cohort of 120 probands. The work is divided into theoretical and practical part. The theoretical part are shortly describes characteristics, etiology, clinical manifestations, examination and treatment of the psoriasis and arthritis psoriatica. Psoriatic arthritis (PsA) is the most common comorbidity of the skin form of psoriasis. The patophysiology of PsA is not fully understood and involves a complex interaction of genetic, environmental and immunologic factors. Clinical features include arthritis, entesitis, dactylitis, sakroilitis and spondylitis, but there could be extraarticular manifestation too. There are also a few case reports of atlantoaxial subluxation. PsA significantly affects the quality of life, aggravates the morbidity and mortality of patients. An important role in early diagnosis of PsA is also played by dermatologists who send the patient to the rheumatologist already at the first symptoms of PsA. The lecture deals with the treatment of psoriatic arthritis with an emphasis on balneotherapy. In the practical part the authors examined, statistically evaluated and assessed the effect of complex balneotherapy on patients with axial form of psoriatic arthritis based on a questionnaire and objective measurements. The questionnaire consisted of eight questions and an objective part of measurement tests Schober, Stibor and Thomayer. The sample consisted of 120 respondents. The results are included in the analysis, expressed quantitatively and graphically as well. The analysis also includes a discussion.

EVALUATION OF THE DURATION OF MUD APPLICATION EFFECT IN PATIENTS WITH KNEE OSTEOARTHRITIS

Inese Kokare, Jevgenijs Susts, Lina Butane, Ilze Valaine, Marija Sokolova, Pauls Stradins

Clinical University Hospital of Latvia, Faculty of Medicine, Latvia

Introduction: Latvia has rich and historical traditions of natural mud treatment in different clinical conditions. Mud treatment decrease level of pain in patients with knee osteoarthritis. Osteoarthritis (OA) is a degenerative joint disease predominantly affecting the weight bearing joints including the knee. Patients with knee OA often experience pain, which affects quality of life. The aim of this study was to evaluate the duration of mud application treatment effect in patients with knee OA.

Objectives: Evaluate patients' level of pain in the affected knee joint before and after the treatment. Analyse patients' opinion on the duration of positive effect after treatment.

Methods: This study was conducted as a randomised prospective trial, taking place in Pauls Stradins Clinical University Hospital. A total of 127 patients (116 female and 11 male), aged 50 to 80, with diagnosed OA of the knee, took part in this study. Participants were randomly divided 2:1 into 2 groups. Intervention group (n=84) received freshwater mud applications on both knees at 37-40°C of 30 minutes 10 times in a period of 2 weeks. Control group (n=43) did not receive mud application. Patients' pain perception was evaluated using Numeric Pain Rating Scale (NPRS) prior to treatment and 3 months after the treatment. In addition, patients were interviewed via phone on average 14 months later. During phone interview, patients were asked to evaluate level of pain in the affected knee and evaluate duration or therapeutic effect (if any). In total, 77 intervention group and 33 control patients were reached for repeated phone interviews.

Results: Pain perception in intervention group prior to treatment was 4,81 on average, decreasing to 3,62 (P=0,003) 3 months after the treatment and later on elevating to 5,08 after 14 months. In the control group average pain at the beginning was 4,78 and increasing to 4,85 (P=0,138) 3 months later and furthermore increasing to 5,03 after 14 months. For treatment group 18% (n=14) evaluated duration of therapeutic effect lasting more than 6 months, 33% (n=24) evaluated duration of 4-6 months and 33% (n=24) evaluated duration for 1-3 months and 16% (n=12) evaluated duration of less than 1 month.

Conclusions: Pain perception 3 months after treatment is significantly lower in patients treated after freshwater mud application compared to control. No significant difference was observed after 14 months period. Based on patients' opinion, therapeutic effect of mud application therapy in patients with knee OA lasts up until 6 months.

THE INFLUENCE OF GEOTHERMAL WATER OF DIFFERENT SALINITY ON PSYCHOEMOTIONAL STATE

Lolita Rapoliene, Daiva Mockeviciene, Arturas Razbadauskas, Aelita Skarbaliene

Klaipeda University, Lithuania

Hydrotherapy in various forms, temperatures and concentrations can produce different effects on body systems. The aim of the study is to determine the effect of different salinity water on the psycho-emotional state.

Methods: A randomized, controlled one-sided blind parallel group intervention study was performed with 250 subjects divided into 20, 40 and 60 g/l of geothermal, tap water and control (without treatment) groups. The participants were assigned for ten 20 min sessions of 36 °C baths everyday for 2 weeks. The Na-Cl-Ca-Mg-SO₄ 108 g/l total mineralization geothermal water diluted to the required mineralization with tap water was used. The effect on stress, anxiety and depression was measured using DASS-21 scale after treatment and during 1-3 month follow-up period. Cortisol level was measured before and after the course. Statistical analysis using general linear model, post-hoc analysis was made from 181 participants dates.

Results: The stress decreased significantly in all groups after 2 weeks with the strongest effect in the 20 g/l group. The level of anxiety decreased in all groups with the biggest effect in the 40 g/l group. Depression decreased in all groups with the strongest effect of 20 g/l water. The strongest long-term effect for stress, anxiety and depression was found after 40 g/l baths. Geothermal water had stronger effect for worse psycho-emotional state. The tap water had the smallest and the shortest effect for depression relief. The lowest changes were found in control group. The assessment of mean changes showed the greatest impact of hydrotherapy on stress, and the lowest- on depression. Immediately after the procedures, the strongest effect was achieved with 20 g/l, the longest – with 40 g/l water. There was no significant difference in stress, anxiety, and depression during intergroup analysis. Cortisol level decreased after 40 g/l and tap water bath, but no significant changes were revealed.

Conclusions: Hydrotherapy improves the psycho-emotional state up to 3 months, with the biggest positive effect on stress reduction. The 20 g/l mineralization water in short time improves psycho-emotional state the best, while the 40g/l water effect is long-lasting.

TRIAL ON THE WATER CONSUMPTION BY THE STUDENTS AT THE FACULTY EDUCATION AND SPORT SUCEAVA

Sinziana Calina Silisteanu, Tadeus Francisc Danelciuc, Andrei Emanuel Silisteanu

"Stefan cel Mare" University of Suceava FEFS-DSDU, Romania

Introduction: Water is necessary to the body for an adequate health condition but the needs are different for each person. Water has the role of eliminating the toxins and of carrying the nutrients to the cellular level. The lack of water affects the kidney function and causes dehydration, fatigue and the accumulation of toxins.

Objectives: The trial focused on the effects of the water consumption by the students who did physical exercises regularly

Materials and Methods: The trial included a number of 131 students at the Faculty of Physical Education and Sport – "Stefan cel Mare" University Suceava, from the Department of Physical Education and from the Department of Health and Human Development. There were questionnaires which identified the type of consumed water, the consumed quantity, the day moment for the water consumption, the influence of water upon the quality of life. The trial was conducted over a period of six months.

Results: Among the 130 students included in the trial, it was found that 58 consumed still water regularly, 12 sparkling water and the rest consumed water from the city's network. The quantity of consumed water depended on the effort they made, on the day moment, on the physical and psychical condition, on the exam session or on the preparations for sports contests. After having been presented the benefits of water and the data that confirmed the usefulness and the importance of the regular water consumption, the students improved their results, so there were 87 students who consumed still water regularly and there were 20 students who consumed sparkling water regularly.

Discussions: The trial pointed out the fact that many students did not know clearly the benefits of the still water, the necessary daily quantity and the using moment. The consumption of still water was also correlated to the social status of the students, many of whom received a social scholarship. It was necessary for them to be presented in several stages the specialty literature data so that they could understand the role of water in the body and the importance to consume a daily quantity which could lead to the best health condition.

Conclusions: The still water has a special role in providing the good health condition, especially for young persons who do intellectual and physical activities. It is important to explain the role of still water by means of mass media but also by specialty works in order to have good body functions and to prevent diseases.

POSSIBILITIES FOR INTERNAL USE OF NATURAL MINERAL WATERS IN THE SYSTEM OF REHABILITATION OF PATIENTS WITH CHRONIC DISEASES

Ivan S. Lemko, Margarita O. Haysak

Scientific practical medical center "Rehabilitation" of the Ministry of Health of Ukraine, Uzhgorod, Ukraine

Introduction: Chronic prolonged duration of the diseases of cardiovascular, respiratory systems, digestive organs and other systems of the organism results in polymorbidity, progression of metabolic disorders, requires long-term medical support and impairs the quality of life of patients. Increasingly, in the non-acute period of the disease attention is being paid to the application of nonspecific effects aimed the universal mechanisms of diseases, functional and metabolic imbalances. In particular, for this case natural mineral waters (MW) may be used.

Objectives: Assessment of the possibility of natural MW use in the programs of long-term stage of medical rehabilitation in the most frequent chronic non-infectious diseases.

Methods: Evaluation and analysis of the main therapeutic effects of natural MW of various balneological groups and composition.

Results: Non-specific functional and metabolic effects of natural MW of various balneological groups are determined by the peculiarities of their chemical composition and biological properties and consist in three groups of effects – regulation of dysfunctions of organs and systems, activation of their adaptive-compensatory possibilities, functional rehabilitation of the system of metabolic protection. A large evidence base concerning effectiveness of MW use in the treatment and prevention of chronic diseases has been accumulated. A systemic alkalizing and acid-neutralizing, lipid-regulating effects of bicarbonate-containing MW; the influence of sulfate-containing MW on the function of the hepatobiliary system; diuretic

and anticrystal-forming effect of siliceous waters, and other effects of their internal use were studied. A differentiated approach to the use of MW allows early correction of functional reserves of the organism on the stage of dysfunction and metabolic imbalance, thus preventing the progression of the disease.

Conclusions: It was shown that natural MW are available, inexpensive, effective and flexible methods that can be an important component of treatment programs and long-term rehabilitation of patients with chronic non-infectious pathology.

POSSIBILITIES FOR BICARBONATE SODIUM MINERAL WATERS USE IN THE COMPLEX TREATMENT OF PATIENTS WITH TYPE2 DIABETES MELLITUS

Tetyana V. Chaikovska, Margarita O. Haysak, Lyudmyla V. Dychka, Oksana B. Lyahova, Nadiya A. Yakovenko, Olena P. Holubka

Scientific-practical medical center „Rehabilitation” of the Ministry of Health of Ukraine, Uzhgorod, Ukraine

Introduction: The correction of functional-metabolic disorders in patients with diabetes mellitus (DM) and comorbid gastroenterological pathology remains a complex problem of preventive medicine.

Objectives: Elevation the effectiveness of treatment and prophylaxis of functional and metabolic disorders in patients with DM comorbid with chronic gastroenterological pathology.

Methods: The effects of bicarbonate sodium mineral waters (MW) of different mineralization on the function of digestive organs and kidneys was evaluated in the series of single-dose studies in 70 healthy individuals and 10 patients with DM type 2. Results of the 24-days course of MW Polyana Kupil internal use on the background of basic hypoglycemic therapy in 50 patients with DM type 2 were studied. Blood glucose, urine α -amylase levels, calculated parameters of pancreatic secretory function, urine pH, urinary excretion of titrated acids and ammonium in the fasting period and 120 minutes after nutritional load were determined.

Results: It was testified that middle-mineralized MW, in particular, MW Polyana Kupil, in comparison with less mineralized waters, has a significantly more pronounced activating influence on the catalytic activity of pancreatic hydrolases in vitro and pancreatotropic effects. This group of MW has also higher acid-neutralizing and systemic alkalizing effects. These effects of MW provide a decrease by 50 % the average level of blood glucose in patients with DM (from $9,28 \pm 0,5$ mmol/l to $6,17 \pm 0,6$ mmol/l).

INTERNATIONAL SESSION VI

SESJA VI MIĘDZYNARODOWA

TRAINING, TEACHING AND RESEARCH – SESSION OF THE FRENCH SOCIETY OF THERMAL MEDICINE AND HYDROLOGY

SZKOLENIE, NAUCZANIE I BADANIA – SESJA FRANCUSKIEGO TOWARZYSTWA MEDYCYN Y UZDROWISKOWEJ I HYDROLOGII

UNIVERSITY TRAINING OF PHYSICIANS SPECIALIZED IN HYDROLOGY AND CLIMATOLOGY

Gisele Kanny

Laboratoire d'Hydrologie et Climatologie Médicales, Faculté de Médecine9, Nancy, France

Education in the practice of spa medicine aims to train practitioners in the prescription and the monitoring of spa treatments, the realization of complementary spa practices, the implementation of actions such as therapeutic education,

prevention and health promotion. In 2015, the need for newly trained doctors was estimated at 30 to 40 practitioners / year. Since 1988, the capacity of medical hydrology and climatology is the French diploma allowing specialist or generalist doctors to acquire skills in spa medicine. It is currently provided by 4 universities in France: Grenoble, Montpellier, Nancy and Toulouse. This training takes place over 2 years and is open after completion of the medical doctorate. It appeared necessary to consider a training dedicated to medical practices in spa that would allow students undergoing specialization (interns), physicians exercising an ancillary spa activity or reconverting late to the spa, to acquire a skill in this specific field. In 2015, on the initiative of Professor Christian Hérissou, the medical schools of Montpellier, Grenoble (Professor Patrick Carpentier) and Nancy (Professors Gisèle Kanny and Michel Boulangé) joined forces to build an interuniversity diploma in spa medical practices. This degree takes place over a university year and is built on the basis of 3 seminars of 2 days, organized in different spas that combine theoretical training with a discovery of thermal sites and practices. It is completed by a 35-hours traineeship in a spa. In 2018, the National Council of the College of Physicians recognized that this interuniversity degree grants the title of spa doctor. Students holding the interuniversity diploma can complete their training in climatology by enrolling in the second year of medical hydrology and climatology.

By optimizing the organization of education on a national level, the college of teachers has increased the number of doctors trained from a dozen in 2015 to sixty in 2019. The renewed interest in these trainings reflects the search of a holistic environmental health exercise.

TRAINING OF STAFF (CAREGIVERS AND OTHERS) WORKING IN SPA CENTERS

Karine Dubourg

France

In France, besides the specific training provided to doctors to obtain skills related to thermalism medicine, there are others training courses dedicated to the hydrotherapy professions in the thermal care sector, alongside which technical and maintenance trades coexist and those of the administrative sector.

Will be described successively the job of hydrotherapist which remains the reference profession of the care sector in the spa centers, then the paramedical staff (caregivers) with the nurses and the physiotherapists, the certificate of therapeutic patient education, the profession of spa manager and assistant spa manager and to finish the profession of thermalism technician or technical manager. Other activities and professions are also identified in the thermal establishments but are not always accompanied by a specific training in hydrotherapy.

It is important to precise that most graduate awarded in hydrotherapy follow the European framework of the LMD or Bachelor – Master – Doctorate system

In recent years, training courses in hydrotherapy or thermalism have gradually been structured, especially in trades where the levels of qualifications were the lowest. This approach has a tendency to extend to all the trades identified in a spa center as far as the health regulations are more and more drastic and the quality approaches more and more encouraged.

HYDROLOGY AND CLIMATOLOGY TEACHING IN PORTUGAL

Isabel Santos

Institute of Biomedical Sciences Abel Salazar, University of Porto, Porto, Portugal

In Portugal, as in other countries, the teaching of medical hydrology and climatology has undergone several changes. We approach the past, the present and future extension of education. It is urgent to continue to stimulate knowledge through teaching but also research with good scientific methodology. Finally, assertive disclosure should be uninterrupted, addressed to general population, health professionals and political-economic powers. It can be a good way to contribute to better health care where the well-being predominates, according to World Health Organization (WHO)!

SCIENTIFIC ASSESSMENT IN CLINICAL BALNEOLOGY: METHODOLOGICAL ISSUES FROM DATA OF THE AFRETH EXPERIENCE

C-F. Roques

Association Française pour le Recherche Thermale (AFRETH), Paris, France

The AFRETH was created 15 years ago and has enrolled 2277 patients to implement 11 clinical studies (RCT 7) now published in English speaking reviews with impact factor (16 papers). 7 clinical studies (4 ECR) enrolling 1427 patients are to be published. 4 RCT (600 patients to enrol) and a medico-economic study (1000 children to enrol) are in progress. 10 studies (9 RCT) are ongoing (1545 patients to enrol). Some studies (5 RCT) failed to enlist the number of patients (1138) beforehand calculated and provided only unusable data.

