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Does Illness Perception Explain Quality of Life of Patients With Prostate Cancer?

Aušra Mickevičienė¹, Giedrius Vanagas¹, Mindaugas Jievaltas², Albertas Ulys³

¹Department of Preventive Medicine, Medical Academy, Lithuanian University of Health Sciences,
²Department of Urology, Medical Academy, Lithuanian University of Health Sciences,
³Division of Oncourology, Institute of Oncology, Vilnius University, Lithuania

Key Words: *prostate cancer; illness perceptions; patient beliefs; quality of life.*

Summary. *Background. It is licely that illness perceptions can explain variations in quality of life of patients with prostate cancer across different treatment methods and stages. Therefore, the aim of this study was to determine if illness perception can explain variations in quality of life of patients with prostate cancer.*

Material and Methods. The cross-sectional national-level study was carried out. Quality of life was evaluated with the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 and the Visual Analogue Scale. Illness perceptions were measured by the revised Illness Perception Questionnaire.

Results. The response rate was 77.1% (N=501). The variation in global quality of life was explained (32.0%) by levels of emotional representation ($\beta=-0.126$; $P=0.023$) and consequences ($\beta=-0.209$; $P<0.01$); physical functioning (27.0%), by consequences ($\beta=-0.203$; $P<0.01$) and chemotherapy ($\beta=-2.911$; $P=0.007$); role functioning (37.0%), by emotional representations ($\beta=-0.198$; $P<0.01$), timeline cyclical ($\beta=-0.209$; $P=0.014$), and stage of the disease ($\beta=-0.779$; $P=0.007$); emotional functioning (43.0%), by emotional representations ($\beta=-0.361$; $P<0.01$) and education level ($\beta=-0.566$; $P=0.025$); cognitive functioning (34.0%), by educational level ($\beta=0.714$; $P=0.005$), emotional representations ($\beta=-0.118$; $P=0.019$), illness coherence ($\beta=-0.167$; $P=0.030$), consequences ($\beta=-0.187$; $P=0.001$), and hormonal therapy ($\beta=-0.778$; $P=0.049$); and social functioning (39.0%), by consequences ($\beta=-0.320$; $P<0.01$) and combined treatment ($\beta=-1.492$; $P=0.016$).

Conclusions. Illness perceptions may be important while investigating quality of life in patients with prostate cancer. It may underlie quality-of-life differences in this group of patients and could inform decision makers about the importance of the provision of psychosocial services to patients with prostate cancer.

Introduction

The estimated incidence rates of prostate cancer (PCa) vary by more than 25-fold worldwide with the highest rates being in Australia/New Zealand (104.2 per 100 000), Western and Northern Europe, and Northern America. The lowest age-standardized incidence rate is reported to be in South-Central Asia (4.1 per 100 000) (1). The mortality rates from PCa are almost the same in developed and developing regions. In Lithuania, PCa is the most common cancer among men. According to the Lithuanian Cancer Registry, there were registered 3123 new PCa cases in 2009. The standardized incidence and mortality rates were 138.8 and 20.2 cases per 100 000 men, respectively, and are among highest in Europe (1, 2).

The assessment of quality of life (QoL) plays a key role in the evaluation and treatment of patients; especially it is seen as a very important indicator of quality of care for cancer patients (3, 4). Our previous study has shown that less than one-fourth (24.6%) of PCa patients could be classified as having high QoL scores (5). Higher QoL scores were found to be associated with age, partnership, educational level, place of residence, duration of the illness, and disease stage (5–8). Moreover, patients managed with active surveillance rated QoL better more frequently (5). All QoL-affecting factors can be classified as directly related to cancer, such as treatment method, disease stage, and others, and indirect factors affecting QoL, such as sociodemographic factors, personal factors, etc. (9, 10).

