Original Article

Health-Related Quality of Life in Prostate Cancer Survivors: Implications for Nursing Care

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Abstract

Background: The quality of life of prostate cancer survivors is influenced by various personal and disease-related factors including age and time passed from cancer diagnosis. Identification of these factors can have implications for improving nursing care strategies during recovery from cancer. Also, there is a lack of knowledge of health-related quality of life (HRQoL) among Iranian prostate cancer (PCa) survivors.

Objective: This study aimed to describe HRQoL among Iranian PCa survivors and compare it with age at cancer diagnosis and time passed from it.

Methodology: This cross-sectional study was conducted on 186 PCa survivors at the radiotherapy department of a large referral teaching hospital in an urban area of Iran. The demographic characteristics form, EORTC QLQ-C30, and EORTC QLQ - PR25 questionnaires were used to gather data. Descriptive and inferential statistics were used for data analysis via SPSS.

Results: The cancer survivors with older age at cancer diagnosis had significantly lower physical (p = 0.001) and sexual function (p = 009), and higher social function (p = 0.03), fatigue (p = 0.02), dyspnea (p = 0.008), urinary (p = 0.007) symptoms and financial difficulties (p = 0.03). Also, statistically significant differences between time passed from cancer diagnosis and physical function (p = 0.03), urinary (p = 0.001) and bowel (p = 0.02) symptoms and urinary aid problems (p = 0.006) were reported.

Conclusions: Nurses need to pay more attention to age at cancer diagnosis and time passed from it among PCa survivors during follow-up care programs in order to improve their HRQoL.

Keywords: Prostate cancer, health-related quality of life, nursing care, cancer survivor

Introduction

Prostate cancer (PCa) is the most common type of cancer in men across the globe (Ferlay et al., 2015). According to a recent report, PCa with 21% growth in the number of new cases of cancer each year is the most common type of cancer in men in

the USA (Siegel, Miller, & Jemal, 2020). In the past years, the prevalence of PCa in Iran has increased and its current prevalence rate has been estimated 7-9% of all types of cancers among men (Pakzad et al., 2016). The 5-year survival rate of localized PCa in developed countries has been reported 98% (Howlader et al., 2015). Living for a longer time does not mean to have a high level of quality of life (QoL), because cancer treatment has negative impacts on patients' QoL (Bourke et al., 2015). Accordingly, the assessment of cancer outcomes not only needs the measurement of the cancer survival rate, but also requires the measurement of health-related quality of life (HRQoL) as the indicator of treatment outcomes in patients with PCa (Kikkawa et al., 2018). Most men undergoing treatment for PCa including surgery, radiotherapy and hormone therapy face negative treatment consequences influencing their HRQoL (Skolarus et al., 2012) especially at the first year of the treatment process (Punnen, Cowan, Chan, Carroll, & Cooperberg, 2015). For instance, surgery can have a large impact on patients' erectile function and urinary continence. Also, radiotherapy disturbs patients' bowel and urinary functions (Punnen et al., 2015). In addition, hormone therapy creates symptoms such as hot flashes, musculoskeletal and sexual dysfunctions, metabolic disorders, fatigue, and mood changes (Sountoulides & Rountos, 2013). The largest reductions in HRQoL often happen within early years after treatment, but some patients may experience improvements in later years (Smith et al., 2009; Punnen et al., 2015). Accordingly, PCa survivors often experience a decline in their HRQoL with the increase of time passed from cancer diagnosis (Holm et al., 2018). The relationship between the patients' age at diagnosis and HQoL after treatment and implications for devising appropriate care strategies has not been completely explored in the international literature (Kurian et al., 2018). On the other hand, the interpretation of the findings of studies on HRQoL following PCa treatment is difficult, because of variations in patients' age and health conditions (Zenger et al., 2010; Kikkawa et al., 2018). Nurses working in the oncology department have a crucial role in improving QoL among cancer survivors through improving their knowledge of the impact of cancer and relevant treatment strategies on patients' lives (Nightingale et al., 2020). Also, the

key principle for the provision of care to PCa survivors is to have a holistic patient-centered care approach in order to support them and meet their care needs (Ferguson & Aning, 2015). Exploratory studies in nursing on PCa survivors can help with devising appropriate nursing interventions for improving their QoL in the recovery period from cancer. However, there is no document about prostate cancer survivor HRQoL among Iranian community, which is the basis to plan for improving the QoL of cancer survivors. Also, it has been shown that Iranian nurses have a moderate understanding of HQoL issues in patients with cancer (Bahrami, 2016). Therefore, the present study aimed to describe HRQoL among Iranian PCa survivors and compare it with age at cancer diagnosis and time passed from it, which have implications for developing appropriate nursing care strategies for patients during recovery from cancer.