All these studies were addressing clinical issues in musculoskeletal, stress related disorders, metabolic, neurological, vascular, respiratory, urinary conditions, cancers consequences, ageing, prevention. From this particular experience some methodological data and issues can be identified and presented.

Are mainly concerned the design of the study, the paradigms of randomization and control treatments, the blinding, statistical analysis, patients' recruitment, endpoints, relevance of the observed improvement, PROM, PREM, qualitative methods of assessment, the investigation task force, financial cost.

The well-designed clinical studies are presently the best accepted way to actual medical benefit assessment; this paper offered us the opportunity to cope with some obstacles to the implementation of such studies in the field of balneology.

SOME EXAMPLES OF APPROPRIATE DESIGN TO EVALUATE CRENOBALNEOTHERAPY

Romain Forestier, Fatma Begüm Erol Forestier, Araceli Muela Garcia, Alain Françon

Centre de Recherche Rhumatologique et Thermale, Aix-les-Bains, France

There are two main particularities of studies on crenobalneotherapy: it is a multicomponent treatment and it is difficult to obtain the blinding of subjects. Evaluation of crenobalneotherapy should be based on a appropriate statistical analysis. Sometimes showing a statistical difference is not enough to show that the treatment is effective.

The most common way to evaluate is to use an open study. It is the simplest and also the cheapest evaluation method. Unfortunately in this kind of design, patient's improvement is not only the result of the treatment effect, but it can also be the result many bias that will be discussed (history, testing, instrumentation & regression to the mean)

That's why it is more appropriate to use comparative studies. But some other bias can occur in these trials especially the selection bias.

Some trials are comparing balneotherapy with no treatment. It may induce other bias: attrition & selection-interaction.

One way to decrease the attrition bias is to use the "waiting list design" but it may lead to a deception bias in the control group.

One possibility to decrease the deception bias is to compare spa treatment to an active treatment but in this case it will be more difficult to show the superiority of the spa treatment. Another way is to attempt a partial blinding of the patients by the "Zelen method". The design will be explained and discussed.

In fact, patient's blinding problem, in the background, reflects the problem of patient's preference that may influence the result of the comparison. Potential difficulties and interests of "patient's preference design" that has never been used in crenobalneotherapy will be discussed.

PLACE OF CRENOBALNEOTHERAPY (CBT) IN INTERNATIONAL GUIDELINES OR RECOMMENDATIONS. PREPONDERANCE OF EVIDENCE OR EXPERT OPINION? EXAMPLES OF CHRONIC LOW BACK PAIN (CLBP) AND KNEE OSTEOARTHRITIS (KOA)

Alain Françon, Araceli Muela Garcia, Fatma Begum Erol Forestier, Isabel Santos, Romain Forestier

Centre de Recherches Rhumatologiques et Thermales, Aix-Les-Bains, France

Introduction: CLBP and KOA are the two most evaluated diseases in CBT. However, there seem to be a few guidelines that recommend CBT.

Objectives: to evaluate the scientific level of evidence obtained by randomized clinical trials (RCTs) in the evaluation of CBT in LBP and KOA and seek the presence of CBT in the latest published international, US, UK and French national recommendations or guidelines.

Methods: Bibliographic analysis was performed by 3 reviewers (AF, RF, IS) on PUBMED and PEDRO databases with: "low back pain", "knee osteoarthritis" AND "recommendations" and "guidelines" AND keywords to identify RCTs on CBT. Then we sought the presence of "CBT" or "balneotherapy" or "spa therapy" in the latest international, US, UK, French national recommendations or guidelines.

Results: in CLBP we found 18 RCTs published assessing CBP but there is no sign that it has been evaluated or even mentioned as an effective treatment in the latest recommendations or guidelines. In KOA, we found 29 published RCTs and a single recommendation for a subgroup of patients with "multiple-joint osteoarthritis and comorbidities" in 2014 OARSI (Osteoarthritis Research Society International) guidelines.

Discussion and Conclusion: Despite of numerous RCTs published, CBT appears either very rarely or does not appear at all in the recommendations and guidelines for CLBP or KOA. This can have several explanations: 1°) The bibliographic research is often not exhaustive and sometimes excluded CBT trials, 2°) The methodologic quality of the published clinical trials is not sufficient to convince the experts. 3°) The experts may have negative prejudgment against the spa treatment, especially when they come from countries where spa therapy is not recognized as a usual treatment modality like US, UK, Northern European countries.

The publication of new RCTs with high methodological quality is needed to improve the level of scientific evidence and the opinion of the experts on CBT. An improvement of the bibliographic research is also essential to avoid a "biographical research bias" when establishing guidelines and recommendations.

SESSION VII

SESJA VII

NAJCZĘSTSZE CHOROBY ZAKAŻNE W PRAKTYCE BALNEOLOGICZNEJ: MOŻLIWOŚCI WYKORZYSTANIA NOWOCZESNEGO LECZENIA UZDROWISKOWEGO

STŁUSZCZENIOWA CHOROBA WĄTROBY I PRZEWLEKŁE WIRUSOWE ZAPALENIA WĄTROBY – ROSNĄCY PROBLEM ZDROWIA PUBLICZNEGO

Małgorzata Inglot

Katedra i Klinika Chorób Zakaźnych, Chorób Wątroby i Nabytych Niedoborów Odpornościowych, Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu, Polska

Przewlekłe choroby wątroby o etiologii infekcyjnej, autoimmunologicznej oraz rozwijające się na podłożu zaburzeń metabolicznych są istotnym problemem zdrowia publicznego. Sytuacja epidemiologiczna zakażeń wirusami hepatotropowymi wywołującymi przewlekłe zapalenia wątroby tj wirusem B i C zapalenia wątroby (HBV i HCV) w Polsce poprawia się w wyniku prowadzenia od wielu lat szeroko zakrojonego programu szczepień ochronnych p/wzw B oraz coraz lepszego od kilku lat

dostępu do leków przeciwwirusowych hamujących replikację HBV i HCV. Nadal jednak szacuje się, że zapalenia wątroby wywołane przez HBV i HCV dotyczą około pół miliona osób. Bez stosowania skutecznego leczenia ich konsekwencją może być rozwój marskości wątroby i raka wątrobowokomórkowego. Niezwykle ważna jest wczesna diagnostyka, propagowanie badań przesiewowych wykrywających osoby zakażone. Na podkreślenie zasługuje bardzo wysoka, zbliżona do 100% skuteczność leczenia przeciwwirusowego w zakażeniu HCV, co daje szansę na zahamowanie progresji choroby wątroby na każdym etapie.

Stłuszczeniowe niealkoholowe zapalenie wątroby (ang. NASH – non alcoholic steatohepatitis, NAFLD – non alcoholic fatty liver disease) jest najczęstszą przewlekłą chorobą wątroby w krajach uprzemysłowionych, występuje w tych krajach u 3-5% populacji. Z występowaniem niealkoholowego stłuszczenia wątroby ściśle związana jest otyłość – u 90% chorych BMI przekracza wartość 35. Dieta zawierająca nadmiar węglowodanów i tłuszczów oraz brak dostatecznej aktywności ruchowej to ważne czynniki usposabiające do rozwoju stłuszczenia wątroby. Choroba może jednak także rozwinąć się u osób z prawidłową masą ciała.

Główną przyczyną niealkoholowej stłuszczeniowej choroby wątroby są zaburzenia przemiany materii. Stwierdza się je bardzo często w nierozpoznanej albo niewłaściwie leczonej cukrzycy typu 2. U pacjentów z cukrzycą typu 2, nadciśnieniem oraz zaburzeniami gospodarki lipidowej stłuszczenie wątroby jest manifestacją tzw. zespołu metabolicznego.

U części chorych NASH może być chorobą o agresywnym przebiegu u ~15-50% chorych na podłożu stłuszczenia rozwija się włóknienie i marskość wątroby, a u 25% chorych może dojść do powstania raka wątrobowokomórkowego.

Podstawowym badaniem pozwalającym wykryć stłuszczenie wątroby jest badanie USG. Dla uzyskania pełnego obrazu choroby konieczne jest wykonanie podstawowych badań biochemicznych (m.in. AspartAT, AlAT, GGTP, glukoza, lipidogram). W diagnostyce pomocne jest badanie elastograficzne wątroby a ostateczne rozpoznanie ustala się na podstawie badania histopatologicznego.

Leczenie jest kompleksowe i obejmuje przede wszystkim zmianę diety i stylu życia, redukcję masy ciała, wyrównanie zaburzeń metabolicznych oraz stosowanie leków hepatoprotekcyjnych. Zachęcające są wyniki wielu prowadzonych aktualnie badań klinicznych nowych leków hamujących rozwój stłuszczeniowej choroby wątroby.

BORELIOZA

Tomasz Smiatacz

Klinika Chorób Zakaźnych GUMed, Gdańsk, Polska

Borelioza jest jedną z nielicznych chorób zakaźnych o wzrastającej w ostatnich latach zapadalności. Jej czynnikiem etiologicznym jest bardzo nietypowa bakteria *Borrelia burgdorferi*, a do zakażenia dochodzi poprzez ukłucie kleszcza. Wobec braku dostępnej szczepionki jedyną dostępną profilaktyką jest dokładne obejrzenie skóry po wizycie w lesie i niezwłoczne usuwanie dostrzeżonych kleszczy. Pamiętać jednak należy, że nie każde ukłucie kleszcza prowadzi do zakażenia, a ponadto jedynie cztery spośród ponad dwudziestu gatunków *B. burgdorferi* ma zdolność do wywołania zmian chorobowych u ludzi, mimo iż kontakt z wszystkimi spośród nich pozostawia we krwi przeciwciała, dlatego co do zasady nie leczy się bezobjawowych odczynów serologicznych. Objawy chorobowe są mało specyficzne (poza rumieniem wędrującym), ważnym problemem jest przypisywanie boreliozie objawów innych chorób neurologicznych, reumatologicznych czy psychiatrycznych. Sporo trudności nastręcza też interpretacja wyników badań serologicznych. Niestety, nie opracowano jak dotąd w diagnostyce boreliozy metod skuteczniejszych niż badania serologiczne (oraz, w bardzo nielicznych przypadkach, PCR); inne metody diagnostyczne mają status eksperymentalnych lub alternatywnych. Należy też pamiętać, że po wyleczeniu zakażenia *B. burgdorferi* przeciwciała pozostają obecne w surowicy przez wiele lat, nie świadczą o toczącej się infekcji i nie chronią przed reinfekcją.

Wiele kontrowersji budzi przede wszystkim sposób leczenia boreliozy, a w szczególności jego czas i ilość równolegle stosowanych antybiotyków. Należy podkreślić, że jak dotąd nie udokumentowano zjawiska lekooporności wśród krętków, a dyskutowane alternatywne formy morfologiczne *B. burgdorferi* nie mają wpływu na wyniki standardowego leczenia. W leczeniu boreliozy ważne jest odróżnienie pojęć: „zakażenie” i „zapalenie”. Niezależnie od alternatywnych doniesień internetowych – zgodnie z medycyną opartą na dowodach borelioza pozostaje chorobą w pełni uleczalną, a monoterapia doksycyliną, amoksycyliną lub cefalosporynami nie powinna być przedłużana ponad 21-28 dni.

KLESZCZOWE ZAPALENIE MÓZGU (KZM) – NIEDOCENIANE ZAGROŻENIE

Joanna Zajkowska

Klinika Chorób Zakaźnych i Neuroinfekcji, Uniwersytet Medyczny w Białymstoku, Polska

W ciągu ostatnich lat obserwuje się wzrost zachorowań oraz ekspansję na nowe terytoria wirusa kleszczowego zapalenia mózgu (KZM) nie tylko w Polsce ale w większości krajów otaczających. Zarejestrowane w Polsce przypadki nie odzwierciedlają rzeczywistej sytuacji, ze względu na utrudniony dostęp do badań serologicznych). Aktywność kleszczy zaczyna się wiosną, gdy temperatury wynoszą powyżej 10 stopni, i trwa aż do coraz późniejszej jesieni

Do zakażenia wirusem KZM dochodzi często na skutek niezauważonego ukłucia przez kleszcza (w odpowiednich warunkach ekspozycji). Większość infekcji po ukąszeniu przez kleszcze jest asymptomatycznych – w przypadku, gdy układ immunologiczny człowieka i jego narzędzia obrony przed patogenami działają skutecznie. U osób, u których nie dojdzie do eliminacji wirusa w miejscu zakażenia, rozwija się wiremia. Jeśli dojdzie do wiremii, choroba objawia się: gorączką, bólami mięśni, kości i głowy. Zakażenia takie – zwane poronnymi – często nie są identyfikowane jako infekcje wywołane przez wirus kleszczowego zapalenia mózgu. Liczba takich zachorowań pozostaje niedoszacowana ze względu na: podobieństwo do innych zakażeń wirusowych, brak potwierdzenia serologicznego i brak konieczności hospitalizacji. Jeśli infekcja nie zostanie pokonana, w kolejnym etapie dochodzi do zajęcia ośrodkowego układu nerwowego (OUN). Najczęściej rozwija się zapalenie opon mózgowo-rdzeniowych, rzadziej mózgu i rdzenia kręgowego często z porażeniami splotów barkowych, kończyn dolnych, porażeniami nn czaszkowymi i licznymi powikłaniami. W nielicznych pracach, pokazujących rozmieszczenie wirusa w OUN w badaniach immunohistochemicznych czy autopsyjnych, wskazywano, że znajdowany on był we wszystkich strukturach mózgu, ze szczególną predyspozycją do: wzgórz, podwzgórz, okolicy podkorowej, schodząc w dół zajmował natomiast mózdzek i rdzeń kręgowy. Problem niedostatecznej odporności przeciwwirusowej dotyczy licznej grupy osób z immunosupresją, leczonej z powodu innych chorób (transplantacje, choroby z autoagresji). Jak potężny jest potencjał wirusa obrazują przypadki osób leczonych immunosupresyjnie u których choroba zwykle kończy się zgonem. Przestrzeganie indywidualnej ochrony przed pokłuciem przez kleszcze może być niewystarczające. Zastosowanie szczepionki (szczególnie w przypadku, gdy mechanizmy odpornościowe są słabsze, np.: z powodu wieku i innych chorób oraz w grupie dzieci) u osób zamieszkujących obszary wysokiego ryzyka jak i spędzających dużo czasu na świeżym powietrzu (właściciele psów, osoby biegające, uprawiające nordic walking czy posiadacze działek i ogrodów) jest najwłaściwszym postępowaniem chroniącym przed KZM.

PÓŹNE ROZPOZNANIA ZAKAŻENIA HIV. RÓWNIEŻ BALNEOLOG MOŻE PRZYSPIESZYĆ ROZPOZNANIE

Jacek Gąsiorowski

Katedra i Klinika Chorób Zakaźnych, Chorób Wątroby i Nabytych Niedoborów Odpornościowych, Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu, Polska

Zakażenie HIV nie stanowi oddzielnego wskazania do leczenia uzdrowiskowego, jednak pacjenci zakażeni HIV odnosić mogą duże korzyści zdrowotne z takiego leczenia schorzeń współistniejących z zakażeniem HIV. Nie są to choroby specyficznie związane z zakażeniem, ale stany chorobowe będące tradycyjnym wskazaniem do leczenia w sanatorium, które u osób żyjących z HIV występują z częstotnością i nasileniem zwykle istotnie większym niż w populacji ogólnej. Szacuje się, że ponad 20% ludzi zakażonych HIV w Polsce nie zna jeszcze swego statusu serologicznego, dotyczy to zwłaszcza osób po 40 roku życia. Podczas leczenia uzdrowiskowego specjalista balneolog, który posiada podstawową wiedzę na temat kliniki zakażeń HIV powinien zwrócić uwagę na objawy mogące wskazywać na zakażenie HIV, może zalecić pacjentowi wykonanie badania w trakcie lub po zakończeniu leczenia sanatoryjnego. Pobyt w uzdrowisku stwarza może okoliczności sprzyjające nabyciu zakażenia HIV. Naturalne czynniki przyrodnicze, klimatoterapia i terenoterapia będące tak istotnymi czynnikami leczącymi w medycynie uzdrowiskowej wpływają też na poprawę stanu psychicznego pacjentów – zmniejszają stres, lęk, powodują odprężenie, poprawiają nastrój, ale również zwiększają poczucie własnej wartości, wpływają również pozytywnie na funkcje seksualne – zwiększają libido. Stan taki może sprzyjać podejmowaniu przypadkowych kontaktów seksualnych. Specyfiką zakażeń nabywanych w sanatorium jest to, że dotyczą one najczęściej ludzi starszych, którzy nie widzą już konieczności stosowania prezerwatywy, traktują ją jedynie jako środek antykoncepcyjny, a antykoncepcja w ich wieku nie jest już potrzebna. Jednocześnie zmiany w obrębie narządów płciowych w okresie menopauzalnym sprzyjają łatwiejszemu zakażeniu HIV. Ponadto do używania prezerwatyw zniechęcają nadal panujące stereotypy – uważa się że choroby weneryczne, w tym HIV dotyczy tylko i wyłącznie osób młodych należących do tzw. grup ryzyka.