Additionally to treatment-related and sociodemographic variables, it is important to understand how patients' cognitive and emotional beliefs about an illness impact QoL in PCa patients. This con-

Correspondence to A. Mickevičienė, Department of Preventive Medicine, Medical Academy, Lithuanian University of Health Sciences, Eivenių 4, 50161 Kaunas, Lithuania
E-mail: ausra.mickeviciene@lsmuni.lt

ceptualization could be based on the self-regulatory model (SRM) (11). Previous studies have identified various dimensions within the cognitive representation of illness: identity, the label the person uses to describe the illness and the symptoms he/she views as being part of the disease; consequences, the expected effects and outcome of the illness; cause, personal ideas about the cause of the illness; timeline, how long the patient believes the illness will last; and cure or control, the extent to which the patient believes that he/she can recover from or control the illness (12, 13).

The aim of this study was to determine if illness perception can explain variations in quality of life of patients with PCa.

Material and Methods

Study Sample and Participants. The 2000 EpiInfo Statcalc program was used to calculate a sample size. The sample size of 372 as a minimum number of subjects was computed to represent the Lithuanian PCa patients' population with the 95% confidence level. The study was performed in 6 biggest Lithuanian hospitals providing a full range of oncology and urology services: the Institute of Oncology of Vilnius University, the Hospital of Lithuanian University of Health Sciences, Oncology Hospital of Lithuanian University of Health Sciences, Klaipėda University Hospital, Šiauliai County Hospital, and Panevėžys County Hospital. All the respondents had a diagnosis of C-61 (by ICD 10), were older than 18 years, were able to fill out the questionnaire, and agreed to participate in the study.

Data Collection. A cross-sectional study design was used. The study was carried out from November 2010 to February 2011. A total of 650 anonymous questionnaires in stick-down envelopes were distributed by the investigators, physicians, and nurses in urologic and oncology departments at the healthcare institutions. The questionnaires with less than 70% of the items answered were excluded (Fig.).

Ethics. The study was approved by the permission of the Biomedical Research Ethics Committee (No. BE-2-58), issued on August 31, 2010.

Demographic and Clinical Variables. The independent variables of 2 types were collected: demographic and clinical characteristics. These variables are at least ordinal in nature, and it is possible approaching to the interval level of measurement. Demographic variables included age, marital status, occupational status, and other. Marital status (0, single; 1, lives in partnership); place of residence (0, rural; 1, urban); occupational status (0, employed; 1, unemployed/retired); etc. were coded as dichotomous variables.

Clinical variables included the duration of the illness, treatment method, and disease stage. Cancer staging was done by the patient's oncologist and then subsequently reported in medical records. Cancer staging was based on the National Cancer Institute (NCI) codes: stage I, in situ (noninvasive malignancy); stage II, local (invasive cancer confined to the site of origin); stage III, regional (spread by direct extension to adjacent organs or to regional lymph nodes); and stage IV, distant metastases (spread to distant organs or lymph nodes). The duration of the illness was ranked into 3 groups: less than 1 year; 1 to 5 years, and more than 5 years.

Assessment of Illness Perception. Respondents' illness perceptions were measured by the revised Illness Perception Questionnaire (IPQ-R) (14). The IPQ-R is a widely used multifactorial questionnaire that assesses illness representations on a 5-point Likert scale with responses ranging from "strongly disagree" to "strongly agree." It provides a quantitative assessment of the nature and strength of pa-
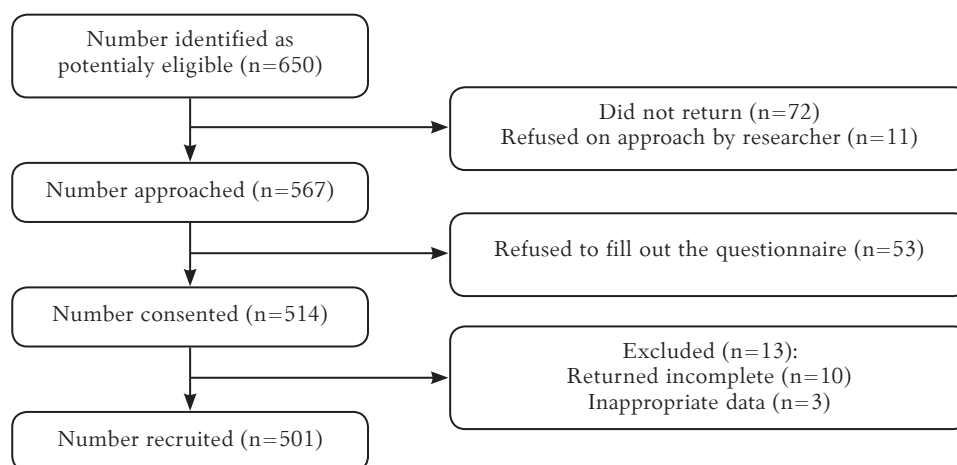
Fig. 1. Flowchart of patients approached, consented, and recruited to the study