Methodology

Design and Samples: This cross-sectional descriptive study was conducted on PCa survivors in an urban area of Iran. Participants were those patients undergoing various treatment modalities in a large referral teaching hospital from April 2014 to February 2017 and had a medical file at the radiotherapy department of the hospital. For recruitment, their medical files were retrieved and reviewed in terms of demographic data and cancer and related therapies. They were contacted via their phone numbers and residence addresses to be invited for taking part in the study. Eligibility criteria were: male gender, age older than 45 years, being diagnosed with PCa, completion of treatment sessions within the past 3-12 months, lack of metastasis to other organs, and willingness to take part in the study. If they had another type of cancer and suffered from psychiatric disorders that could influence their HRQoL, they were excluded. Out of the 285 PCa survivors who had a medical file in the hospital, 99 patients lacked the inclusion criteria or were unwilling to take part in the study. Therefore, 186 patients were recruited (Figure 1).

It is noted that the adequacy of the sample size was confirmed given a minimum effect size of 0.15, power of 90% and type 1 error of 0.05 (Kim et al., 2017) that were applied to a sampling formula. Although the minimum sample size was estimated

150 patients, all 186 patients were recruited to   increase the power of our study.
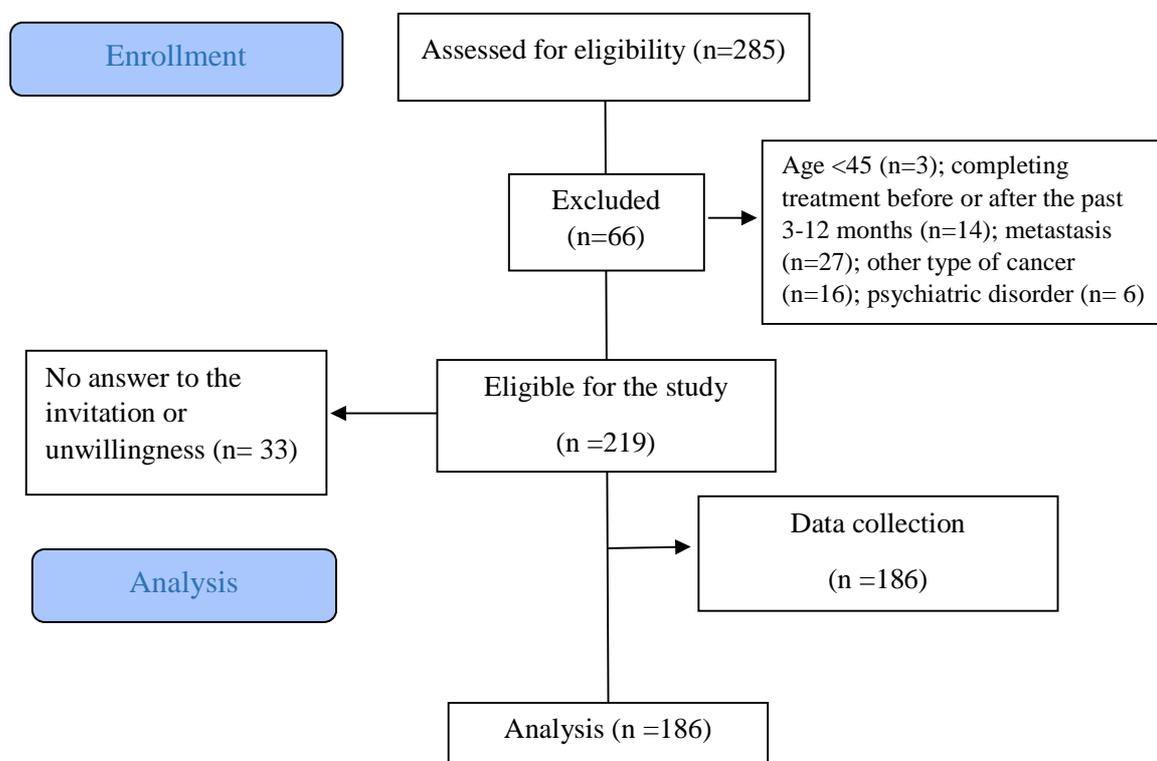