Podczas wykładu zaprezentowane zostaną podstawowe informacje na temat obrazu klinicznego zakażenia HIV, jego przebiegu, możliwości wykrywania, w tym szczególnie, jakie sytuacje kliniczne powinny zwrócić uwagę lekarza na możliwość zakażenia HIV u pacjenta. Poruszony zostanie również istotny w Polsce problem późnych rozpoznań zakażeń HIV, zwłaszcza u osób starszych.

OCENA KLINICZNA ZASTOSOWANIA KURACJI PITNEJ WODĄ HUMUSOWĄ U PACJENTÓW Z ALKOHOLOWYM USZKODZENIEM WĄTROBY

Natallia Veryho, Marcin Ziółkowski, Damian Czarnecki, Maria Kłopocka, Jacek Budzyński

Uniwersytet Mikołaja Kopernika w Toruniu, Polska

Wprowadzenie: Woda humusowa (WH) jest naturalnym roztworem kwasów humusowych (KH), unikalną w skali światowej wodą mineralną podziemną pierwotnie czystą. Przeprowadziliśmy pierwsze w Polsce badanie kliniczne zastosowania kuracji pitnej wodą humusową.

Celem pracy było ocena wpływu kuracji pitnej WH na czynność wątroby u pacjentów z uzależnieniem od alkoholu.

Metody: W badaniu uczestniczyło 50 pacjentów grupy badawczej i 42 pacjentów grupy kontrolnej, uzależnionych od alkoholu. Leczenie i badanie prowadzone w Oddziale Leczenia Uzależnień w Klinice Psychiatrii w Bydgoszczy. Pacjentom grupy badawczej podawano wodę humusową 3 razy dziennie przed posiłkami przez 30 dni w ilości 8 ml/kg masy ciała (1,7 mg KH na kg masy ciała), pacjentom grupy kontrolnej zalecano picie analogicznych ilości wody gospodarczej.

Przed i po leczeniu w obu grupach przeprowadzono badanie laboratoryjne (morfologia krwi i biochemiczne badanie krwi), badanie obrazowe wątroby (USG) oraz badanie jakości życia dla pacjentów z przewlekłymi chorobami wątroby na podstawie kwestionariusza CLDQ (Chronic Liver Disease Questionnaire).

Wyniki: Nikt z pacjentów nie zgłaszał żadnych niepokojących objawów ubocznych stosowanej terapii; parametry morfologii krwi, wskaźnik CRP, parametry odzwierciedlające czynność nerek, bilans elektrolitowy pozostawały w granicach normy co przemawia za bezpieczeństwem prowadzonej kuracji pitnej WH. W obu grupach wartości AspAT, GGTP, bilirubiny, wielkości wątroby obniżyły się statystycznie istotnie osiągając praktycznie poziom w zakresie normy. W grupie badawczej wartość AlAT oraz wielkość żyły wrotnej obniżyły się istotnie w stosunku do wartości wyjściowych. Analizy porównawcze wyników jakości życia przed i po leczeniu wykazały istotną poprawę w obu grupach w teście CLDQ. W obu grupach uzyskano istotną poprawę w zakresie reakcji emocjonalnych oraz nerwowości. W grupie badawczej uzyskano istotną poprawę jakości życia we wszystkich pozostałych domenach tj. poczucia zmęczenia, aktywności życiowej, objawów brzusznych, objawów ogólnych w stosunku do wartości wyjściowych.

Wnioski: Badana woda humusowa nie wywołuje skutków ubocznych, jest dobrze tolerowana przy stosowaniu w kuracji pitnej u pacjentów z uzależnieniem od alkoholu w czasie kuracji odwykowej. Uzyskane efekty korzystnego działania WH na czynność wątroby sugerują możliwość i celowość ich wykorzystania u osób z chorobami i zaburzeniami czynności wątroby.

SESJA VIII

SESSION VIII

KLIMATOLOGIA UZDROWISKOWA

REPREZENTATYWNOŚĆ POMIARU HAŁASU NA TERENIE UZDROWISK

Jarosław Baranowski, Krzysztof Błazejczyk

Instytut Geografii i Przestrzennego Zagospodarowania PAN, Warszawa, Polska

Słownik Języka Polskiego określa hałas jako „dźwięk niepożądany lub szkodliwy dla zdrowia ludzkiego”. Podobnie jest on definiowany w Encyklopedii PWN „hałas, dźwięk niepożądany, którego działanie może być uciążliwe lub szkodliwe dla

człowieka”. W otoczeniu człowieka do najważniejszych źródeł hałasu należą środki transportu (hałas: drogowy, kolejowy, lotniczy). O ile w pewnym zakresie jesteśmy w stanie odizolować się od komunalnych, społecznych i przemysłowych źródeł hałasu, o tyle hałas komunikacyjny jest powszechny w naszym otoczeniu i dotyczy to również uzdrowisk, a w szczególności strefy A. Hałas związany z ruchem samochodowym jest integralnym elementem życia we współczesnych uzdrowiskach. Jego natężenie wzrasta systematycznie wraz z bogaceniem się społeczeństwa. Większość kuracjuszy dojeżdża własnymi pojazdami do miejsca zakwaterowania. Wymaga to rozbudowy sieci drogowej oraz powstawania nowych miejsc parkingowych.

Niniejsze opracowanie przedstawia wyniki badania klimatu akustycznego na terenie uzdrowisk, jednak szczególna uwaga została poświęcona nie tyle samym wynikom pomiarów, ile metodyce doboru punktów pomiarowych i ich reprezentatywności. Bardzo istotnym elementem przed rozpoczęciem pomiarów jest szczegółowe rozpoznanie topografii uzdrowiska, jego sieci drogowej, dostępności komunikacyjnej do poszczególnych obiektów, natężenia ruchu na poszczególnych odcinkach. Dobre rozpoznanie pozwala zidentyfikować podstawowe źródła hałasu i ich charakter, co warunkuje wytypowanie konkretnych miejsc, w których prowadzone będą pomiary. Każdorazowo konieczna jest optymalizacja liczby punktów z uwagi na kosztocłonność pomiarów (koszt aparatury, obsługi). Ważny jest także problem terminu prowadzenia pomiarów oraz liczby ich powtórzeń.

W referacie analizowane są podstawowe charakterystyki klimatu akustycznego: średni i maksymalny równoważny poziom dźwięku, czas występowania hałasu o określonym natężeniu (50 i 45 dB). Cechy klimatu akustycznego są zestawiane z intensywnością ruchu i strukturą pojazdów na badanych odcinkach dróg. Omawiana jest także propagacja dźwięku w otoczeniu tras komunikacyjnych oraz wpływ lokalnych cech środowiska (rzeźby i wilgotności terenu) na rozprzestrzenianie się hałasu. Poruszony będzie także problem reprezentatywności pomiarów prowadzonych metodą ciągłą w ograniczonym czasie. Dyskutowane są także możliwe środki zmniejszające poziom hałasu w otoczeniu dróg.

Granica między hałasem dokuczliwym, a niedokuczliwym jest płynna i zależna nie tylko od rodzaju słyszanych zakłóceń, ale również od odporności nerwowo-psychicznej człowieka, jego chwilowego nastroju lub rodzaju wykonywanej pracy. Bardzo często ten sam zespół dźwięków może w pewnych przypadkach wywoływać wrażenie przyjemne, a w innych nieprzyjemne.

ADAPTACJA POPULACJI DO SKRAJNYCH WARUNKÓW TERMICZNYCH W POLSCE

Magdalena Kuchcik

Zakład Geoekologii i Klimatologii, IGI PAN, Warszawa, Polska

Warunki pogodowe są jednym z wielu czynników ryzyka zgonu, jednak w ekstremalnych warunkach pogodowych to one stają się głównym czynnikiem ryzyka, prowadząc pośrednio, a niekiedy także bezpośrednio do zgonu. Wraz z notowanym od lat 90. wzrostem częstości i intensywności fal upałów wzrosło zainteresowanie ich wpływem na umieralność.

W tej sytuacji Autorka dysponując dobowymi sumami zgonów z lat 1975-2014, z 8 największych miast Polskich dokonała próby odpowiedzi na pytanie czy wraz ze wzrostem częstości skrajnych warunków termicznych w XXI wieku występuje złagodzenie wzrostu umieralności w porównaniu do lat 80. i 90. XX wieku.

W celu sprawdzenia powyższej hipotezy obliczono ryzyko względne zgonu w czasie trwania okresów gorących i zimnych do 7 dni po ich zakończeniu (z podziałem na płeć, wiek, przyczyny zgonu w 8 wybranych miastach) i porównano je w kolejnych dekadach 40-lecia (1975-1984, 1985-1994, 1995-2004, 2005-2014) uwzględniając częstość okresów termicznie skrajnych. Analizę umieralności przeprowadzono z wykorzystaniem uogólnionych modeli addytywnych GAM, w których uwzględniono długookresowy trend i zmienność sezonową liczby zgonów, rok, dzień tygodnia oraz średnią dobową temperaturę powietrza.

Analiza ryzyka względnego zgonu (RR) w okresach gorących między poszczególnymi dekadami wykazała, że w 6 na 8 analizowanych miast w dekadzie 2005-2014 RR zgonu było zdecydowanie niższe w porównaniu z poprzednimi dekadami. Wzrost ryzyka względnego zgonu ogółem w falach upałów w dekadzie 1985-1994 wyniósł 29%, zaś w dekadzie 2005-2014 – 17%, podobnie wzrost RR z powodu chorób układu krążenia wśród kobiet wyniósł odpowiednio 46% i 19%, zaś wśród mężczyzn 15% i 12%.

W okresach zimnych najwięcej istotnych wzrostów umieralności odnotowano w dekadach 1985-1994 i 2005-2014. W Białymstoku wzrost RR ogółem w dekadzie 2005-2014 sięgał 36%, a z powodu chorób układu krążenia 56%. W Łodzi i Warszawie wzrost RR był najwyższy w latach 2005-2014 i sięgał 31% dla zgonów ogółem i 44% z powodu chorób układu krążenia w Łodzi i odpowiednio 11% i 12% w Warszawie. W Poznaniu z kolei RR było najwyższe w latach 1985-1994. W niektórych miastach, jak w Poznaniu czy Lublinie w ostatnich latach umieralność wyraźnie zmalała, w większości miast – wzrosła.

Wyniki świadczą o adaptacji Polaków do warunków gorących, w tym zwłaszcza kobiet, w mniejszym stopniu mężczyzn. Nie wiadomo jednak czy adaptacja ta ma cechy biologiczne czy jest tylko adaptacją behawioralną, gdyż poszerzyła się znajomość zachowań mających na celu unikanie lub osłabianie negatywnych skutków upałów. Proces adaptacji do warunków skrajnie mroźnych ogólnie nie jest widoczny.

OCENA WŁAŚCIWOŚCI KLIMATU – DYLEMATY NAUKOWE I PRAWNE

Krzysztof Błażejczyk, Anna Błażejczyk, Magdalena Kuchcik, Jarosław Baranowski

Instytut Geografii i Przestrzennego Zagospodarowania PAN, Warszawa, Polska,
Pracownia Bioklimatologii i Ergonomii Środowiskowej, Warszawa, Polska

Ustawa uzdrowskowa nakazuje przeprowadzenie co 10 lat badań mających na celu potwierdzenie leczniczych właściwości bioklimatu. Jednocześnie Rozporządzenie Ministra Zdrowia precyzuje zakres tych badań i okres, który powinny obejmować. Obecnie jest to okres 24 miesięcy poprzedzających wydanie odpowiedniego świadectwa.

W zakres badań wchodzi poznanie zarówno różnych cech klimatu i bioklimatu, jak również stanu czystości powietrza oraz natężenia hałasu i pól elektromagnetycznych. Wyniki badań prowadzonych od wielu lat w większości polskich uzdrowisk pokazują, że podany w Rozporządzeniu MZ dwuletni okres jest wystarczający jedynie do oceny warunków aerosanitarnych, klimatu akustycznego i pól elektromagnetycznych. W przypadku oceny różnych cech klimatu i bioklimatu okres ten jest zdecydowanie zbyt krótki. Decyduje o tym duża, typowa dla obszaru Polski, zmienność warunków pogodowych klimatycznych nie tylko w skali dobowej i sezonowej, ale także pomiędzy kolejnymi latami. Światowa Organizacja Meteorologiczna podaje, że minimalny okres obserwacji uprawniający do określenia warunków klimatycznych w danym miejscu wynosi 10 lat, a okres optymalny – 30 lat.

Odrębnym zagadnieniem jest fakt, że w Rozporządzeniu MZ brak jest precyzyjnych kryteriów oceny większości cech klimatu, które w istotny sposób wpływają na przebieg i wyniki leczenia klimatycznego w uzdrowiskach.

Celem referatu jest przedstawienie kilku przykładów ilustrujących diametralnie różne oceny cech klimatu zależnie od tego, które 2 lata badań uwzględnimy i porównanie ich z ocenami wykonanymi na podstawie danych co najmniej 10-letnich. Przedstawione zostaną także propozycje uszczegółowienia kryteriów ocen niektórych cech klimatu.

OCENA ZINTEGROWANEGO SYSTEMU ANTYOKSYDACYJNEGO USTROJU I ZJAWISKO ODCZYNU UZDROWISKOWEGO W PRZEBIEGU RADONOTERAPII – BADANIA PILOTAŻOWE

Jadwiga Kuciel-Lewandowska

Uniwersytet Medyczny, Katedra Fizjoterapii, Wrocław, Polska

Wstęp: Odczyn uzdrowskiowy jest odczynem adaptacyjnym organizmu, powstającym na skutek działania czynników zewnętrznych. Jest to korzystny element terapii uzdrowskiej prowadzący do istotnych dla organizmu przemian metabolicznych. Efektem tych zmian jest wzrost odporności i aktywności odczynów regeneracyjnych. Mechanizm powstawania odczynu nie do końca jest znany.

Cel pracy: Celem pracy była ocena zmian zachodzących w zakresie zintegrowanego układu antyoksydacyjnego ustroju w przebiegu radonoterapii szczególnie w aspekcie odczynu uzdrowskiego.

Materiał i metody: Badania przeprowadzono w Uzdrowisku Świeradów-Zdrój. Obserwacją objęto pacjentów poddanych terapii wodą radocynną. Przed terapią, po 5. oraz po 18. dniach leczenia dokonano oceny całkowitego statusu antyoksydacyjnego (ang. TAS) standardowym testem kolorymetrycznym. Grupę badaną stanowiło n=35 pacjentów z chorobą zwyrodnieniową stawów i kręgosłupa. Grupę kontrolną stanowiło 15. osób wybranych spośród pracowników uzdrowiska, obciążonych również chorobą zwyrodnieniową, nie korzystających z terapii radonowej (bez kontaktu z radonem).

Wyniki: W piątym dniu terapii stwierdzono w obu grupach wzrost TAS ze znacznie gorszym wynikiem w grupie kontrolnej. Po terapii w grupie badanej nastąpił wzrost stężenia TAS, a w grupie kontrolnej zdecydowany spadek TAS.

Wnioski: 1. Wykazano korzystny wpływ zabiegów radonowych na wzrost całkowitego statusu antyoksydacyjnego ustroju u pacjentów leczonych w uzdrowisku. 2. Wzrost TAS w piątym dniu terapii może wskazywać na związek tych zmian ze zjawiskiem odczynu uzdrowskiego. 3. Zaistniałe zmiany są wynikiem działania małych dawek promieniowania jonizującego, pochodzącego z radonu rozpuszczonego w wodzie leczniczej zastosowanej w terapii.