tients' beliefs on the following 7 domains: the nature of the patients' illness "identity," the number of symptoms they perceive to be related to their illness; how long patients think their illness will last, and whether symptoms are sustained or cyclical; the perceived consequences of the illness; how much personal control patients feel they have over their illness; and the emotional picture patients have of the illness (13).

The previous version of the IPQ questionnaire had 5 dimensions: timeline (acute/chronic) (6 items), consequences (6 items), emotional impact (6 items), personal control (6 items), and treatment efficacy (5 items) (15). A revised version of this scale, the IPQ-R, extended the original scale by adding more items, splitting the control dimension into personal control and treatment control, and incorporating a cyclical timeline dimension, the overall comprehension of an illness factor, and emotional representation (14). The IPQ-R is a validated and reliable instrument (14, 15) and has been widely used in the assessment of different diseases, including major malignant diseases (16, 17).

According to the IPQ-R, *consequences* are described as the expected personal beliefs about the negative effects and outcomes of the illness affecting one's personal life; *emotional representation* incorporates negative reactions such as fear, anger, and distress; *personal control*, perceived personal control over one's condition; *treatment control*, perceived degree to which the condition may be controlled by treatment; *illness coherence*, perceived comprehension of one's condition to be dangerous. The timeline dimension was differentiated into beliefs about the relative chronic manifestations of the illness and beliefs about the fluctuation in symptoms and temporal changeability of the illness. Two scales were labeled timeline (acute/chronic) and timeline-cyclical, respectively.

QoL Assessment. There is no gold standard for QoL assessment. The choice of the instrument is influenced by the situation, stage of the disease, and treatment. Dependent variables included the QoL assessment by the European Organization for Research and Treatment of Cancer QoL Questionnaire Core 30 (EORTC QLQ-C30) and the Visual Analogue Scale (VAS).

The EORTC QLQ-C30 is an internationally validated instrument for the evaluation of QoL in cancer patients (18–20). It is characterised by excellent psychometric properties. The QLQ-C30 is composed of both multi-item scales and single-item measures. These include 5 functional scales (physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning), 3 symptom scales (fatigue, nausea and vomiting, and pain), and 6 single items (dyspnoea, insomnia, appetite loss, constipation, diarrhoea, and financial difficulties). It has become the gold standard of QoL assessment in clinical trials both in Europe and North America, with much normative data available for comparison (19, 21, 22).

The scoring of the EORTC QLQ-C30 consists of the estimation for the average as a raw score (RS) and the use of the linear transformation to standardize the raw score to the range from 0 to 100.

All the scales and single-item measures range in score from 0 to 100. Thus, a high score for a functional scale represents a high/healthy level of functioning, but a high score for a symptom scale/item represents a high level of symptom expression (21).

The cutoff point for QoL scales was defined. The following formula to define the cutoff point was used: $\Sigma \ QoL_n/N$. The cutoff point of 70.3 was defined for QLQ-C30 functional scales. According to this, all patients in the analysis were classified to good and poor QoL groups by its QoL evaluation.

The VAS is a line with descriptors at each end (good and bad QoL). The respondents were asked to place a mark along the line indicating their subjective experience. The score is measured as the distance of the mark from one end of the line. The VAS is the most simple, highly sensitive, and reliable rating scale to assess subjective experiences (23), being one of the commonest global QoL assessment tools in cancer care.

Statistical Analysis. Statistical analysis included descriptive statistics, Spearman rank correlation analysis, and stepwise linear regression modelling. The Spearman rank correlation was used to assess the associations between all sociodemographic and clinical outcome measures and QoL domains, where significant correlations existed ($P \leqslant 0.05$). Those variables were then entered into multiple binary logistic regression models using a stepwise entry method together with the IPQ-R subscales in order to assess how much of the variation in each of the QoL measures could be explained by any of these independent variables. All models were considered acceptable when χ^2 value was $P \leqslant 0.05$; Wald criterion, $P \leqslant 0.05$; correct classification (CC), not less than 50%; Cook, $\leqslant 1$; DFB, $\geqslant 1$; and R^2, $\geqslant 0.20$.