Figure 1. Process of study from sampling to data analysis

Data Collection

The demographic characteristics form: It included questions about the participants' age, BMI (body mass index), marital status, education level, employment status, economic status, and need for help in daily living activities. It also contained questions about the time passed from cancer diagnosis, treatment modalities, accompanying illnesses, exercise and smoking habit, and history of sexual issues before PCa.

The European Organization for Research and Treatment of Cancer. Quality of life Questionnaire-Core 30 Version 3 (EORTC QLQ-C30 V. 3): It was used to collect data regarding HRQoL and was designed by the European Cancer Research and Treatment Agency to evaluate HRQoL in the past week in patients suffering from

cancer. It consisted of 30 items under five functional scales of physical, role, cognitive, emotional, and social function, nine symptoms scales, and one global health-status/quality of life scale. Moreover, the symptoms scales included fatigue, nausea, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties. For scoring, each item had four response alternatives including not at all (score 1), a little (score 2), quite a bit (score 3), and very much (score 4). The global health-status/quality of life scale had a response option ranging from very poor (score 1) to excellent (score 7) (Fayers et al., 2015). For reliability, its Cronbach's alpha coefficient for all domains was above 0.7 except for cognitive function domain (Ayana, Negash, Yusuf, Tigeneh, & Haile, 2016). Safaee et al. (2007) reported that the third Farsi version of

EORTC QLQ-C30 V. 3 was valid and reliable (r > 0.70 for all domains).

The European Organization for Research and Treatment of Cancer. Quality of Life Questionnaire - Prostate Cancer Module (EORTC QLQ - PR25): It was used as a supplement to the EORTC QLQ-C30 questionnaire for the assessment of HRQoL in patients with urinary tract cancer. It consisted of 25 questions in six domains of urinary symptoms, bowel symptoms, incontinence aid (those participants who wore an incontinence aid answered this question), hormonal treatment-related symptoms, sexual activity, and sexual function (those participants who had sexual activities during the past four weeks answered this question). Each item had four response alternatives: not at all (score 1), a little (score 2), quite a bit (score 3), and very much (score 4) (van Andel et al., 2008). Van Andel et al. (2008) confirmed its validity and reliability in a study in thirteen countries. It was translated to Farsi and was filled out by 20 PCa survivors. For internal consistency, the Cronbach's alpha coefficients for the whole instrument and its domains were 0.63 and 0.85, respectively. For stability using the test-retest method within a two-week interval, the Pearson correlation coefficient was 0.895. For both of these questionnaires, the domain score was calculated separately and converted to 0-100 based on the formula suggested in the questionnaires. Each domain score was reported separately and in the functional domains and symptom domains, high scores indicated a better condition and the severity of symptoms, respectively (Fayers et al., 2015). After identifying eligible participants, the first author (AM) met them at their residence and provided them with information about the study process. Each participant was provided with data collection questionnaires upon giving consent to take part in the study.

Ethics Considerations: The research proposal was approved by the Ethics Committee affiliated with the University in which the second author (SPR) worked. The permission to enter the research zone was obtained and the participants were informed of the study's purpose and method. Also, their verbal consent for retrieving their medical files and participation in the study were obtained. They were ensured of confidentiality of data and that they could leave the study at any time without any effect on their care. Before data collection, they were asked to sign the informed consent form to enter the study.

Data Analysis: For data analysis, descriptive and inferential statistics via SPSS software v. 25 were used. Normal distribution of the data was evaluated using the Shapiro–Wilk test and the Kolmogorov–Smirnov test. The patients' age at cancer diagnosis was categorized into less than 70 years and 70 years and/or older. The independent sample t-test and Chi-square test on the basis of age at diagnosis were used to examine the patients' demographic variables. Also, for the assessment and comparison of HRQoL scores at two age categories, the independent t-test was used. In addition, time passed from cancer diagnosis was categorized as less than 1 year, 1-3 years, and 3 years and more. The one-way ANOVA test was used to assess and compare HRQoL scores across these categories. P value < 0.05 was regarded as a significant level.