PROFILAKTYKA ZESPOŁU POZAKRZEPOWEGO I LECZENIE UZDROWISKOWE PRZEWLEKŁEJ NIEWYDOLNOŚCI ŻYLNEJ

Antoni Stadnicki, Iwona Stadnicka

Katedra Podstawowych Nauk Biomedycznych, Wydział Farmacji z Oddziałem Analityki Medycznej w Sosnowcu, Śląski Uniwersytet Medyczny, Katowice, Polska, Uzdrowisko Połczyn Zdrój, Polska

Wprowadzenie: Przewlekła niewydolność żylna (PNŻ) układu żylnego kończyn dolnych to częsta choroba dotycząca ok. 30 % dorosłej populacji w krajach Zachodu. Charakterystyczne cechy kliniczne PNŻ to występowanie żylaków z jednoczesnych obrzękiem podudzi, a w stadium zaawansowanym również owrzodzeń. W oparciu o patofizjologiczne cechy i kliniczne objawy przedstawia się klasyfikację CEAP (*Clinical-Etiology-Anatomic-Pathophysiologic classification*). W patogenezie PNŻ podkreśla się znaczenie niedrożności żylną i wstecznego przepływu krwi.

Metody: Przeglądu artykułów w bazach elektronicznych Pubmed i Medline według haseł: chronic venous insufficiency, postthrombotic syndrom, w połączeniu z hasłami: coagulation, balneotherapy, hydrotherapy.

Wyniki: Najczęstsze przyczyny PNŻ to pierwotna, wrodzona niewydolność zastawek żylnych i otyłość, szczególnie w wieku podeszłym. Częstym czynnikiem ryzyka PNŻ jest również zespół pozakrzepowy, powikłanie występujące w 20-50 % po żylnym epizodzie zatorowo-zakrzepowym (z-z), szczególnie jeśli zmiana z-z jest w żyłach głębokich, proksymalnych kończyny dolnej. Czynniki ryzyka zmian z-z w można przedstawić w oparciu o triadę Vichowa tj. aktywacja układu krzepnięcia (trombofilia nabyta lub wrodzona), uszkodzenie śródbłonna naczyń i zaburzenia przepływu krwi żylną. W leczeniu, które stanowi również prewencję PNŻ określanej jako zespół pozakrzepowy, stosuje się heparynę drobnocząsteczkową przez 5 dni z jednoczesnym podaniem leku doustnego (acenokumarol lub warfaryna) przez 3-6 miesięcy. Jednoczesne leczenie środkami mechanicznymi ma formę bandażu elastycznego od drugiego dnia choroby, a następnie pończoch uciskowych. Niedawne próby kliniczne wskazują, że stosowanie nowych leków przeciwkrzepliwych tj. inhibitorów czynnika X i inhibitorów trombiny zmniejsza częstość zespołu pozakrzepowego. Istotna jest ocena układu żylnego kończyny za pomocą kompresyjnej ultrasonografii, gdy ucisk żył przez sondę ultradźwiękową pozwala ocenić występowanie i lokalizację zmiany zakrzepowej. W przypadkach organizacji zakrzepu żylnego leczenie przeciwzakrzepowe i ocenę ultrasonograficzną należy przedłużyć. Leczenie farmakologiczne PNŻ jest mało skuteczne, stąd rola kinezyterapii, balneoterapii i fizykoterapii. Leczeniem uzdrowiskowym mogą być objęci pacjenci w czasie co najmniej sześciu miesięcy po ustąpieniu cech epizodu z-z. Wśród klasycznych zabiegów stosowanych w uzdrowisku, kąpiel kwasowęglowa wpływa korzystnie na procesy krzepnięcia i fibrynolizy. Również zabiegi ozonowe normalizują reologie krwi i układ hemostazy. Hydroterapia powinna być w formie zabiegów chłodnych, wraz z kinezyterapią, która wpływa pozytywnie na krążenie krwi i aktywność fibrynolityczną. Autorzy włoscy wskazują również na korzystny efekt kąpieli mineralnych w wodach solankowych zawierających jod lub brom. Niedawne, nieliczne, randomizowane oceny kliniczne wskazują na korzystny efekt balneofizykoterapii u pacjentów z PNŻ. Badacze niemieccy poddali porównawczej ocenie grupę chorych z PNŻ (C3 i C4 stopnia) u których zastosowano podczas 3-tygodniowej standardowej terapii uzdrowiskowej i dodatkowo polewania wodne wg. Kneippa, ćwiczenia w basenie z wodą mineralną i masaż podwodny. W grupie tej wykazano znamienne poprawę odnośnie dolegliwości (parastezje, bóle, uczucie ciężkości) oraz objawów (zmiany skórne, obrzęki). Autorzy francuscy przedstawili wielośrodковую porównawczą terapię u pacjentów z pierwotną i w zespole pozakrzepowym PNŻ w stadium C5 i C6. Pacjenci byli poddani 4 sesjom/dz. balneoterapii z cyklami masażu podwodnego mechanicznego przez 3 tygodnie. Ocena po 6 i 12 miesiącach wykazała znamienne poprawę objawów subiektywnych i obiektywnych PNŻ. W grupie badanej nie było powikłań z-z, chociaż częstość występowania owrzodzeń podudzi po roku nie uległa zmianie.

Wnioski: Leczenie uzdrowiskowe pacjentów z PNŻ w mechanizmie zespołu pozakrzepowego powinno być poprzedzone oceną układu żylnego kończyny dolnej metodą ultrasonografii kompresyjnej. Stosowanie sesji intensywnego leczenia hydroterapią i balneoterapią w uzdrowisku jest bezpieczne i zmniejsza dolegliwości i objawy u pacjentów z PNŻ.

JULIAN PAPIERKOWSKI, A LITTLE FORGOTTEN PILLAR OF POLISH BALNEOLOGY

Krzysztof Marczewski

Faculty of Health Sciences Lublin University of Economy and Innovations

The Second World War meant for Poland the loss of nearly half of its territory including the famous Zakarpattia health resorts. After the Second World War, the severe loss was also a consequence of the Holocaust depriving the Jewish population, among them doctors from health resorts such as Rymanów or Iwonicz and centuries old Jewish hygienic traditions quite closely connected to religion.

On the other hand, the health resorts of the Sudeten spas were deserted by the expelled Germans. There was a lot of work to be done.

A young physician Julian Papierkowski (1908 -1990) joined this work. He was young, but with some academic achievements. His work as a doctor focused in Iwonicz, in which he was born as the third youngest son of a local entrepreneur. As a scientist, he was interested in balneology as such and its development in Poland. Among his numerous publications, it is worth paying special attention to the description of the organisation of balneological education in France and a series of publications on the possibilities and potential difficulties of balneology development in many regions of Poland. Today he is almost completely forgotten but our congress is a great opportunity to change it.

POŁCZYŃSKA BOROWINA I SOLANKA BLIŻEJ ZDROWIA I NATURY

Uzdrowisko Połczyn (wykład sponsorowany)

SESSION IX DROZDOWICE CAVE SALT MINE WIELICZKA

SESJA IX KOMORA DROZDOWICE KOPALNIA SOLI WIELICZKA

SUBTERRANEOTHERAPY

FUNDAMENTAL FACTORS OF SALTY AIR ENVIRONMENT IN VARIOUS SALT AND POTASH SUBTERRANEAN SPELEOCLINICS AND ARTIFICIAL SALT CAVE

Grigorij Z. Fainburg, Konstantin A. Chernyi, Pavel V. Ganzhin

Perm National Research Polytechnic University Perm, Russia

Introduction: The diversity of construction types of various “salt caves” and other analogical devices of “salty air therapy” and their curative environment, including salt and potash subterranean speleoclinics, produces very important for non-drug medicine question – What is scientific basis of these innovative methods and constructions?

Objectives: To generalize results of scientific investigations for their implementation in practice.

Method: There is analysis of one's own research and materials of published scientific papers.

Results: By long-term researches it is revealed that all factors of the curative environment can be divided into two groups. The first group is characteristic of any air environment in any “rooms” and contains microclimate parameters – temperature, pressure, mobility and humidity of air; radioactive, existence or lack of bio- and not-salt aerosol. The second group is characteristic of the salt air environment. It is a range of salt (rock salt or potash salt) aerosol, a range of negative air ions, potassium-40. Combination of these factors generate different curative environment in various constructions of “salty air” rooms. These factors generate different treatment methods, depending on various curative environments: A – underground: speleotherapy in caves (1), subterranean therapy in ore (2), salt (3) and potash (4) mines; B – earth surface: “salt caves therapy” (haloclimatotherapy) (5), halotherapy with special generator of salt aerosol (6), sylvinitic speleoclimatotherapy (7). But all of these methods of treatment have some common points – complex general intermittent influence on all human body functions. It means that the duration and the number of sessions are very significant for treatment efficiency. They must be adequate circadian, month and annual rhythms.

Conclusion: A best curative environment is generated in sylvinitic speleoclimatic rooms. Besides quality of the curative environment the organization of treatment has very significant role. Moreover, treatment must have 3-4 hours per session for 10-15 sessions minimum. If speleoclimatotherapy realize these rules then they get good results.

ROMANIAN SALT MINES USED FOR SPELEOTHERAPY – FROM BASIC RESEARCH TO MEDICAL SERVICES

Constantin Munteanu, Diana Nicoleta Munteanu, Gabriela Dogaru, Mihail Hoteteu

Emergency Clinical Hospital Bagdasar-Arseni, Bucharest, National Institute of Rehabilitation,
Physical Medicine and Balneoclimatology Bucharest, Romania

Speleotherapy, the use of the climate of caves and salt mines, should be considered as an optimal environment for complex respiratory rehabilitation. Our objective was to explore the effects of speleotherapy on cellular morphology and physiology of pulmonary fibroblasts in normal and ovalbumin-challenged "asthmatic" conditions. Wistar rats of 75 – 100 g weight were divided in two lots, control and ovalbumin-challenged animals. Ten animals of each lot were sent to Turda, Cacara and Dej Salt Mines and maintained in the salt mine environment for 14 days, as in speleotherapy treatment. Pulmonary fibroblasts cultures were prepared from Wistar rats lung tissues and after changes were evaluated through microscopic, biochemical, electrophoretic and Western Blott techniques.

TURDA SALT MINE is one of the historical monuments of Romania, from Cluj and a touristic attraction at national and international level, has legally all prerequisites, for therapeutic use: mines with furnished rooms, tailored for both tourists and sick persons, including disabled persons, mines rooms are large space, isolated rooms; no exploitation activities; in Terezia Mine there is a saline lake adapted for recreation.

CACICA SALT MINE – it is situated in the N-E part of Romania, at 42 km W from Suceava. The real measure of the craftsmanship of those who dug the salt with the hammer is given by the small church built in salt at a depth of 27 metres and the dance hall located at a depth of 37 metres. The Catholic chapel was sanctified in 1800.

OCNA DEJ SALT MINE is located in Romania, in the Transylvanian Basin 3 km from Dej and 60 km from Cluj. The first statement concerning the Ocna Dej salt exploitation dating from Roman times. Ocna Dej salt mine is part of National Salt Company and its main activity is extraction, preparation and marketing of gemstones salt.

The Ocna Dej salt mine is characterised by: temperature: 12–14 °C, humidity: 65–71%, presence of saline aerosols.

ASSESSMENT OF THE QUALITY OF LIFE OF ELDERLY PEOPLE WITH RESPIRATORY DISEASES PARTICIPATING IN SPELEOTHERAPY COMBINED WITH PULMONARY REHABILITATION AT THE WIELICZKA SALT MINE HEALTH RESORT – A PILOT STUDY

**Sylwia Mętel, Magdalena Kostrzoń, Justyna Adamiak, Halina Gattner,
Dominika Kościelecka, Angelika Sosulska, Elżbieta Szczygieł, Joanna Golec**

Zakład Medycyny Fizycznej i Odnowy Biologicznej Wydział Rehabilitacji Ruchowej AWF w Krakowie,
Uzdrowisko Kopalnia Soli Wieliczka, Wieliczka, Poland

Introduction: World Health Organization defines Healthy Ageing as the process of developing and maintaining the functional ability that enables wellbeing in older age. Health related quality of life is an important factor to aging well.

Aim: Assessing the quality of life in elderly people with respiratory diseases participating in speleotherapy combined with pulmonary rehabilitation at the "Wieliczka" Salt Mine Health Resort.

Methods: Before and after the 3-week rehabilitation and treatment stay in healthy salt chambers 22 people (17 women, 5 men) aged ≥ 65 years (mean age 68.27 ± 3.01) were evaluated for quality of life using the St. George's Respiratory Questionnaire (SGRQ-C). Patients participated in a complex, pulmonary rehabilitation conducted for 6.5 hours a day, for 5 days a week, 135 m below the earth's surface.

Results: For all persons in the Short Physical Performance Battery Test (SPPB) performed before and after the stay, results ≥ 10 points were noted indicating no limitations in physical fitness. Analysing the quality of life of the examined elderly people it was found that for the first domain – the severity of symptoms before the stay was 45.15 ± 22.84 points, while after the stay it significantly decreased to 37.28 ± 19.45 points.

THIRTY YEARS OF THE SYLVINITE SPELEOCLIMATOTHERAPY DEVELOPMENT FROM BASIC SCIENTIFIC RESEARCH TO CLINIC SUCCESSES FOR HUMAN BODY REVITALIZATION UNDER INFLUENCE OF SALITY AIR ENVIRONMENT

Grigorij Fainburg, Lidiya A. Verikhova, Natalia V. Minaeva

Perm National Research Polytechnic University, Perm, Russia

Introduction: Perm engineers, scientists, physicists and physicians were the first in the world to make and operate a sylvinite speleoclimatic chamber (SSCC) which was launched in the “Kaliets” hospital of the Solikamsk City, Perm Region, in 1989. It modeled the therapeutic conditions of the subterraneotherapy that was also the first in the world to be constructed in a potash mine of the Berezniki City, Perm Region, in 1977. This event turned out to be extremely important for health care. Only now, 30 years after, we are just beginning to deeply understand the SSCC capabilities for treating a wide range of pathologies in adults and children, for strengthening and preserving health, as well as prolonging active longevity and life.

Objectives: To generalize results of SSCC application in practice and to consider the prospects of their use for prophylaxis, treatment and healing in future.

Method: There is analysis of one's own research and materials of published scientific papers.

Results: Researches of the first years of speleoclimatotherapy development were directed to clarifications of separate curative environment factors and applicability of this treatment to such diseases as COPD, asthma, allergy. The analysis showed a role of environmental influence in general, revealed a role of adaptation and self-rehabilitation of an organism. Moreover, change of the external environment is a natural irritant for a human body, and its “positive” reaction to this irritant is fixed by the evolution. Even smallest change causes hormesis. Moreover, interval “intermittent” influence at the sessions of speleoclimatotherapy causes strengthening of adaptation processes and includes all functional reserves of an organism for homeostasis normalization.

Conclusion: Interval influence of the curative environment makes complex integrated non-specific impact on an organism in general, on its adaptation and reparative processes of self-revitalization. Such treatment is easily combined with any pharmacological influences which are additional support for the main reasons of revitalization.

THE EFFECT OF SUBTERRANOTHERAPY ON THE QUALITY OF LIFE AND EXERCISE TOLERANCE IN PATIENTS WITH ASTHMA

Joanna Kin-Dąbrowska, Jolanta Czerwik, Magdalena Kostrzon

Krakowska Akademia im. Andrzeja Frycza Modrzewskiego, Kraków, Polska, Uzdrowisko Kopalnia Soli „Wieliczka”, Wieliczka, Polska

Introduction: The current ATS/ERS guidelines recommend the inclusion of pulmonary rehabilitation (PR) programs in the integrated medical care of chronically ill patients with respiratory diseases, such as asthma. The effectiveness of the PR may be influenced by the environment in which the programs are implemented. Subterraneotherapy, that is the use of microclimate of underground salt chambers for medicinal purposes, is one of the methods of climotherapeutic treatment used for increasing the PR effectiveness.

Study objective: The aim of the study was to assess the impact of pulmonary rehabilitation carried out in salt chambers on the quality of life and exercise tolerance in patients with asthma.

Material and Methods: The study involved 19 adults with allergic asthma. Seventeen patients, who completed a 3-week pulmonary rehabilitation program at the “Wieliczka” Salt Mine, were included in the statistical analysis. The following tests were performed: spirometry, march test and the questionnaire assessment of the quality of life in people with asthma. The measurements were taken at three points: before starting rehabilitation (P1), a week after its completion (P2) and 4 weeks from P1 (P3).