Results

During the study period, 650 questionnaires were distributed. Of these questionnaires, 514 were collected and 501 were identified as eligible according to the study purposes (Fig.). The response rate was 77.1%.

The mean age of respondents was 69.3 years (SD, 8.8); in 72.4% of the respondents, the duration of the disease was less than 5 years with a mean disease duration of 46.9 months (SD, 37.1). All other

sociodemographic and clinical characteristics of the study population are presented in Table 1.

The typical study participant was aged 64 years and more (74.4%), living in partnership (married or cohabitating) (83.1%), living in the urban area (70.2%), without higher education (75.8%), retired (82.6%), with stage II or III PCa (91.2%), and undergoing hormonal therapy (37.3%).

QoL Evaluation. The mean QoL scores on all subscales are summarized in Table 2. The mean VAS score was 54.06 (SD, 20.01). The EORTC QLQ-C30 scores ranged from 71.81 (SD, 22.02) to 82.26 (SD, 28.91), with the highest mean score being in the role functioning domain, and the lowest, in the physical functioning domain.

Correlation Analysis. Table 3 shows correlation between standardized QoL measures and sociodemographic and clinical variables.

The VAS score correlated significantly with active surveillance ($r=0.116$; $P=0.02$).

EORTC QLQ-C30 physical functioning correlated significantly with age ($r=-0.115$, $P=0.019$), educational level ($r=0.123$, $P=0.010$), illness duration ($r=-0.122$, $P=0.018$), active surveillance ($r=0.136$, $P<0.01$), chemotherapy ($r=-0.212$, $P<0.01$), and radiotherapy ($r=0.137$, $P<0.01$).

Role functioning correlated significantly with the place of residence ($r=-0.116$, $P=0.019$), active surveillance ($r=0.136$, $P<0.01$), surgery ($r=-0.104$, $P=0.037$), and chemotherapy ($r=-0.234$, $P<0.01$).

Emotional functioning correlated significantly with age ($r=0.226$, $P<0.01$), education level ($r=-0.150$, $P<0.01$), occupation ($r=0.167$, $P<0.01$), stage of the disease ($r=0.104$, $P=0.033$), active surveillance ($r=0.156$, $P=0.001$), surgery ($r=-0.122$, $P=0.012$) and chemotherapy ($r=-0.183$, $P<0.001$).

Cognitive functioning correlated significantly with radiotherapy ($r=0.111$, $P=0.023$).

Social functioning correlated significantly with

Table 1. Sociodemographic and Clinical Characteristics of the Respondents With Prostate Cancer (N=501)

Characteristic	N (%)
Age (n=466)	
⩽63	119 (25.6)
64–74	221 (47.4)
⩾75	126 (27.0)
Marital status (n=498)	
In partnership	414 (83.1)
Single	84 (16.9)
Place of residence (n=497)	
Urban	349 (70.2)
Rural	148 (29.8)
Education level (n=494)	
Primary/basic	187 (37.9)
Secondary	187 (37.9)
Higher education	120 (24.2)
Occupation (n=494)	
Employed	86 (17.4)
Retired	408 (82.6)
Cance stage (objective) (n=501)	
I (T1a, N0, M0)	13 (2.6)
II (T1b–T2b, N0, M0)	178 (35.5)
III (T3, N0, M0)	279 (55.7)
IV (T4, any N, M1)	31 (6.2)
Method of treatment (objective) (n=501)	
Active surveillance	61 (12.2)
Surgery	92 (18.4)
Chemotherapy	22 (4.3)
Radiotherapy	73 (14.6)
Hormonal therapy	187 (37.3)
Combined treatment	66 (13.2)

Table 2. Mean, Standard Deviation and Range for the Quality-of-Life Measures in the Study Population

QoL Domain	Mean	SD	Range
Visual Analogue Scale			
Global quality of life (n=402)	54.06	20.01	0–100
EORTC QLQ-C30 scales			
Physical functioning (n=438)	71.81	22.02	0–100
Role functioning (n=412)	82.26	28.91	0–100
Emotional functioning (n=422)	73.90	27.46	0–100
Cognitive functioning (n=417)	76.06	21.44	0–100
Social functioning (n=411)	79.93	27.04	0–100

QoL, quality of life; EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30.