Results

Demographic and Social Characteristics of the Patients: All participants approached, agreed to take part in the study. Of all, 53% (n = 99) were < 70 years old and 47% (n = 87) aged ≥ 70 years. There were differences in the demographic and clinical characteristics of the patients in age groups. As such, the education level (p = 0.001), marital status (p = 0.01), economic status (p = 0.001), and performing exercise (p = 0. 01) were significantly lower and respiratory diseases including asthma, bronchitis and chronic obstructive pulmonary diseases (COPD) (p = 0.04) were significantly higher in the age group of ≥ 70 years (Table 1).

HRQoL: the EORTC QLQ-PR25 and EORTC QLQ-C30 Questionnaires: Comparison of HRQoL scores between the age categories (age < 70 years and ≥ 70 years) was shown in Table 2. In the function domains, participants with a younger age at cancer diagnosis (< 70 years) had a lower social function (mean difference (MD) = -7.24, p = 0.03). However, their physical function (MD = 9.90, p = 0.001) and sexual activity (MD = 6.06, p = 0.009) were higher than those with a higher age of cancer diagnosis (≥ 70 years). In the symptoms domain, fatigue (MD = -6.06, p = 0.02), dyspnea (MD = -10.26, p = 0.008), financial difficulties (MD = -10.87, p = 0.03) and urinary symptoms (MD = -6.06, p = 0.009) were significantly lower

in the younger participants (p< 0.05). Comparison of HRQoL scores diagnosis on the basis of time passed from cancer indicated statistically significant differences in physical function (p = 0.03).

Table 1. The demographic and social characteristics of the patients

Variable		All patients (n=186) n (%)	Age category at cancer diagnosis		P-value #
			< 70 years (n=99) n (%)	≥ 70 year (n=87) n (%)	
Age at cancer diagnosis mean (±SD)		70(5.56)	65.70(3.21)	74.88(3.07)	**0.001***
Body mass index mean (±SD)		24.32(2.52)	24.39 (2.80)	24.23(2.17)	0.65*
Marital status	Single	49(26.3)	19 (19.2)	30 (34.5)	**0.01**
	Married	137(73.7)	80 (80.8	57 (67.5)	
Education level	Illiterate	54(29)	19(19.2)	35(40.2)	**0.001**
	Elementary	60(32.3)	30(30.3)	30(34.5)	
	Higher than elementary	72(38.7)	50(50.5)	22(25.3)	
Occupation	Employed	44(23.7)	29(29.3)	15(17.2)	0.11
	Retired	112(60.2)	57(57.6)	55(63.2)	
	Unemployed	30(16.1)	13 (13.1)	17(19.6)	
Economic status	Sufficient	42(22.6)	28(28.3)	14(16.1)	**0.001**
	Relatively Sufficient	91(51.6)	56(56.6)	40(46)	
	Not-sufficient	48(25.8)	15(15.2)	33(37.9)	
Need to help with daily living activities	Yes	89(47.8)	46(46.5)	43(49.4)	0.68
	No	97(52.2)	53(53.5)	44(50.6)	
Time passed from cancer diagnosis	Less than one year	25(13.5)	11(11.1)	14(16.1)	0.56
	1-3 years	104(55.9)	58(58.6)	46 (52.9)	
	More than 3 years	57(30.6)	30(30.3)	27(31)	
Treatment modality	EBRT	67(36)	36(36.4)	31(35.6)	0.6
	EBRT +RP	22(11.9)	11(11.1)	11(12.6)	
	EBRT+HT	81(43.5)	41(41.4)	40(46.1)	
	EBRT + RP+ HT	16(8.6)	11(11.1)	5(5.7)	
Underlying disease	Hypertension	75(40.5)	37(37.8)	38(43.7)	0.41
	Diabetes	42(22.6)	19(19.2)	23(26.7)	0.22
	Heart disease	31(16.7)	19(19.2)	12(13.8)	0.32
	Asthma, bronchitis, COPD	30(16.1)	11(11.1)	19(21.8)	**0.04**
Performing exercise	Some times	43(23.1)	30(30.3)	13(14.9)	**0.01**
	Not at all	143(76.9)	69(69.7)	74(85.1)	
Smoking habit	Yes	73(39.2)	35(35.4)	38(43.7)	0.24
	No	113(60.8)	64(64.6)	49(56.3)	
History of sexual problem before cancer diagnosis	Yes	40(21.5)	22(22.9)	18(20.7)	0.80
	No	146(78.5)	77(77.8)	69(79.3)	