Results: Subterraneotherapy increased exercise tolerance measured in a 6-minute march test. There was a statistically significant increase in the distance measured in this test (P2 vs. P1 and P3 vs. P1, $p=0.001$). The evaluation of spirometric parameters showed no statistical significance ($p > 0.05$). The quality of life considerably increased and remained significantly higher compared to the baseline values (P2 vs. P1 and P3 vs. P1, $p<0.001$). An increase in the quality of life included the following domains: the symptoms and activity limitations. There were no changes in the quality of life in the domain of emotional functioning.

Conclusions: Pulmonary rehabilitation in combination with subterraneotherapy increase exercise tolerance and improve the quality of life in patients with allergic asthma.

RECOMMENDATION FOR USING SUBTERRANEOTHERAPY IN UPPER RESPIRATORY TRACT DISEASES – THE EXPERIENCE OF 5 YEARS COOPERATION BETWEEN OTOLARYNGOLOGY CLINIC IN CRACOW AND „WIELICZKA” SALT MINE HEALTH RESORT

Remigiusz Ziarno, Aleksandra Grudzień-Ziarno, Magdalena Kostrzon, Sebastian Kocoń, Jacek Składzień

Kliniczny Oddział Otolaryngologii Szpitala Uniwersyteckiego w Krakowie, Kopalnia Soli Wieliczka, Poland

Introduction: In 2014 the Otolaryngology Clinic in Cracow established the cooperation with „Wieliczka” Salt Mine Health Resort to rehabilitate patients with upper respiratory tract diseases in subterranean conditions. During 5 years of collaboration tens of patients were referred to the health resort in Wieliczka for subterraneotherapy.

Aim: The aim of this work is to present the experience of 5- years long cooperation between Cracow’s Otolaryngology Clinic and „Wieliczka” Salt Mine Health Resort, underlining the role of subterraneotherapy in treatment of upper respiratory tract diseases on example of project regarding the connection between chronic laryngitis and the smog phenomenon.

Material and Methods: During 5 years of collaboration 3 joint projects were realised (Impact of smog on occurrence of chronic laryngitis, role of subterraneotherapy in treatment of allergic rhinitis, using salt aerosols as supplemental form of treatment of preschool children with upper respiratory tract diseases). Between 2015 and 2016 in study regarding the connection between chronic laryngitis and the smog phenomenon 2 groups were chosen from 141 patients referred to the Phoniatic Outpatient Clinic of the University Hospital in Cracow. Each group consisted of 30 patients, first group included patients from Cracow, while patients in second group came from locations at least 60 km away from Cracow. The 2 groups were equal regarding sex, age and voice usage. Patients from both groups underwent laryngological and videolaryngostroboscopic examinations in Otolaryngology Clinic and laryngographic examination in the Pedagogical University of Cracow.

Afterwards the patients were referred to Wieliczka for rehabilitation using subterraneotherapy. After 3 months control examinations were performed in Otolaryngology Clinic and Pedagogical University.

Results: Comparing the laryngological, videolaryngostroboscopic and laryngographic examinations the improvement of patients results was observed (improvement of local state of laryngeal mucosa and decrease in irregularity of vocal folds vibrations in CFx histograms).

Conclusions: Example of foregoing study confirmed that subterraneotherapy is an effective and noninvasive form of treatment of the upper respiratory tract diseases. The absence of side effects of this therapy is confirmed in seasonal control examinations. The cooperation between Otolaryngology Clinic in Cracow and „Wieliczka” Salt Mine Health Resort will continue to use balneological methods as an complementary therapy of upper respiratory tract diseases.

BRINE AEROSOL THERAPY IN THE WIELICZKA SALT MINE HEALTH RESORT

Joanna Czerwik, Maria Kmiecik

Wieliczka Salt Mine Health Resort, Poland

Aerosol therapy is important in the treatment of upper and lower respiratory tract diseases, including chronic conditions. Aerosols are relatively stable systems of solid, liquid or gaseous particles, dispersed and suspended in a gaseous medium. Aerosol therapy is a way of applying medicaments to the airways. Currently, the patient can take some medications and mineral healing waters, e.g. brine in the form of spray. The main advantages of aerosol therapy include: a direct and non-invasive access to the target organ, the use of a lower dose of the drug compared to systemic treatment, a rapid onset of the action and fewer general actions.

The size of the aerosol particles is relevant because it determines where the aerosol reaches and acts. The smaller the aerosol particles, the deeper they reach in the airways.

Mineral waters of the „Wieliczka” Salt Mine from the X-VII-16 outflow have a certificate confirming their healing properties. These waters have a mineralization of 68.9 g/dm³, pH 6.94 and temperature 16.9°C. The outflow efficiency is 9 m³/h. They are used for individual inhalations and for the production of spray on a brine graduation tower. Moreover, inhalations of salt aerosol in underground mining excavations are applied. Subterraneotherapy, that is, the impact of a set of physical, chemical and biological factors of underground spaces on the human body, brings benefits in the treatment of chronic respiratory diseases (including asthma).

The post-inhalation procedure, which consists of a set of activities leading to the cleaning of the bronchi from the excess of retained secretions, is an important aspect of aerosol therapy. This fact is of particular importance during therapy

with mucolytic drugs and hypertonic brine. A removal of retention from the airways ensures their patency and prevents breathing difficulties. Brine aerosol therapy has also a beneficial effect on the regeneration of the airway epithelium and an improvement of mucociliary clearance. These processes are translated into an improvement of the course of chronic respiratory diseases and greater resistance of the body to respiratory infections.

HOW TO PERSUADE PATIENTS TO CONTINUE THEIR PHYSICAL ACTIVITY

Anna Pełkowska, Michał Stachura, Magdalena Kudłacik

Wieliczka Salt Mine Health Resort, Poland

The regular physical activity is one of the factors which reduce the unpleasantness resulting from the presence of age-related symptoms. However, according to research, older people often limit their physical activity to a minimum. The most common reasons include the lack of motivation, fear for health or the lack of habit of spending time actively. In the Wieliczka Salt Mine Health Resort, patients take part in 15-day training sessions including a series of general development and breathing exercises along with education conducted by a team of nurses, physicians and physiotherapists. Most of the patients go down to the underground salt chambers regularly, at least once a year, but almost everyone admits that at home they stop practicing previously learned physical exercises.

In the first quarter of 2019, a survey was conducted among patients regarding their motivation to continue physical activity on the surface. The was conducted among 60 adult patients participating in pulmonary rehabilitation in underground conditions. The questionnaire was completed by 70% of the patients aged 62 years on average, the majority – 28 people were women, almost 50% were referred to the Health Resort because of asthma. Sixteen people were in the Health Resort again. Less than 75% of the respondents would gladly continue physical exercises on the surface under the supervision of a physiotherapist, but free of charge. In addition, over 50% of the patients would like to combine exercises on the surface with educational activities.

Pulmonary rehabilitation programs for patients should include the element of pro-health education. The financial barrier may be a reason for limiting the motivation for rehabilitation in the elderly

SESSION X

SESJA X

BALNEOLOGIA KINICZNA

SESJA POLSKIEGO TOWARZYSTWA BALNEOLOGII I MEDYCYNY FIZYKALNEJ SESSION OF POLISH ASSOCIATION OF BALNEOLOGY AND PHYSICAL MEDICINE

WPŁYW KRIOTERAPII OGÓLNOUSTROJOWEJ NA PARAMETRY NIESTABILNOŚCI BLASZKI MIAŻDŻYCOWEJ U PACJENTÓW Z ZESZTYWNIJĄCYM ZAPALENIEM STAWÓW KRĘGOSŁUPA

Agata Stanek, Cholewka Armand, Tomasz Wielkoszyński, Ewa Romuk

Katedra i Oddział Kliniczny Chorób Wewnętrznych, Angiologii i Medycyny Fizykalnej w Bytomiu, Śląski Uniwersytet Medyczny, Katowice, Polska, Zakład Fizyki Medycznej, Instytut Fizyki, Uniwersytet Śląski, Katowice, Polska, Higher School of Strategic Planning in Dąbrowa Górnicza, Polska

Cel: Pacjenci z zeszywniającym zapaleniem stawów kręgosłupa (ZZSK) mają wyższe ryzyko zachorowalności i śmiertelności z przyczyn sercowo-naczyniowych w porównaniu z ogólną populacją, co może być związane z aktywnością choroby. Celem badania była ocena wpływu krioterapii ogólnoustrojowej (WBC) na czynniki ryzyka sercowo-naczyniowe u pacjentów z ZZSK.

Materiał i metody: Zbadano wpływ WBC z późniejszą kinezyterapią na markery stanu zapalnego, profilu lipidowego i blaszki miażdżycowej u mężczyzn z ZZSK (grupa WBC n = 16). W celu oceny aktywności choroby obliczono również BASDAI i BASFI. Grupę WBC porównano z wynikami z grupy kinezyterapii (KT; n = 16).

Wyniki: W grupie WBC stężenie hsCRP w osoczu obniżyło się znacząco bez zmiany stężenia IL-6. Stężenie ICAM-1 wykazywało tendencję spadkową. Stężenie CER, a także BASDAI i BASFI zmniejszyły się w obu grupach, ale zmiany wskaźnika aktywności choroby były wyższe w grupie WBC niż u pacjentów z KT. W obu grupach stężenie cholesterolu całkowitego i cholesterolu LDL, triglicerydów, sCD40L, PAPP-A i PLGF obniżyło się znacząco, ale zmiany parametrów były znacząco wyższe w grupie WBC.

Wniosek: WBC wydaje się być użyteczną metodą zapobiegania miażdżycy u pacjentów z ZZSK.

PROFILAKTYKA CHOROÓB ODITYTONIOWYCH NA TERENIE OBIEKTÓW UZDROWISKOWYCH

– DONIESIENIE WSTĘPNE

Wioletta Tomczak, Hanna Tomczak

Katedra i Klinika Hematologii i Transplantologii, Gdański Uniwersytet Medyczny, Gdańsk, Polska,
Wydział Fizjoterapii i Nauk o Zdrowiu, Wyższa Szkoła Zdrowia, Gdańsk, Polska

Wprowadzenie: Od 2010 roku ustawodawca wprowadził zakazy palenia w miejscach publicznych, które mają na celu pomóc osobom palącym rozstać się z nałogiem i uchronić społeczeństwo przed biernym wdychaniem dymu tytoniowego. Przepisy unijne doprowadziły do rozszerzenia tego zakazu także o używanie nowatorskich wyrobów tytoniowych i papierosów elektronicznych.

Cel pracy: Ocena przestrzegania zakazu palenia papierosów tradycyjnych, elektronicznych i nowatorskich wyrobów tytoniowych oraz realizacja działań związanych z profilaktyką chorób oditytoniowych na terenie ośrodków świadczących usługi z zakresu leczenia uzdrowiskowego.

Materiał i metoda: Przeprowadzono dwa internetowe badania ankietowe. Pierwsze w 2017 roku oraz drugie w 2019 roku uzupełnione o pytania dotyczące zakazu używania nowatorskich wyrobów tytoniowych i papierosów elektronicznych. Zastosowano ankietę własnej konstrukcji zawierającą 10 pytań zamkniętych i 2 pytania otwarte. Wysłano internetowo prośbę o wypełnienie ankiety do ponad 100 placówek.

Wyniki: W jednym i drugim badaniu uzyskano niewielki odsetek odpowiedzi – badanie 2017-21 a w 2019 (badanie w toku) tylko 8. Obiekty są oznakowane znakami zakazu palenia, jednakże nie wszystkie posiadają oznaczenia dotyczące zakazu używania nowatorskich wyrobów tytoniowych oraz papierosów elektronicznych. Na spotkaniach organizacyjnych kuracjusze są informowani o zakazie palenia na terenie całego obiektu, w tym na balkonach, ale nie wszędzie doprecyzowana jest ta informacja o zakaz używania papierosów elektronicznych. Ponad połowa respondentów w badaniu z 2017 roku przyznała, że kuracjusze palą na balkonach. Mniej niż połowa obiektów uczestniczących w badaniu prowadzi działania profilaktyczne z zakresu przeciwdziałania chorobom oditytoniowym. W większości są to plakaty informacyjne i prelekcje. Żaden z badanych ośrodków nie prowadzi turnusów antynikotynowych, a zdecydowana większość nie jest zainteresowana, aby takie organizować.

Wnioski: 1. W badanych obiektach nie przestrzega się w pełni obowiązującego zakazu palenia, w tym papierosów elektronicznych, na terenie całego ośrodka świadczącego usługi zdrowotne. 2. Nie wszystkie ankietowane placówki zaangażowały się w rozszerzanie polityki antytytoniowej związane z zagrożeniami stosowania nowatorskich wyrobów tytoniowych i papierosów elektronicznych. 3. Prowadzona działalność profilaktyczna z zakresu chorób oditytoniowych, jest niewystarczająca.

CZĘSTOŚĆ WYSTĘPOWANIA WYSIŁKOWEGO NIETRZYMANIA MOCZU U KOBIET LECZONYCH W UZDROWISKU ORAZ MOŻLIWOŚCI FIZJOTERAPII I EDUKACJI

Hanna Tomczak, Ewelina Karasińska, Katarzyna Felczak,

Wydział Fizjoterapii i Nauk o Zdrowiu, Wyższa Szkoła Zdrowia, Gdańsk, Polska, Zakład Fizjoterapii, Katedra Rehabilitacji,
Gdański Uniwersytet Medyczny, Gdańsk, Polska

Wstęp: Wysiłkowe nietrzymanie moczu (WNM) może dotyczyć nawet 200 mln kobiet na świecie. Szacuje się, że w Polsce choruje nawet od 4-6 mln, szczególnie w wieku pomenopauzalnym, lecz coraz częściej i kobiet młodszych. Ze względu na charakter dolegliwości WNM jest problemem często skrywanym, a chora sięga po wkładkę urologiczną częściej niż po fachową pomoc. Koszty pielęgnacji w tym schorzeniu są ogromne, a rynek pieluch dla dorosłych przewyższa już ten

dla dzieci. Wysiłkowe nietrzymanie moczu urasta więc do rangi choroby cywilizacyjnej. Czynnikiem ryzyka choroby jest wiele, ale istotną rolę odgrywa osłabienie mięśni dna miednicy. Ważnym elementem zarówno profilaktyki jak i leczenia dolegliwości jest fizjoterapia oraz edukacja, która może i powinna być prowadzona również w uzdrowisku.

Cel pracy: Celem pracy jest ocena częstości występowania wysiłkowego nietrzymania moczu, poziomu wiedzy kobiet o schorzeniu oraz możliwości fizjoterapii i edukacji kobiet podczas pobytu na turnusie w uzdrowisku.

Metody: Badanie przeprowadzono wśród 120 kobiet leczonych z powodu schorzeń narządu ruchu w uzdrowisku Sopot (sanatorium Leśnik) i w Inowrocławiu (CU Energetyk). Średnia wieku $66,6 \pm 10,8$. Badania przeprowadzono za pomocą sondażu diagnostycznego przy użyciu ankiety skonstruowanej na potrzeby pracy. Wyniki poddano analizie statystycznej.

Wyniki: Objawy wysiłkowego nietrzymania moczu zgłosiło 44% badanych. Spośród czynników ryzyka choroby tylko liczba porodów oraz skłonność do zaprac istotnie korelowały z obecnością objawów WNM. Jedynie 46% kobiet wiedziało o możliwościach fizjoterapii w profilaktyce i leczeniu schorzenia. Potrzebę i chęć uczestnictwa w zajęciach z fizjoterapeutą deklarowało 92% badanych, w tym aż 65% chciałoby nauczyć się ćwiczeń mięśni dna miednicy.

Wnioski: 1. Wysiłkowe nietrzymanie moczu to częsty problem w badanych grupach kobiet leczonych w uzdrowisku. 2. Wiedza na temat możliwości fizjoterapii i profilaktyki wysiłkowego nietrzymania moczu jest niedostateczna. 3. Większość kuracjuszek wyraża chęć uczestnictwa w zajęciach edukacyjnych, w tym ćwiczeniach, gdyby były prowadzone podczas pobytu w uzdrowisku.