Table 3. Spearman Rank Correlation Between Quality of Life Subscales/Evaluation and Sociodemographic and Clinical Variables

Independent Variable	VAS	PF	RF	EF	CF	SF
Sociodemographic variables						
Age	0.065	−0.115*	0.031	0.226**	−0.083	0.259**
Marital status	−0.007	−0.021	0.046	−0.003	−0.002	0.089
Place of residence	−0.046	−0.027	−0.116*	−0.016	−0.038	0.008
Educational level	0.085	0.123*	−0.050	−0.150**	0.052	−0.219**
Occupation	0.003	−0.050	−0.026	0.167**	−0.037	0.157**
Clinical variables						
Cancer stage	0.018	−0.052	−0.021	0.104*	−0.054	0.188**
Illness duration	−0.006	−0.122*	−0.099	0.034	−0.096	0.068
Active surveillance	0.116*	0.136**	0.136**	0.156**	−0.006	0.159**
Surgery	−0.075	−0.017	−0.104*	−0.122*	−0.008	−0.208**
Chemotherapy	−0.022	−0.212**	−0.234**	−0.183**	−0.019	−0.171**
Radiotherapy	0.007	0.137**	0.032	−0.067	0.111*	−0.161**
Hormonal therapy	−0.025	−0.076	−0.016	0.095	−0.078	−0.176**
Combined treatment	−0.006	0.024	−0.095	−0.031	0.011	−0.126*

VAS, Visual Analogue Scale; PF, physical functioning; RF, role functioning; EF, emotional functioning; CF, cognitive functioning; SF, social functioning.
*$P<0.05$; **$P<0.01$.

age ($r=0.259$, $P<0.01$), education ($r=-0.219$, $P<0.01$), occupation ($r=0.157$, $P<0.01$), stage of the disease ($r=0.188$, $P<0.01$), active surveillance ($r=0.159$, $P=0.001$), surgery ($r=-0.208$, $P<0.01$), chemotherapy ($r=-0.171$, $P<0.001$), radiotherapy ($r=-0.161$, $P=0.001$), hormonal therapy ($r=-0.176$, $P<0.001$), and combined treatment ($r=-0.126$, $P=0.001$).

Stepwise Logistic Regression Models. The extent to which independent factors could explain variations in QoL was examined. The main findings are presented in Table 4. The percentage of variation explained by the IPQ-R and sociodemographic and clinical variables on the VAS and each of 5 EORTC QLQ-C30 scales ranged from 27.0% to 43.0%.

The variation in global QoL on the VAS was explained (32.0%) only by the levels of emotional representation ($\beta=-0.126$; $P=0.023$) and consequences ($\beta=-0.209$; $P<0.01$). These variables were inversely related to QoL representing that lower levels of personal beliefs about illness significance and lower levels of negative emotional representations were associated with better global QoL.

The variation in physical functioning by the EORTC QLQ-C30 was explained (27.0%) by consequences and chemotherapy. Consequences ($\beta=-0.203$; $P<0.01$) and chemotherapy ($\beta=-2.911$; $P=0.007$) were inversely related to QoL indicating that lower levels of personal beliefs about a negative impact of illness on one's personal life were associated with a higher/healthy level of functioning and better QoL. Lower QoL values on the physical functioning domain can also be explained by chemotherapy.

The variation in role functioning was explained (37.0%) by emotional representations ($\beta=-0.198$; $P<0.01$), timeline cyclical ($\beta=-0.209$; $P=0.014$), and stage of the disease ($\beta=-0.779$; $P=0.007$). All these variables were inversely related indicating that lower levels of negative emotional representations and beliefs that illness and its symptoms were cyclical were associated with a higher/healthy level of functioning and better QoL. Lower QoL scores in role functioning can be also explained by end stages of the disease.