COPD: chronic obstructive pulmonary disease; EBRT: external beam Radiotherapy; HT: Hormone therapy; RP: Radical prostatectomy. # Chi-square (X^2) test, * Independent sample t-test

Table 2. Health-related quality of life and symptoms scales by age at cancer diagnosis and the time passed from cancer diagnosis

	Age< 70 years (n=99) Mean(SD)	Age≥70 year (n=87) Mean(SD)	P value*	< 1 Year (n =25) Mean (SD)	1-3 Year (n=104) Mean (SD)	> 3 Year (n=57) Mean (SD)	P-value[#]
QLQ-C30 Functioning Scale							
Global HRQOL	42.50(15.17)	40.90(14.52)	0.46	43(11.45)	43.26(15.53)	38.45(14.58)	0.13
Physical function	68.48(13.29)	58.58(15.63)	**0.001**	66.93(15.21)	65.44(15.97)	59.53(13.02)	**0.03**
Role function	67.50(18.50)	63.98(20.31)	0.21	66.33(18.58)	67.78(21.19)	62.57(15.83)	0.26
Emotional function	64.56(16.16)	64.08(15.78)	0.83	66(18.14)	65.30(16.42)	61.84(13.90)	0.36
Cognitive function	77.77(20.48)	74.71(18.47)	0.28	72.66(21.98)	77.40(19.83)	76.02(18.09)	0.55
Social function	53.87(23.78)	61.11(22.39)	**0.03**	62(22.83)	56.57(23.95)	56.43(22.65)	0.55
QLQ-C30 Symptom Scale							
Fatigue	30.97(16.51)	37.03(20.09)	**0.02**	32(19.59)	32.69(19.38)	36.64(16.12)	0.37
Nausea	9.42(12.17)	10.53(12.98)	0.54	11.33(15)	8.65(11.37)	11.69(13.35)	0.28
Pain	26.09(18.77)	28.35(20.66)	0.43	27.33(17.92)	25.48(19)	30.11(21.46)	0.36
Dyspnea	21.54(23.48)	31.80(23.79)	**0.008**	22.66(24.94)	28.84(27.10)	23.39(24.36)	0.33
Insomnia	35.01(26.67)	31.41(26.09)	0.35	28(26.66)	33.97(26.26)	34.50(26.70)	0.55
Appetite	24.24(26)	30.26(27.67)	0.12	34.66(32.60)	24.67(26.68)	28.07(24.22)	0.23
Constipation	26.62(27.72)	31.41(25.59)	0.65	20(23.57)	32.69(26.26)	30.99(28.07)	0.1
Diarrhea	22.89(25.92)	21.45(27.83)	0.71	18.66(25.60)	22.11(27.32)	23.97(26.54)	0.71
Financial	45.45(33.14)	56.32(35.33)	**0.03**	56(32.94)	48.07(34.70)	52.63(35.04)	0.5
QLQ-PR25 Scale							
Sexual activity	21.38(17.01)	15.32(13.97)	**0.009**	16(31.15)	17.14(15.48)	22.22(17.34)	0.1
Sexual function (conditional) [a]	51.66(10.24) (n=10)	41.62(13.60) (n=4)	0.15	41.66(23.56) (n= 2)	51.04(11.30) (n=8)	47.87(8.02) (n=4)	0.62
Urinary symptoms	25.84(12.89)	31.13(13.49)	**0.007**	19.16(7.97)	28.16(13.09)	32.60(13.95)	**0.001**
Bowel symptoms	10.35(8.59)	9.77(8.63)	0.64	8.33(8.33)	9.13(8.17)	12.57(9.06)	**0.02**
Hormonal symptoms	13.24(9.07)	15.83(10.42)	0.07	10.66(6.39)	14.63(10.61)	15.78(9.14)	0.08
Urinary aid problems (conditional) [b]	85.33(19.43) (n=25)	77.38(22.32) (n=28)	0.17	44.44(19.24) (n=3)	82.05(16.94) (n=26)	84.72(21.93) (n=24)	**0.006**