WPŁYW STYLU ŻYCIA NA EFEKTY LECZENIA ŁUSZCZYCY METODĄ PUVA I UVB311

Marcin Uznański, Hanna Tomczak, Elżbieta Rajkowska-Labon

Ośrodek Dermatologii Estetycznej, Dermatochirurgii i Fotodermatologii „Derm-art”, Gdynia, Polska, Wydział Fizjoterapii i Nauk o Zdrowiu, Wyższa Szkoła Zdrowia, Gdańsk, Polska, Zakład Fizjoterapii, Katedra Rehabilitacji, Gdański Uniwersytet Medyczny, Gdańsk, Polska

Wstęp: Łuszczyca jest przewlekłą chorobą o podłożu autoimmunologicznym. Wśród głównych objawów wyróżnia się zmiany skórne i stawowo-ścięgnowe. W leczeniu łuszczycy stosuje się fizykalne bodźce świetlne takie jak terapia metodą PUVA oraz lampą UVB311. Wiele dowodów naukowych przemawia za skutecznością fototerapii, ale na całym świecie schematy jej wykorzystywania znacznie się różnią. Bardzo istotnym elementem w leczeniu łuszczycy jest styl życia pacjentów. Składowe stylu życia, takie jak dieta, stres, stosowanie używek, palenie papierosów, alkohol i in. mogą mieć wpływ na ostateczny rezultat terapii.

Cel pracy: Celem pracy jest ocena skuteczności leczenia skórnych zmian łuszczykowych za pomocą dwóch metod fototerapii – PUVA i UVB311, w odniesieniu do wpływu wybranych składowych stylu życia, takich jak: palenie tytoniu, spożywanie alkoholu, dieta oraz subiektywne odczuwanie stresu przez pacjentów.

Metody: Badania wykonano w Naukowo-Badawczym i Naukowo-Szkoleniowym Ośrodku Dermatologii Estetycznej, Dermatochirurgii i Fotodermatologii „Derm-art” w Gdyni. Badana grupa składała się z dwóch równolicznych podgrup (N=40). Podgrupy A, stosującej terapię PUVA, (N=20), podgrupy B (N=20), u której zastosowano leczenie lampą UVB311. Przydział był uwarunkowany zakwalifikowaniem do danej terapii przez lekarza dermatologa, który również oceniał kliniczny efekt terapii. Warunkowało to liczbę zleconych zabiegów. Końcowa liczba naświetlań, była równoznaczna z remisją choroby. W pracy oceniono ponadto subiektywne poczucie poziomu stresu (skala numeryczna) oraz wybrane aspekty stylu życia. Wyniki poddano analizie statystycznej.

Wyniki: W podgrupie A średnia liczba naświetlań była istotnie mniejsza ($M = 11,90$, $SD = 3,75$), niż w podgrupie B, ($M = 25,00$, $SD = 8,65$).

LASEROTERAPIA WYSOKOENERGETYCZNA W POŁĄCZENIU Z BALNEOTERAPIĄ W LECZENIU BÓLÓW I OGRANICZONEJ RUCHOMOŚCI LĘDŹWIOWEGO ODCINKA KRĘGOSŁUPA

Alicja Grzesińska, Kamila Niewolak, Dariusz Fielek, Paula Pecyna, Dariusz Chełminiak, Paweł Zieliński, Bogna Szoltys, Laura Piejko, Michał Kręćchwost, Agnieszka Nawrat-Szoltysik

Przychodnia Rehabilitacyjna „Technomex”, Gliwice, Polska, Zakład Rehabilitacji Leczniczej „Solanki”, Uzdrowisko Inowrocław, Polska, Katedra Informatyki i Aparatury Medycznej, Wydział Inżynierii Biomedycznej, Politechnika Śląska, Zabrze, Polska, Katedra Fizjoterapii Układu Nerwowego i Narządu Ruchu, Wydział Fizjoterapii, Akademia Wychowania Fizycznego, Katowice, Polska

Wprowadzenie: Jedną z najczęstszych przyczyn bólów kręgosłupa jest choroba zwyrodnieniowa, która często dotyka osoby młode i nasila się wraz z wiekiem. Bóle kręgosłupa powstające na tle choroby zwyrodnieniowej są jedną z najczęstszych przyczyn czasowej lub trwałej niezdolności do pracy u osób w wieku aktywności zawodowej. Leczenie bólów i innych dolegliwości kręgosłupa spowodowanych zmianami zwyrodnieniowymi jest jednym z największych wyzwań terapii ambulatoryjnej, szpitalnej i uzdrowskiej.

Cel: Celem badania było poznanie wpływu terapii uzdrowskiej obejmującej balneoterapię oraz laseroterapię wysokoenergetyczną na zmniejszenie bólów oraz zwiększenie ruchomości lędźwiowego odcinka kręgosłupa.

Metody: Badanie przeprowadzono w okresie od 01.09.2018 r. do 28.02.2019 r. w Uzdrowisku „Solanki” w Inowrocławiu. Badanie było współfinansowane z Europejskiego Funduszu Rozwoju Regionalnego Województwa Kujawsko-Pomorskiego. Było to badanie wstępne (pilotowe), bez grupy kontrolnej. Do badania włączono 53 osoby (w tym 34 kobiety i 19 mężczyzn), w wieku średnio 53.79 ± 8.33 lat. U chorych występowały przewlekłe bóle oraz ograniczenia ruchomości lędźwiowego odcinka kręgosłupa spowodowane chorobą zwyrodnieniową. Średnie nasilenie bólu oceniane w skali VAS przed leczeniem wynosiło 6.41 ± 2.07 punktu. Wszyscy badani poddani byli terapii uzdrowskiej trwającej 3 tygodnie. Leczenie obejmowało kąpiele solankowe całego ciała i ćwiczenia fizyczne prowadzone w wodzie lub na sali ćwiczeń. Dodatkowo u pacjentów zastosowano laseroterapię wysokoenergetyczną w obszarach o największej bolesności, w lędźwiowym odcinku kręgosłupa. Stosowano promieniowanie laserowe o długości 648 nm i mocy 0.05 W, za pomocą wiązki rozproszonej na powierzchni 39 cm^2 o gęstości energii wynoszącej 0.7 J/cm^2 (30 J/39 cm^2). Następnie w tych samych miejscach aplikowano promieniowanie laserowe o długości 904 nm, mocy 1.5 W i gęstość energii 17.5 J/cm^2 (684 J/39 cm^2), które było rozproszone na powierzchni 39 cm^2 . Zabiegi laseroterapii były wykonywane codziennie, przez 6 dni w tygodniu, przez 3 tygodnie.

Wyniki: Po leczeniu u chorych stwierdzono statystycznie zmniejszenie bólu odcinka lędźwiowego, z poziomu 6.41 ± 2.07 punktów w skali VAS przed leczeniem do 5.17 ± 2.18 punktu po leczeniu ($p=0.0035$). Nastąpiła również statystycznie istotna poprawa zakresów zgięcia kręgosłupa w prawo (średnio o 31.5%; $p=0.390$) i w lewo (średnio o 25.09%; $p=0.0030$) oraz zakresów rotacji kręgosłupa w prawo (średnio o 17.87%; $p=0.0430$) i w lewo (średnio o 23.69%; $p=0.0293$).

Wnioski: Terapia uzdrowska obejmująca balneoterapię, ćwiczenia fizyczne oraz laseroterapię wysokoenergetyczną przyczynia się do zmniejszenia bólów i poprawy ruchomości lędźwiowego odcinka kręgosłupa. Celem uzyskania wiedzy na temat wpływu samej laseroterapii wysokoenergetycznej na leczenie bólów kręgosłupa należy prowadzić dalsze badania kliniczne obejmujące grupy kontrolne i placebo.

LECZENIE UZDROWSKOWE Z WYKORZYSTANIEM WIRTUALNEJ RZECZYWISTOŚCI I SPRZĘŻEŃ ZWROTNYCH W CELU POPRAWY KONTROLI POSTURALNEJ I ZMNIJSZENIA RYZYKA UPADKÓW U OSÓB W WIEKU 65+

Laura Piejko, Kamila Niewolak, Dariusz Fielek, Paula Pecyna, Dariusz Chełminiak, Paweł Zieliński, Michał Kręćchwost, Alicja Grzesińska, Bogna Szoltys, Anna Polak

Przychodnia Rehabilitacyjna „Technomex”, Gliwice, Polska, Zakład Rehabilitacji Leczniczej „Solanki”, Uzdrowisko Inowrocław, Polska, Katedra Informatyki i Aparatury Medycznej, Wydział Inżynierii Biomedycznej, Politechnika Śląska, Zabrze, Polska, Katedra Fizjoterapii Klinicznej w Chorobach Narządów Wewnętrznych, Wydział Fizjoterapii, Akademia Wychowania Fizycznego, Katowice, Polska

Wprowadzenie: Zmiany degeneracyjne zachodzące wraz z wiekiem w układzie nerwowym i narządach ruchowych skutkują upośledzeniem procesów odpowiedzialnych za kontrolę posturalną i koordynację ruchową, wskutek czego u osób starszych zwiększa się ryzyko upadków. Według statystyk Departamentu Zdrowia USA upadki są główną przyczyną urazów u osób starszych i drugą w kolejności przyczyną zgonów. Statystyki Państwowego Zakładu Higieny wykazują, że w Polsce rocznie

przynajmniej jednego upadku doznaje 19% populacji seniorów. W związku z powyższym jednym z najważniejszych celów rehabilitacji osób starszych jest utrzymanie odpowiedniej koordynacji ruchowej i kontroli posturalnej oraz zmniejszenie ryzyka upadków.

Cel: Celem badania było poznanie wpływu leczenia uzdrowskiego obejmującego balneoterapię i ćwiczenia fizyczne wykorzystujące wirtualną rzeczywistość i sprzężenia zwrotne na kontrolę posturalną i zmniejszenie ryzyka upadków u osób w wieku 65+.

Metody: Badanie zostało przeprowadzone w Uzdrowisku „Solanki” w Inowrocławiu i było współfinansowane z Europejskiego Funduszu Rozwoju Regionalnego Województwa Kujawsko-Pomorskiego. Do badania włączono 74 osoby, w wieku od 65 do 84 lat. Było to badanie wstępne (pilotowe), bez grupy kontrolnej. Pacjenci byli poddani terapii uzdrowskiej trwającej 3 tygodnie. Stosowano kąpiele solankowe całego ciała i gimnastykę ogólnokondycyjną w wodzie. Dodatkowo u pacjentów zastosowano nowoczesne ćwiczenia fizyczne wykorzystujące wirtualną rzeczywistość i sprzężenia zwrotne, które były ukierunkowane na poprawę kontroli posturalnej. Ocenę kontroli posturalnej przeprowadzono na platformie stabilometrycznej wykonując między innymi próbę Romberga, w której oceniano położenie CoP (centrum nacisku stóp na podłoże; ang. center of pressure) w testach przeprowadzanych z oczami otwartymi i zamkniętymi.

Wyniki: Po 3 tygodniach terapii długość ścieżki przemieszczania się CoP skróciła się średnio o 38,6%.

MOŻLIWOŚCI FIZJOTERAPEUTYCZNE W LECZENIU DYSFUNKCJI STAWÓW SKRONIOWO-ŻUCHWOWYCH W BALNEOKLIMATOLOGII

Joanna Borek, Piotr Poniewierski, Przemysław Keczer, Agnieszka Krawczyk-Wasielewska, Roksana Malak, Anna Kostiukow, Teresa Matthews-Brzozowska, Włodzimierz Samborski

Katedra i Klinika Reumatologii i Rehabilitacji, Pracownia Fizjoterapii Reumatologicznej,

Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu,

Katedra i Klinika Reumatologii i Rehabilitacji, Poznań, Polska

Pracownia Fizjoterapii Reumatologicznej, Uniwersytet Medyczny im. K. Marcinkowskiego, Poznań, Polska,

Katedra i Klinika Ortopedii Szczęki i Ortodoncji, Uniwersytet Medyczny im. K. Marcinkowskiego, Poznań, Polska

Wprowadzenie: Zmieniający się styl życia, zmniejszająca się aktywność fizyczna, która zwiększa liczbę zwyrodnieniowych chorób stawów o różnej etiologii, oraz niektóre zabiegi stomatologiczne zwiększają liczbę pacjentów skarżących się na ból w stawach skroniowo-żuchwowych. American Academy of Orofacial Pain (AAOP) definiuje zaburzenie skroniowo-żuchwowe (TMD) jako termin złożony, obejmujący szereg problemów klinicznych związanych między innymi ze stawami skroniowo-żuchwowymi oraz z powiązanymi z nimi strukturami.

Materiał i metody: Został przeprowadzony przegląd literatury pod kątem skuteczności terapii u pacjentów z dysfunkcjami stawów skroniowo-żuchwowych. Niniejsza praca ma charakter poglądowy. Analizie podlegała baza PubMed oraz Google Scholar. Słowami kluczowymi użytymi w wyszukiwaniu były: staw skroniowo-żuchwowy, balneologia, fizykoterapia. Autorzy skupili się na doniesieniach opublikowanych w języku polskim oraz angielskim.

Wyniki: Terapia manualna oraz techniki mobilizacyjne są najczęstszym podejściem terapeutycznym stosowanym w leczeniu kompleksu twarzowo-czaszkowego. Terapia manualna jest użyteczną oraz skuteczną metodą w leczeniu dysfunkcji stawów skroniowo-żuchwowych. Należy zwrócić uwagę iż dodatkowo metody fizykoterapeutyczne mają na celu rozluźnienie mięśni bądź zmniejszenie napięcia mięśniowego. Wywnioskowano iż zarówno metody fizykoterapeutyczne jak terapia manualna pozytywnie wpływają na poprawę funkcjonalności stawów skroniowo-żuchwowych.

Wnioski: Literatura naukowa wskazuje iż metody fizjoterapeutyczne stosowane w rehabilitacji dysfunkcji układu stomatognatycznego mają na celu zmniejszenie lub nawet eliminację bólu, przywracając funkcjonalność oraz poprawę jakości życia. Poprzez skuteczność terapii twarzoczaszkowej następuje zmniejszenie objawów oraz symptomów złego samopoczucia.

ZALEŻNOŚĆ RUCHOMOŚCI KRĘGOSŁUPA OD RODZAJU WYKONYWANEJ PRACY I AKTYWNOŚCI FIZYCZNEJ

Anna Turowska, Aleksandra Walczak, Magdalena Sobieska

Uniwersytet Medyczny, Zakład Fizjoterapii, Poznań, Polska

Wstęp: Aktywność fizyczna stanowi nieodzowny element funkcjonowania organizmu człowieka. Głównym celem badań była ocena zależności ruchomości kręgosłupa od deklarowanej aktywności fizycznej, a także zależność wyników od rodzaju wykonywanej pracy.

Materiał i metody: Przebadano 45 osób w wieku od 25 do 35 lat (Me; Q25-Q75 30; 27-32; kobiety: 29; 26-32; mężczyźni 30; 28-33). Badani zostali podzieleni na 4 podgrupy względem aktywności fizycznej i rodzaju pracy: praca statyczna i aktywność fizyczna (18 osób), praca statyczna i brak aktywności (9 osób), praca fizyczna i aktywność fizyczna (10 osób), praca fizyczna i brak aktywności (8 osób). Podczas badania wykonano Test Schobera, Test Otto, Test palce-podłoga, pomiar ruchu zgięcia i wyprostu w odcinku szyjnym oraz wywiad na podstawie autorskiego kwestionariusza.

Wyniki: Poddano analizie statystycznej, w celu sprawdzenia rozkładu zmiennych wykonano test W Shapiro-Wilka, ze względu na rozkład różny od normalnego wyniki przedstawiono w postaci mediany i kwartyli (Me (Q25-Q75)). Dla wszystkich obliczeń różnic pomiędzy grupami zastosowano testy nieparametryczne.

CZY OZONOTERAPIA TO MEDYCYNALTERNATYWNA?

Sylwester Siejka

Metrum Cryoflex (wykład sponsorowany)

SESSION XI

SESJA XI

POSTĘPY W MEDYCYNIE FIZYKALNEJ

PORÓWNANIE EFEKTYWNOŚCI LECZNICZEJ METOD MEDYCYNY FIZYKALNEJ – OXYBARII S I LASEROBARII S W TERAPII OWRZODZEŃ KOŃCZYN DOLNYCH

Grzegorz Cieślak, Mikołaj Pietrzak

Katedra i Oddział Kliniczny Chorób Wewnętrznych, Angiologii i Medycyny Fizykalnej w Bytomiu,
Wydział Lekarski z Oddziałem Lekarsko-Dentystycznym w Zabrze, Śląski Uniwersytet Medyczny, Katowice, Polska,
Oddział Kliniczny Chorób Wewnętrznych, Angiologii i Medycyny Fizykalnej, Szpital Specjalistyczny nr 2, Bytom, Polska

Wprowadzenie: Skojarzone zabiegi medycyny fizykalnej wykorzystujące synergistyczne, terapeutyczne oddziaływanie miejscowej hiperbarii tlenowej, ozonu, zmiennych pól magnetycznych oraz światła niskoenerygetycznego, charakteryzujące się nieinwazyjnością i niewielką liczbą działań niepożądanych stanowią cenne uzupełnienie standardowej terapii owrzodzeń kończyn dolnych.