The variation in emotional functioning was explained (43.0%) by emotional representations ($\beta=-0.361$; $P<0.01$) and education level ($\beta=-0.566$; $P=0.025$). These variables were inversely related indicating that lower levels of negative emotional representations were associated with better QoL. Contrary, a higher educational level explained poorer QoL in patients with PCa.

The variation in cognitive functioning was explained (34.0%) by education level ($\beta=0.714$; $P=0.005$), emotional representations ($\beta=-0.118$; $P=0.019$), illness coherence ($\beta=-0.167$; $P=0.030$), consequences ($\beta=-0.187$; $P=0.001$), and hormonal therapy ($\beta=-0.778$; $P=0.049$). A higher level of education and hormonal therapy was positively associated with higher QoL scores. Opposite, a lower level of negative emotional representations, understanding of a negative impact of the illness on one's personal life, and lower perceived comprehension of one's condition to be dangerous were associated with higher QoL.

The variation in social functioning was explained (39.0%) by consequences ($\beta=-0.320$; $P<0.01$) and combined treatment ($\beta=-1.492$; $P=0.016$). These

Table 4. Variations in Quality of Life Among Patients With Prostate Cancer Explained by Independent Variables

HR-QoL Domain	Explanatory Factor	β	Overall Model		
			χ^2	Nagelkerke R^2	CC, %
Visual Analogue Scale					
Global Quality of Life	Emotional representations (IPQ-R)	$-0.126*$	35.2**	0.32	78.5
	Consequences (IPQ-R)	$-0.209**$			
EORTC QLQ-C30 functional scales					
Physical functioning (n=438)	Consequences (IPQ-R)	$-0.203**$	34.2**	0.27	70.8
	Chemotherapy	$-2.911*$			
Role functioning (n=407)	Emotional representations (IPQ-R)	$-0.198**$	47.9**	0.37	73.8
	Timeline cyclical (IPQ-R)	$-0.209*$			
	Disease stage	$-0.779*$			
Emotional functioning (n=422)	Emotional representations (IPQ-R)	$-0.361**$	60.2**	0.43	78.7
	Education	$-0.566*$			
Cognitive functioning (n=417)	Education	$0.714*$	44.5**	0.34	72.2
	Emotional representations (IPQ-R)	$-0.118*$			
	Illness coherence items (IPQ-R)	$-0.167*$			
	Consequences (IPQ-R)	$-0.187**$			
	Hormone therapy	$-0.778*$			
Social functioning (n=411)	Consequences (IPQ-R)	$-0.320**$	53.0**	0.39	73.2
	Combined treatment	$-1.492*$			

IPQ-R, revised Illness Perception Questionnaire; CC, correct classification;
EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30.
*$P<0.05$; **$P<0.01$.

variables were inversely related to QoL indicating that higher levels of personal beliefs about a negative impact of the illness on one's personal life and combined treatment were associated with poorer QoL.

Age, occupation, duration of the illness, marital status, place of residence, and some treatment methods (active surveillance, surgery, and radiotherapy) did not contribute significantly to any of the QoL domains in this sample.

Discussion

Patients diagnosed with cancer or any other chronic illness generally develop an organized pattern of beliefs about their condition. These attitudes are key determinants of patient's behavior while managing the illness. It is a dynamic process that changes in response to shifts in patients' perceptions and ideas about their illness (24).

Our study highlighted that 27.0% to 43.0% of variation in QoL scales can be explained by IPQ-R and sociodemographic and clinical variables. The variation in global QoL by the VAS can be explained by the levels of emotional representation and consequences; physical functioning by the EORTC QLQ-C30, by consequences and chemotherapy; role functioning, by emotional representations, timeline cyclical, and stage of the disease; emotional functioning, by emotional representations and educational level; cognitive functioning, by education level, emotional representations, illness coherence, consequences, and hormonal therapy; and social functioning, by consequences and combined treatment. Age, occupation, duration of the illness, marital status, place of residence, and some treatment methods (active surveillance, surgery, and radiotherapy) did not contribute significantly to any of the QoL domains in this sample.