HRQoL: Health-Related Quality of Life; QLQ-C30: Quality of life Questionnaire-Core 30; QLQ-PR25: Quality of Life Questionnaire - Prostate Cancer Module [a] This section was related to questions 25-22, and only those patients who had sexual activities in the past 4 weeks responded to these questions.
[b] This section was related to the difficulty of using incontinence aid, and they answered this question only if wore an incontinence aid. * Independent t-test [#] One-way ANOVA

The post hoc test showed a statistically significant difference between those participants with 1-3 years passed from cancer diagnosis and those patients with > 3 years passed from cancer diagnosis (MD = 5.91, p = 0.04). For urinary symptoms (p = 0.001), those participants with < 1 year passed from cancer diagnosis had statistically significant differences with those participants with 1-3 years and > 3 years passed from cancer diagnosis (MD = -8.99, p = 0.005; MD = -13.43, p = 0.001, respectively). Regarding bowel symptoms (p = 0.02), a statistically significant difference was

reported between those participants with 1-3 years passed from cancer diagnosis and those participants with > 3 years passed from cancer diagnosis (MD = -3.43, p = 0.03). For urinary aid problems (p = 0.006), the participants with < 1 year passed from cancer diagnosis had statistically significant differences with these participants with 1-3 years passed from cancer diagnosis (MD = -37.60, p = 0.007) and those participants with > 3 years passed from cancer diagnosis (MD = -40.27, p = 0.004)). There were no statistically significant differences in other functions and symptom scales on the basis of time passed from cancer diagnosis (p> 0.05) (Table 2).

Discussion

This study described HRQoL among Iranian PCa survivors and compared it with age at diagnosis and time passed from it. We found that those PCa survivors with older age at cancer diagnosis had lower physical and sexual function, and higher fatigue, dyspnea, urinary symptoms and financial difficulties. Also, there was a statistically significant difference between time passed from cancer diagnosis and physical function, urinary and bowel symptoms and urinary aid problems.

In this study, the participants with older age at cancer diagnosis reported lower physical function and sexual activity. Age is the most important factor influencing HRQoL in patients with PCa (Porreca et al., 2018). Similar to our study findings, Kurian et al. (2018) showed that patients with PCa and at a younger age at diagnosis had better physical function and sexual activity than those with an older age (> 70 years) at PCa diagnosis. Nevertheless, the interpretation of our finding indicating the relationship between the increase of age and reduction of HRQoL should be done with caution, because similar changes may be observed due to the aging process. For example, the study by Pinkawa et al. (2009) on HRQoL in patients with PCa before treatment showed that the patient's age had a major impact on HRQoL before the start of the first treatment process. Therefore, decreased sexual activity related to age should be considered during the interpretation of our findings. Moreover, in this study, those PCa survivors with a younger age at diagnosis had a statistically significant difference in the exercise performance. It is believed that younger age at

diagnosis can have a positive effect on patients' physical function and sexual activity (Galvão et al., 2014; Cormie et al., 2015). Also, the study finding showed that survivors with more than three years passed from cancer diagnosis had significantly lower physical activity. In this line, Smith et al. (2009) documented that physical performance reduced with increasing the time passed from the diagnosis of PCa. Therefore, oncology nurses can include physical activity programs to routine follow up care, particularly for those PCa survivors with an older age (Mishra et al., 2014; Mardani et al., 2020).

In the present study, fatigue was reported to be higher in those patients with an older age at cancer diagnosis. Giacalone et al. (2013) reported that fatigue in patients with cancer increased with age. Also, Kurian et al. (2018) indicated that fatigue associated with age was higher in survivors with a higher age at cancer diagnosis. Fatigue as one of the most important symptoms influencing the QoL of PCa survivors especially older patients can be relieved by nurses through regular physical activities (Tomlinson et al., 2014), psychoeducational support and nutritional counseling (Berger et al., 2015).