Cel pracy. Celem pracy jest porównanie efektywności terapeutycznej urządzeń Oxybaria S oraz Laserobaria S wykorzystujących miejscową hiperbarię tlenową i różniących się stosowanymi pozostałymi czynnikami fizycznymi w leczeniu chorych z przewlekłymi owrzodzeniami kończyn dolnych.

Metody: W badaniu uczestniczyło 36 pacjentów obojga płci, w wieku 18-80 lat, z przewlekłymi owrzodzeniami kończyn dolnych o etiologii tętniczej, żylniej i mieszanej, losowo podzielonych na 2 równoliczne grupy różniące się rodzajem

używanego urządzenia terapeutycznego: Oxybaria S lub Laserobaria S, przy czym leczenie fizykalne było prowadzone łącznie ze stosowanym rutynowo w przypadku owrzodzeń kończyn dolnych postępowaniem obejmującym chirurgiczne oczyszczenie rany oraz farmakoterapię miejscową i aplikowanie sterylnych opatrunków. W grupie leczonej za pomocą urządzenia Oxybaria S, w trakcie zabiegu kończyna dolna pacjenta po włożeniu do cylindrycznej komory terapeutycznej zamykanej za pomocą rękawa uszczelniającego poddawana była miejscowej hiperbarii tlenowej z użyciem tlenu o ciśnieniu 1 mBa (2 kPa) i przepływie ok. 6 l na minutę oraz ozonu w stężeniu 50 µg ozonu/ml tlenu. W grupie leczonej za pomocą urządzenia Laserobaria S w trakcie zabiegu kończyna dolna pacjenta po włożeniu do komory terapeutycznej poddawana była jednocześnie miejscowej hiperbarii tlenowej o podobnych jak w grupie poprzedniej parametrach fizycznych oraz oddziaływaniu zmiennego pola magnetycznego o sinusoidalnym przebiegu impulsu, częstotliwości 40 Hz i indukcji 10 mT i światła emitowanego przez diody półprzewodnikowe LED o długości fali 635 nm i 410 nm oraz gęstości energii 10 J/cm². W obu grupach cykl terapeutyczny obejmował 10 zabiegów trwających 30 minut, wykonywanych codziennie przez 5 dni w tygodniu z przerwą sobotnio-niedzielną.

Wyniki i wnioski: Oba oceniane urządzenia wywołują efekt regeneracyjny przejawiający się zmniejszeniem powierzchni owrzodzenia ocenianym planimetrycznie, przy czym Oxybaria S wykazuje większą efektywność leczniczą w tym zakresie (41% vs. 28%). Żadne urządzenie nie powoduje znamiennej statystycznie poprawy ukrwienia tkanek w okolicy owrzodzenia ocenianej na podstawie pomiaru temperatury w jego centralnym punkcie przy użyciu kamery termowizyjnej. Oba oceniane urządzenia wywołują porównywalne, znamienne statystycznie działanie analgetyczne, oceniane przy użyciu skali VAS.

METODY HYDROBALNEOLOGICZNE W PROFILAKTYCE I LECZENIU CHOROÓB UKŁADU KRAŻENIA

Włodzisław Kuliński

Klinika Rehabilitacji WIM, Warszawa, Polska, Wydział Lekarski i Nauk o Zdrowiu, Uniwersytet JK, Kielce, Polska

Wstęp: Choroby układu krążenia są główną przyczyną śmiertelności na świecie i stanowią poważny problem kliniczny i społeczny współczesnej cywilizacji.

Cel: Ukazanie możliwości wykorzystania wybranych metod hydrobalneologicznych w profilaktyce i leczeniu schorzeń układu krążenia.

Materiał: Przedstawiono wyniki leczenia 50 chorych z nadciśnieniem tętniczym I/II stop., u których zastosowano serie natrysków zmiennocieplnych oraz obraz kliniczny chorego z miażdżycą zarostową kończyn dolnych i zmianami nekrotycznymi skutecznie leczony z wykorzystaniem kąpeli kwasowęglowych.

Wyniki: U obserwowanych chorych z nadciśnieniem tętniczym uzyskano po zastosowaniu serii natrysków zmiennocieplnych normalizację ciśnienia tętniczego krwi. U pacjenta ze zmianami nekrotycznymi kończyny w przebiegu zmian miażdżycowych uzyskano po 3-miesięcznym leczeniu z zastosowaniem kąpeli kwasowęglowych normalizację ukrwienia.

Wnioski: 1. Wybrane metody hydrobalneologiczne mogą być szerzej wykorzystane w profilaktyce i leczeniu chorób układu krążenia. 2. Istnieje pilna potrzeba szerszej promocji możliwości wykorzystania tych metod zarówno wśród lekarzy jak i społeczeństwa.

OCENA WILGOTNOŚCI I TEMPERATURY POWIETRZA W GÓRNYCH DROGACH ODDECHOWYCH W CZASIE INHALACJI

Piotr Rapiejko, Włodzisław Kuliński

Klinika Laryngologii WIM, Warszawa, Polska, Klinika Rehabilitacji WIM, Warszawa, Polska, Wydział Lekarski i Nauk o Zdrowiu, Uniwersytet JK, Kielce, Polska

Wstęp: Znajomość procesów fizjologicznych zachodzących w jamach nosa w trakcie oddychania ma duży wpływ na diagnostykę i leczenie chorób dróg oddechowych. Ma to szczególne znaczenie w przypadku stosowania środków farmakologicznych w czasie inhalacji.

Cel: Porównanie wartości temperatur do jakich powietrze wdychane jest nagrzewane w procesie oddychania /inhalacji/ przez nos i jamę ustną. Porównanie wilgotności powietrza w górnych drogach w zależności od toru oddychania w czasie inhalacji.

Materiał i metody: Badania przeprowadzono w grupie 32 osób obojga płci w wieku 17-62 lat /śr 35,5/. Dokonywano ciągłej rejestracji zmian temperatury miniaturowym elektronicznym termometrem w przedsionku nosa i nosogardle.

Pozwalało to na wyznaczenie parametrów w czasie procesu oddychania przez nos, podobny pomiar wykonywano w gardle przy otwartej jamie ustnej.

Wyniki: Przy oddychaniu przez usta powietrze wdychane jest ogrzewane średnio o $6,3^{\circ}$, a przy oddychaniu przez nos o prawie $9,5^{\circ}$. Zarówno nos jak i jama ustna odzyskuje ciepło z powietrza wydychanego. W przypadku jamy ustnej różnica między temperaturą powietrza wdychanego w gardle i na wysokości zębów wynosi $0,8^{\circ}\text{C}$ / $p < 0,001$ / a w przypadku oddychania przez nos pomiędzy nosogardłem a przedścionkiem nosa wynosi $3,1^{\circ}\text{C}$ / $p < 0,001$ /. Istnieje różnica statystyczna pomiędzy temperaturą powietrza wydychanego z płuc przy oddychaniu przez nos i przez gardło na korzyść oddychania przez nos.

Wnioski: 1. Powietrze wdychane przez nos jest ponad 1,5 razy skuteczniej ogrzewane niż przy oddychaniu przez usta.

2. Dla powietrza wydychanego odbieranie ciepła jest ponad 3 razy skuteczniejsze przy oddychaniu przez nos niż przy oddychaniu przez jamę ustną.

KOMPUTEROWO WSPOMAGANA DIAGNOSTYKA PSYCHOLOGICZNA W LECZENIU UZDROWISKOWYM NA PRZYKŁADZIE BADANIA FUNKCJI POZNAWCZYCH OSÓB Z RZS ORAZ Z RZS I CHOROBYMI WSPÓŁISTNIEJĄCYMI BATERIĄ TESTÓW ANAM

Agnieszka Pigłowska-Juhnke, Ewa Mojs, Piotr Kalmus

22 Wojskowy Szpital Uzdrowiskowo-Rehabilitacyjny w Ciechocinku, Katedra i Zakład Psychologii Klinicznej, Uniwersytet Medyczny, Poznań, Polska, Katedra i Zakład Psychologii Klinicznej, Uniwersytet Medyczny, Poznań, Polska

Wprowadzenie: Aktualnie w Polsce dostępna jest platforma Epsilon przeznaczona do prowadzenia badań komputerowych wybranymi testami z oferty Pracowni Testów Psychologicznych Polskiego Towarzystwa Psychologicznego, do której płatny dostęp mają dyplomowani psycholodzy. Ponadto, dostępne w polskiej wersji językowej jest kilka komputerowych baterii testów diagnostycznych: Automated Neuropsychological Assessment Metrics ANAM, Cambridge Neuropsychological Test Automated Battery CANTAB, Wiedeński System Testów WST, MOXO, oraz kilka testów do badania koordynacji wzrokowo-ruchowej np. System Psychologicznych Testów Komputerowych SIGM, czy Test2Drive. W 2005 roku Międzynarodowa Komisja ds. Testów opracowała Wytyczne ITC Dotyczące Komputerowych i Internetowych Badań Testowych. Zawierają opis dobrych praktyk w obszarze technologii, jakości, kontroli oraz bezpieczeństwa stosowania oprogramowań i badań on-line w psychologii. Są skierowane do twórców, wydawców i użytkowników metod komputerowych. W 22 Wojskowym Szpitalu Uzdrowiskowo-Rehabilitacyjnym w Ciechocinku wprowadzono komputerowo wspomaganą diagnostykę neuropsychologiczną. Doniesienie dotyczy różnic w wynikach wybranych testów poznawczych uzyskanych przez osoby z „czystym” RZS w porównaniu z osobami chorującymi na RZS i choroby współistniejące.

Cel: Celem przeprowadzonych badań była odpowiedź na pytanie o istnienie różnic w wybranych domenach poznawczych między osobami chorującymi na reumatoidalne zapalenie stawów (28 osób) w porównaniu z osobami chorującymi na reumatoidalne zapalenie stawów i choroby współistniejące (35 osób) oraz ocena przydatności wybranej metody diagnostyki komputerowej w badaniach pacjentów przebywających na leczeniu uzdrowiskowym.

Metody: Wykorzystano Automated Neuropsychological Assessment Metrics ANAM, baterię GNS, ze względu na rekomendacje The American College of Rheumatology jako „złotego standardu” w diagnostyce funkcji poznawczych w innej chorobie reumatycznej – toczeniu układowym. W pracy scharakteryzowano parametry ANAM oraz poszczególne podtesty.

Wyniki: Osoby chorujące na RZS poprawniej wykonywały zadania pamięci bezpośredniej przestrzenno-wzrokowej, orientacji przestrzennej i elastyczności umysłowej, w porównaniu z chorującymi na RZS i schorzenia współwystępujące

Wnioski: Przedstawione wyniki potwierdzają, że wielochorobowość obniża sprawność poznawczą. Bateria ANAM ma ograniczone zastosowanie w diagnostyce psychologicznej, ze względu na niedopracowaną polską wersję językową, nieatrakcyjne opracowanie graficzne, brak polskich norm oraz długi czas badania. Komputerowe i multimedialne systemy będą nabierać coraz większego znaczenia w diagnostyce i terapii psychologicznej świadczonych w leczeniu uzdrowiskowym. Pomocne w wyborze oprogramowania byłoby udostępnienie przez dystrybutorów wersji na czas testowy.

POZIOM DEPRESJI U OSÓB Z RZS

Piotr Poniewierski, Mateusz Romanowski, Anna Kostiukow, Wojciech Strzelecki, Włodzimierz Samborski

Katedra i Klinika Reumatologii i Rehabilitacji, Uniwersytet Medyczny im. K. Marcinkowskiego, Poznań, Polska,
Zakład Fizjoterapii, Katedra i Klinika Reumatologii i Rehabilitacji, Uniwersytet Medyczny im. K. Marcinkowskiego, Poznań, Polska,
Katedra i Zakład Psychologii Klinicznej, Uniwersytet Medyczny im. K. Marcinkowskiego, Poznań, Polska

Wprowadzenie: Depresja jest powszechną i bardzo uciążliwą chorobą psychiatryczną. Biorąc pod uwagę sytuację zmian demograficznych określanych potocznie „starzeniem się społeczeństw”, nawet przy braku zmian wskaźników chorobowości, rosnący odsetek osób starszych istotnie wpłynie na wzrost zapotrzebowania na leczenie tychże dolegliwości. Depresja, zatem, stanowić będzie istotne wyzwanie dla zdrowia publicznego i polityki społecznej

Cel: Głównym celem pracy było określenie prawdopodobieństwa wystąpienia depresji w związku z posiadaniem rozpoznania RZS.

Metody: W badaniu wzięło udział 151 kobiet i 14 mężczyzn w wieku od 18 do 78 lat. Do realizacji celu badawczego zastosowano Skalę Depresji Becka (SDB) oraz Kwestionariusz Nijmegen. SDB jest to kwestionariusz samooceny, służący do przesiewowego rozpoznania u siebie objawów depresji. Skala składa się z 21 pytań i jest jednym z najpowszechniej stosowanych narzędzi oceny nasilenia objawów depresyjnych.

Wyniki: Analiza współczynnika kontyngencji ujawniła istotny statystycznie związek między wynikami skali SDB u osób cierpiących na RZS oraz u osób zdrowych. U osób zdrowych w większości przypadków nie odnotowano depresji, natomiast u znacznej części osób chorych odnotowano epizody depresyjne o łagodnym bądź umiarkowanym nasileniu. Porównanie kobiet i mężczyzn cierpiących na RZS wykazało statystycznie istotne różnice w zależności od płci. Udowodniono, że średnie wyników kwestionariusza SDB, uzyskanych przez kobiety i mężczyzn cierpiących na RZS różnią się od siebie w sposób istotny statystycznie.

Wnioski: Stany depresji są częściej występującym zjawiskiem u chorych reumatycznie. Należałoby objąć chorych pomocą psychologiczną w celu ograniczenia ryzyka występowania depresji.

OCENA PROCESU LECZENIA ROPOWICY JAKO NASTĘPSTWA CUKRZYCY TYPU 2 PRZY UŻYCIU MIEJSCOWEJ HIPERBARYCZNEJ TERAPII TLENOWEJ – OPIS PRZYPADKU

Jarosław Pasek, Grzegorz Cieślar

Instytut Wychowania Fizycznego Turystyki i Fizjoterapii, Uniwersytet im. Jana Długosza, Częstochowa, Polska,
Katedra i Oddział Kliniczny Chorób Wewnętrznych, Angiologii i Medycyny Fizykalnej w Bytomiu,
Wydział Lekarski z Oddziałem Lekarsko-Dentystycznym w Zabrze, Śląski Uniwersytet Medyczny, Katowice, Polska

Wprowadzenie: Ropowica to choroba powodująca ropne zapalenie tkanki podskórnej o nieograniczonym charakterze. Choroba ta dotyczy nie tylko zewnętrznych powłok ciała. Może także przenosić się na narządy wewnętrzne prowadząc do ich niewydolności. W przypadku jej rozpoznania wymaga podjęcia natychmiastowych działań leczniczych. W wielu ośrodkach zabiegi hiperbarycznej terapii tlenowej wykorzystywane są coraz częściej u pacjentów z różnymi jednostkami chorobowymi, w tym również z przewlekłymi ranami, których podłoże stanowią najczęściej zmiany miażdżycowe tętnic obwodowych, choroba zakrzepowo-zatorowa, przewlekłe niedokrwienie kończyn dolnych, stany zapalne a także cukrzyca.

Cel: W pracy dokonano oceny wpływu miejscowej hiperbarycznej terapii tlenowej na proces gojenia się ropowicy zlokalizowanej na wysokości prawego podudzia oraz stopy po dotychczasowym, nieskutecznym miejscowym leczeniu objawowym.