Some studies showed that negative illness perceptions were associated with lower QoL, poor adaptation to cancer, depression, poor treatment adherence, and poor health (25, 26). Research based on the SRM indicates that the cognitive representation of any health problem comprises a cluster of perceptions, which affect mental health, behavioral and emotional responses (27–29). These perceptions include the label applied to the illness and its symptoms; perceived illness duration; beliefs about the causes of the illness; perceived consequences of the illness on personal life; and beliefs about the extent to which the illness can be controlled by oneself or one's treatment. Numerous studies have supported these dimensions and demonstrated that they are relevant to different illnesses (25, 27, 29).

There is a lack of studies analyzing illness perceptions among PCa patients; explanations on how illness perception can explain variations in QoL of PCa patients across different treatment methods and stages of the disease are scarce as well.

The major methodological limitation of this study was its cross-sectional design, which precludes an evaluation of temporal precedence and causality of the observed associations.

The strengths of the present study should be mentioned as well. Anonymous questionnaires in stick down envelopes were used, and it increased the response rate and the protection of patient's data; self-reported questionnaires in combination with data collection from medical records were used; and the sample size was sufficient to reflect the Lithuanian population of patients with PCa. Moreover, the EORTC QLQ-C30, the VAS, and the IPQ-R that are validated in different patients' populations were employed (19, 21, 24, 30). It is accepted that self-reported questionnaires are the commonest means by which outcomes reported by the patient can be measured (5).

Conclusions

Our results suggest that illness perceptions may be important while investigating quality of life among patients with prostate cancer. Moreover, the importance to provide the opportunity for patients to receive adequate information about one's health status in a supportive atmosphere and help them normalize their health experiences by developing realistic perceptions about the course of the disease should be noted. Further explorations of psychosocial factors that may underlie quality-of-life differences in this group of patients and could inform decision makers about the importance of the provision of psychosocial services to patients with prostate cancer.

Statement of Conflict of Interest

The authors state no conflict of interest.