Materiał i metody: W pracy przedstawiono wyniki leczenia ropowicy u 57-letniego pacjenta przyjętego do Oddziału Klinicznego Chorób Wewnętrznych, Angiologii i Medycyny Fizykalnej SUM w Bytomiu z powodu utrzymujących się bardzo silnych dolegliwości bólowych, utrzymującego się stanu zapalnego oraz licznych, głębokich przewlekłych ran. W leczeniu zastosowano zabiegi miejscowej hiperbarycznej terapii tlenowej wykorzystując do tego celu wielofunkcyjne urządzenie OXYBARIA-S w którym podczas leczenia kończynę pacjenta poddawano terapeutycznemu działaniu gazów o wysokiej zawartości tlenu bliskiej 100% pod ciśnieniem powyżej 1 atmosfery. Leczenie kontynuowano przez 7 miesięcy. U pacjenta przed i po zakończeniu terapii dokonano oceny występujących dolegliwości bólowych w skali VAS oraz termograficznej oceny ukrwienia i pomiaru temperatury leczonej kończyny. Do oceny jakości życia leczonego pacjenta wykorzystano skalę EuroQol oraz wykonano dokumentację fotograficzną postępu leczenia.

Wyniki: Uzyskano całkowite ustąpienie dolegliwości bólowych ocenianych w skali VAS, całkowite zagojenie ran, zmniejszenie odczynu zapalnego oraz przekrwienia skóry. Korzystny efekt terapeutyczny przełożył się bezpośrednio na poprawę jakości życia leczonego pacjenta odraczając wykonanie amputacji kończyny.

Wnioski: Korzystne efekty terapeutyczne, dobra tolerancja oraz łatwość wykonywania zabiegów z użyciem urządzenia OXYBARIA-S wskazują, że ta metoda leczenia może stanowić cenne uzupełnienie klasycznego leczenia farmakologicznego pacjentów cierpiących z powodu zmian zapalnych, w tym także ropowicy.

ZACHOWANIA ZDROWOTNE PACJENTA LECZONEGO W WARUNKACH UZDROWISKOWYCH Z POWODU WYBRANYCH ZABURZEŃ METABOLICZNYCH

Elżbieta Stokowska-Zagdan, Lilla Szykowska, Aleksandra Stankiewicz

Instytut Nauk Społecznych, Państwowa Szkoła Zawodowa, Skierniewice, Polska, 22 Wojskowy Szpital Uzdrowiskowo-Rehabilitacyjny, Ciechocinek, Polska

Wstęp: Chociaż zdrowie człowieka można zaliczyć do wartości autotelicznych, to nie wszyscy mają świadomość, że prawie każde zachowanie człowieka może mieć znaczenie dla zdrowia. Zwłaszcza te zachowania, które stanowią element stylu życia są powtarzane konsekwentnie. Dlatego tak ważne jest, by uczynić z codziennych zachowań element ich świadomego ukierunkowania na zdrowie. Poprzez edukację zdrowotną można wpływać na prozdrowotną reorientację zachowań, a docelowo na prozdrowotny styl życia. Uzdrowisko jest miejscem, w którym pobyt pacjenta w swym założeniu ukierunkowany jest na poprawę zdrowia, dlatego jest ono szczególnie dobrym miejscem, w którym pacjent może być efektywnie stymulowany poznawczo, celem wdrażania prozdrowotnej postawy w codziennym życiu, co jest stanem pożądanym zwłaszcza w odniesieniu do chorób tzw. stylu życia. Celem badań było poznanie zachowań zdrowotnych pacjentów leczonych w warunkach uzdrowiskowych z powodu cukrzycy i/lub otyłości i ich ewentualnej zmiany w kierunku zachowań prozdrowotnych po zakończeniu leczenia uzdrowiskowego.

Materiał i metody: Badanie przeprowadzono wśród 100 osób hospitalizowanych z powodu cukrzycy i/lub otyłości w Klinice Rehabilitacji Metabolicznej 22 Wojskowego Szpitala Uzdrowiskowo-Rehabilitacyjnego w Ciechocinku. Do zbadania zachowań zdrowotnych zastosowano Inwentarz Zachowań Zdrowotnych. Zachowania zdrowotne badane były w pierwszej dobie pobytu w szpitalu oraz 3 miesiące po wypisie ze szpitala. IZZ służy ustaleniu nasilenia zachowań sprzyjających zdrowiu w 4 kategoriach: prawidłowych nawyków żywieniowych, zachowań profilaktycznych, praktyk zdrowotnych, pozytywnego nastawienia psychicznego. Każdy pacjent odpowiadając na 24 stwierdzenia mógł uzyskać od 24. do 120. punktów – im wyższy wynik, tym większe natężenie deklarowanych zachowań.

Wyniki: Wynik ogólny w zakresie deklarowanych zachowań zdrowotnych dla badanej próby wyniósł w pierwszym punkcie czasowym badania $91,71 \pm 13,34$, w drugim punkcie czasowym $96,19 \pm 12,19$ ($p=0,001$). W poszczególnych kategoriach zachowań uzyskano następujące wyniki: w kategorii prawidłowych nawyków żywieniowych w pierwszym punkcie czasowym badania (I) uzyskano wynik $22,95 \pm 4,04$, w drugim punkcie czasowym (II) $24,03 \pm 3,17$ ($p=0,001$); w kategorii zachowań profilaktycznych I – $23,32 \pm 4,19$, II – $24,20 \pm 3,65$ ($p=0,001$); w kategorii zachowań profilaktycznych I – $23,12 \pm 4,73$, II – $24,30 \pm 3,45$ ($p=0,001$); w kategorii pozytywnego nastawienia I – $22,32 \pm 4,73$, II – $23,66 \pm 4,26$ ($p=0,001$).

Wnioski: Uzyskane wyniki badań wskazują na istotny statystycznie związek pomiędzy deklarowanymi zachowaniami zdrowotnymi pacjentów w pierwszej dobie pobytu na leczeniu uzdrowiskowym i ich zmianą w kierunku zachowań prozdrowotnych 3. miesiące po zakończeniu leczenia.

ZJAWISKO TERMOWIZJI W MONITOROWANIU ODCZYNU ZABIEGOWEGO NA PRZYKŁADZIE FIZYKALNEJ TERAPII NACZYNIOWEJ BEMER ORAZ TERAPII ŚWIATŁEM SPOLARYZOWANYM BIOPTRON

Urszula Maria Hura-Ruitenbach, Katarzyna Maria Jastrzębska

Olśztyńskie Centrum Rehabilitacji (OCR), Polska

Wstęp: Termografia medyczna jest narzędziem znajdującym zastosowania w monitorowaniu wielu dyscyplin terapeutycznych. Termowizja pozwala bezdotykowo ocenić rozkład wartości powierzchniowych temperatury ciała, umożliwiając obrazowanie odpowiedzi biologicznej ustroju na czynniki fizyczne, pozwalając także ocenić stan fizjologiczny oglądanych tkanek i narządów oraz wczesnych stanów patologicznych. Organizm ludzki jest idealnym przedmiotem badań termowizyjnych, gdyż posiada

stały współczynnik emisyjności wynoszący 0,98 i doskonale emituje oraz absorbuje promieniowanie podczerwone. Aby dane badawcze były porównywalne i obiektywne przyjęto utrzymywanie podczas badań odpowiedniej temperatury (20 – 24°C) i odpowiedniej wilgotności (45 – 55%), w warunkach komfortu cieplnego. Podczas badań ogranicza się też cyrkulację celem zmniejszenia ryzyka nieregularnego rozkładu temperatur. W miejscu badania nie powinno być też promienników ciepła, a odległość badanego od kamery powinna wynosić ok. 1 – 1,2 metra, obszar poddawany ocenie ustawia się prostopadłe do kamery. Wiarygodność wyników bywa zaburzona u osób otyłych lub nadmiernie owłosionych.

Cel: Celem badań było ukazanie odczynu zabiegowego, jako następstwo oddziaływania terapii BEMER oraz terapii BIOPTRON (zobrazowanie efektów niewidocznych dla oka), oraz ponowna ocena odczynu po półgodzinnym odpoczynku celem wyjaśnienia jak długo odczyn się zachowuje i jaki jest jego charakter.

Metody: Autorki pracy chcąc potwierdzić efekty terapeutyczne stosowanych zabiegów fizykalnych (BEMER, BIOPTRON), wykonały badania wśród 36 pacjentów OCR, w wieku 18-89 (średnia wieku 68 lat), zakwalifikowanych do leczenia usprawniającego, w wyniku następstw dysfunkcji narządu ruchu. W celu dokonania obiektywnej analizy stosowana była monoterapia (BEMER lub BIOPTRON), pacjenci poddawani byli badaniom bez odzieży, przed badaniem z 15-minutowym odpoczynkiem, po badaniu – z odpoczynkiem 20-minutowym (BEMER) lub 30-minutowym (BIOPTRON) w warunkach komfortu cieplnego. Badania dokonywano zawsze o tej samej porze dnia, w tym samym pomieszczeniu. Oceniano: 1) Terapii BEMER: a) przed zabiegiem, b) po zabiegu, c) po 20-minutowym odpoczynku, d) po pięciu dniach zabiegowych, 2) Terapii BIOPTRON: a) przed zabiegiem, b) podczas zabiegu, c) po zabiegu d) po 30-minutowym odpoczynku.

Wyniki: W wyniku przeprowadzonych badań zobrazowano 792 termogramy, wykonane w pozycji stojącej przodem oraz tyłem. Uzyskane wyniki wykazały istotne statystycznie różnice między kolejnymi pomiarami w zakresie temperatury poddawanych terapii obszarów, obrazując miejscowy odczyn zabiegowy typu natychmiastowego oraz odczyn – po okresie odpoczynku. Badania potwierdzają pozabiegowy stan przekrwienia czynnego poddawanych terapii odcinków.

Wnioski: Analiza badań udowodniła, że: 1. Zmiany temperatury mają bezpośredni związek ze zmianami krążenia krwi w obrębie pola zabiegowego, ukazując miejscowy odczyn zabiegowy. 2. Badania pozwalają na obserwacje zmienności ucieplenia podczas terapii i po zabiegu. 3. Wykorzystanie termowizji to możliwość optymalizacji dawek zabiegowych. 4. Badanie kamerą termowizyjną umożliwia zobrazowanie wczesnych dysfunkcji narządowych: Podczas badań uwidoczniono zmiany ucieplenia (niewidoczne gołym okiem oraz palpacyjnie) – żyłaków podudzi i stanu zapalnego przedziału przyśrodkowego kolana lewego. 5. Wiarygodność wyników była zaburzona u osób otyłych, ze współczynnikiem BMI powyżej 40.

PORÓWNYWANIE WPŁYWU KRIOTERAPII OGÓLNOUSTROJOWEJ I KINESIOTAPINGU NA WYBRANE GRUPY MIĘŚNIOWE

Joanna Łuczak, Joanna Michalik

Oddział Rehabilitacji Kardiologicznej, Szpital MSWiA w Warszawie, 2 Wydział Nauk o Zdrowiu, Wyższa Szkoła Inżynierii i Zdrowia, Warszawa, Polska, Zakład Informatyki Medycznej i Telemedycyny, WUM, Warszawa, Polska

Wstęp: Krioterapia ogólnoustrojowa oraz Kinesiotaping to uznane metody stosowane w schorzeniach układu mięśniowo-szkieletowego oraz medycynie sportowej. Dlatego ciekawym problemem badawczym było porównanie skuteczności zabiegów z zastosowaniem tych metod.

Cel: Celem pracy była ocena zmian wybranych cech motorycznych: szybkości oraz skoczności po Kinesiotapingu, oraz zabiegach kriostymulacji ogólnoustrojowej.

Materiał i metody: Grupa badana to 35 mężczyzn uprawiających specjalistyczny trening fizyczny z przyczyn zawodowych. Wiek: 27-55 lat (AVG 40+/-7). Sprawność motoryczną badano za pomocą cech uznanych w systemie Health-related fitness. Szybkość oceniano w tapping-test: notowano liczbę krzyżyków kreślonych na papierze przez 20 sekund (Tt). Skoczność mierzono wysokością wyskoku osiągniętego z miejsca z zamachem kończynami górnymi (CMJ). W etapie I badań wykonano taping metodą mięśniową. Oklemano zginacz powierzchowny palców kończyny górnej wiodącej, następnie zginacz brzuchaty łydki kończyny dolnej wiodącej, a później dodatkowo analogiczny mięsień drugiej kończyny. W etapie II, który rozpoczął się tydzień po etapie I, zastosowano serię 20 zabiegów krioterapii (czas 2 min, temp. -130°C, 1 raz dziennie przez 5/7 dni). Pomiary cech motorycznych wykonano po 10 i 20 zabiegu krioterapii, a skoczności dodatkowo po 1 i 15 zabiegu. Serię 10 zabiegów ukończyło 35, a 20 zabiegów 23 badanych.

Wyniki: Wartości początkowe Tt były w zakresie 29-46 (AVG 38+/-4,6) i wysoce statystycznie zmiennie wzrosły po tapingu (34-54; AVG 43+/-4,9; test Wilcoxon).

Dr Virgaudas Taletavicius

On January 22, 2019, at the age of 55, Virgaudas Taletavicius died after a serious illness.

Virgaudas Taletavicius was born on March 19, 1964 in Lazdijai in Lithuania. In 1988 he graduated from the Medical Institute in Kaunas and began working as a doctor with the specialization of balneology and medical rehabilitation in the largest Lithuanian health resort - Druskininkai. In the years 2001 - 2013 he was the director of the clinic in Druskininkai, in 2015 he was the director of the hospital in Varėna, and from 2016 he worked as a medical rehabilitation physician.

From 2001 he actively participated in the social and political life of the health resort. He was elected to the City Council, and he put a lot of effort into the reconstruction and development of Lithuanian balneology, introducing new methods of treatment and medical procedures, including systemic cryotherapy. He actively participated in international conferences in the field of health resort medicine and from 2011 he was a participant in all international congresses of balneology and physical medicine organized by Polish scientists.

His death is a huge loss not only for family and friends but also for the society. He was a professional, he had great ambitions, and he passionately realized his ideas. In our memory he will always be a unique, talented, intelligent, cordial and witty person with a huge sense of humor.



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and the Board of the Polish Association of
Balneology and Physical Medicine.*



POŻEGNANIA

Dr Virgaudas Taletavicius

W dniu 22 stycznia 2019 roku w wieku 55 lat zmarł po ciężkiej chorobie Virgaudas Taletavicius.

Virgaudas Taletavicius urodził się 19.03.1964 r. w Lazdijai na Litwie. W 1988 r. ukończył Instytut Medyczny w Kownie i rozpoczął pracę jako lekarz ze specjalizacją balneologia i rehabilitacja medyczna w największym litewskim uzdrowisku Druskienniki. W latach 2001-2013 był dyrektorem kliniki w Druskiennikach, w 2015 r. dyrektorem szpitala w Varėna, a od 2016 r. pracował jako lekarz rehabilitacji medycznej.

Od 2001 r. aktywnie uczestniczył w życiu społecznym i politycznym uzdrowiska, został wybrany do Rady Miasta, włożył wiele wysiłku w odbudowę i rozwój litewskiej balneologii, wprowadzając nowe metody leczenia i procedury medyczne, w tym krioterapię ogólną. Aktywnie uczestniczył w międzynarodowych konferencjach naukowych medycyny uzdrowiskowej a od 2011 r. roku był uczestnikiem wszystkich międzynarodowych kongresów balneologii i medycyny fizykalnej organizowanych przez polskich naukowców.

Jego śmierć to ogromna strata nie tylko dla rodziny i przyjaciół ale także dla społeczeństwa. Był profesjonalistą, miał ogromne ambicje, z pasją realizował swoje pomysły. W naszej pamięci na zawsze pozostanie wyjątkową, utalentowaną, inteligentną, serdeczną i dowcipną osobą z ogromnym poczuciem humoru.

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“Acta Balneologica” (“Balneologia Polska”) is an official magazine of the Polish Association of Balneology and Physical Medicine and the only scientific and educational journal in Poland and CEE countries dedicated exclusively to health resort treatment.

The Board of Editors accept for publication original previously reviewed research-, opinion- and case study papers concerning balneology, bioclimatology, physical medicine, physiotherapy, cryotherapy, kinezytherapy, pressure therapy and rehabilitation, as well as reviews of books and administrative and organizational accounts from health resorts. “Acta Balneologica” publishes also reports and materials from scientific conferences, information about future congresses, seminars, editorials, and other congresses.

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Original papers should be divided into paragraphs labeled: background, material and method, results, discussion, conclusions, and the text should be divided into passages containing compact content. Opinion papers can be divided in a different way. The suggested volume of the article cannot be exceeded: original and clinical papers – 10 pages (standard typescript) including tables and figures, object papers – 12 pages (standard typescript) including tables and figures. These limits do not apply to summaries and bibliographies.

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They should be numbered. Their descriptions should be given on a separate piece of paper with table numbers in Arabic numerals. Photographs should be accompanied by a written agreement for republishing.

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