References

1. Cancer Incidence and Mortality Worldwide in 2008. World Health Organization, International Agency for Research on Cancer. Globocan: http://globocan.iarc.fr. Accessed 22 July 2011.
2. Smailytė G, Aleknavičienė B. Cancer in Lithuania in 2009. Vilnius, DC: Lithuanian Cancer Register. Vilnius: Petro ofsetas; 2011. p. 2-22.
3. Lintz K, Moynihan C, Steginga S, Norman A, Eeles R, Huddart R, et al. Prostate cancer patients support and psychological care needs: survey from a non-surgical oncology clinic. Psychooncology 2003;12:769-83.
4. Vanagas G, Padaiga Ž, Subata E. Drug addiction maintenance treatment and quality of life measurements. Medicina (Kaunas) 2004;40(9):833-41.
5. Mickevičienė A, Vanagas G, Ulys A, Jievaltas M, Smailytė G, Padaiga Ž. Factors affecting health-related quality of life in prostate cancer patients. Scand J Urol Nephrol 2012;46(3):180-7.
6. Jayadevappa R, Schwartz JS, Chhatre S, Wein AJ, Malkowicz SB. Association between utility and treatment among patients with prostate cancer. Qual Life Res 2010;19(5):711-20.
7. Song L, Northouse LL, Braun TM, Zhang L, Cimprich B, Ronis DL, et al. Assessing longitudinal quality of life in prostate cancer patients and their spouses: a multilevel modelling approach. Qual Life Res 2010;20(3):371-81.
8. Gore JL, Krupski T, Kwan L, Maliski S, Litwin MS. Partnership status influences quality of life in low-income, uninsured men with prostate cancer. Cancer 2005;104(1):191-8.
9. Lehto US, Ojanen M, Väkevä A, Aromaa A, Kellokumpu-Lehtinen P. Noncancer life stresses in newly diagnosed cancer. Support Care Cancer 2008;16(11):1231-41.
10. Daubenmier JJ, Weidner G, Marlin R, Crutchfield L, Dunn-Emke S, Chi C, et al. Lifestyle and health-related quality of life of men with prostate cancer managed with active surveillance. Urology 2006;67(1):125-30.
11. Dempster M, McCorry NK, Brennan E, Donnelly M, Murray LJ, Johnston BT. Do changes in illness perceptions predict changes in psychological distress among esophageal cancer survivors? J Health Psychol 2011;16(3):500-9.
12. Leventhal H, Nerenz DR, Steele DJ. Illness representations and coping with health threats. In: Baum A, Taylor SE, Singer JE, editors. Handbook of psychology and health. Vol. 4. Social psychological aspects of health. Hillsdale (NJ): Erlbaum; 1984. p. 219-52.
13. Llewellyn CD, McGurk M, Weinman J. Head and neck cancer: to what extent can psychological factors explain differences between health-related quality of life and individual quality of life? Br J Oral Maxillofac Surg 2006;44(5):351-7.
14. Moss-Morris R, Weinman J, Petrie K, Horne R, Cameron L, Buick D. The revised illness perception questionnaire (IPQ-R). Psychol Health 2002;17(1):1-16.
15. Weinman J, Petrie K, Moss-Morris R, Horne R. The illness perception questionnaire: a new method for assessing the cognitive representation of illness. Psychol Health 1996; 11(3):431-45.
16. Ford D, Zapka J, Gebregziabher M, Yang C, Sterba K. Factors associated with illness perception among critically ill patients and surrogates. Chest 2010;138(1):59-67.
17. Scharloo M, Baatenburg de Jong RJ, Langeveld TPM, van Velzen-Verkaik E, Doorn-op den Akker MM, Kaptein AA. Quality of life and illness perceptions in patients with recently diagnosed head and neck cancer. Head Neck 2005; 27(10):857-63.
18. Namiki S, Arai Y. Health-related quality of life in men with localized prostate cancer. Int J Urol 2010;17(2):125-38.
19. Arraras UJI, Iturre EV, Vega FA, Domínguez DMA, Milagro NL, Burgaleta AM, et al. The EORTC Quality of Life Questionnaire QLQ-C30 (version 3.0). Validation study for Spanish prostate cancer patients. Arch Esp Urol 2008;61(8): 949-54.
20. Krahn M, Bremner KE, Tomlinson G, Ritvo P, Irvine J, Naglie G. Responsiveness of disease-specific and generic utility instruments in prostate cancer patients. Qual Life Res 2007;16(3):509-22.
21. European Organisation for research and treatment of Cancer, (EORTC) official page, QLQ-C30 questionnaire. Available from: URL: http://groups.eortc.be/qol/questionnaires_qlqc30.htm Accessed 27 June 2011.
22. Carlson LE, Speca M, Patel KD, Goodey E. Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress, and immune parameters in breast and prostate cancer outpatients. Psychosom Med 2003;65(4): 571-81.
23. Hauser K, Walsh D. Visual analogue scales and assessment of quality of life in cancer. J Support Oncol 2008;6(6):277-82.
24. Petrie KJ, Weinman J. Why illness perceptions matter. Clin Med 2006;6:536-9.
25. Traeger L, Penedo FJ, Gonzalez JS, Dahn JR, Lechner SC, Schneiderman N, et al. Illness perceptions and emotional well-being in men treated for localized prostate cancer. J Psychosom Res 2009;67(5):389-97.
26. Husson O, Thong MS, Mols F, Oerlemans S, Kaptein AA, van de Poll-Franse LV. Illness perceptions in cancer survivors: what is the role of information provision? Psychooncology 2013;22(3):490-8. Epub 2012 Feb 6.
27. Leventhal H, Meyer D, Nerenz D. The common sense model of illness danger. In: Rachman S, editor. Contributions in medical psychology. New York: Pergamon Press; 1980. p. 7-30.
28. Løyland B, Miaskowski C, Dahl E, Paul SM, Rustøen T. Psychological distress and quality of life in long-term social assistance recipients compared to the Norwegian population. Scand J Public Health 2011;39(3):303-11.
29. Meyer D, Leventhal H, Gutmann M. Common-sense models of illness: the example of hypertension. Health Psychol 1985;4:115-35.
30. Giannousi Z, Manaras I, Georgoulias V, Samonis G. Illness perceptions in Greek patients with cancer: validation of the Revised-Illness Perception Questionnaire. Psychooncology 2010;19(1):85-92.