Also, the study finding revealed that dyspnea was higher in the participants with older age at cancer diagnosis. Van de Poll-Franse et al. (2011) examined HRQoL in ordinary people using the EORTC QLQ-C30 questionnaire and showed that dyspnea similar to most EORTC QoL symptoms increased with age. Also, it has been shown that dyspnea in cancer patients is associated with the history of respiratory conditions such as smoking, asthma and COPD (McKenzie et al., 2018). In addition, Damani et al. (2018) reported that dyspnea in cancer patients was associated with fatigue. Given the significance of fatigue and dyspnea as well as the history of respiratory illnesses in older survivors of PCa in the current study, our study findings was consistent with those of studies reviewed above. Due to the chronic nature of dyspnea in PCa survivors, nurses can educate patients and their family caregivers about how to follow healthy lifestyles, use psycho-emotional support, manage anxiety, and learn relaxing and visualization exercises as a self-management strategy to mitigate dyspnea (Ramos et al., 2017).

This study showed that financial difficulties were influenced by age at cancer diagnosis. It is believed that cancer can impose economic and financial burdens on its survivors (Sharp, Carsin, & Timmons, 2013). Sharp and Timmons (2016) reported that 48% of patients with prostate and breast cancers experienced economic stress. An Iranian study showed that PCa imposed a considerable financial burden on the Iranian healthcare system and patients (Mojahedian et al., 2019). Also, Zenger et al. (2010) and Sharp et al. (2013) indicated that financial difficulties in patients with PCa were inversely correlated with their age, which was not consistent with the results of the current study. The occupation and economic status of the participants in this study justifies the financial difficulties experienced by older survivors. On the other hand, Sharp and Timmons (2016) found a relationship between economic burdens and HRQoL associated with cancer, which could be attributed to a reduction in most aspects of QoL in older cancer survivors. Better understanding of financial difficulties faced by PCa survivors can help nurses find appropriate referral and economic healthcare services (Osawa et al., 2016).

In this study, the participants with more than 3 years passed from cancer diagnosis reported more bowel problems. Similarly, Smith et al. (2009) reported that patients with PCa who were treated using radiotherapy with or without hormone therapy experienced more bowel problems after three years of diagnosis. Previous research has less focused on how to manage bowel problems including rectal bleeding in PCa survivors from the nursing perspective. However, lifestyle changes including the increase of physical activity, reduction of weight and the body mass index, and quitting smoke can alleviate bowel problems in PCa survivors undergoing pelvic radiation (Thomas et al., 2013).

The present study showed that urinary symptoms were more common in the participants with older age at diagnosis and also were higher in those participants with longer time passed from cancer diagnosis. Similarly, Porreca et al. (2018) found that patients with an older age who were newly diagnosed with PCa suffered more from urinary problems. In addition, it has been shown that urinary symptoms and urinary incontinence are associated with age and are lower in PCa patients diagnosed at a younger age (Pinkawa et al., 2009). Also, patients with PCa experience more urinary problems in all treatment groups even after three years (Smith et al., 2009). From the nursing perspective, the efficacy of pelvic floor muscle training in combination with biofeedback has been shown effective for the management of urinary issues in PCa (K. Kim & Kim, 2017; Mardani et al., 2020), that can be incorporated into nursing care for improving their QoL.

In the present study, only 7.5% of the participants who were within 3-12 months after treatment reported having sexual intercourse in the past four weeks indicating the effect of cancer treatment on the sexual dysfunction. Also, those patients with an older age had lower sexual activities and sexual function. Treatment for PCa including radiotherapy, prostatectomy, and hormone therapy has a significant effect on the sexual function of patients with PCa and its survivors (Zelefsky et al., 2014; Canalichio, Jaber, & Wang, 2015). Cormie et al. (2015) reported that 27% of PCa survivors in initial hormonal therapy had sexual intercourse in the past four weeks during initial hormone therapy based on the results of the QLQ-PR25 questionnaire. Another study showed that about 36% of patients with PCa undergoing radiotherapy were sexually active during the past two weeks (van den Bergh et al., 2012). Kikkawa et al. (2018) also reported a low sexual function in older patients with PCa. As shown in previous research, sexual intercourse has an association with the QoL of PCa survivors and is emphasized in the sexual rehabilitation of these patients (Kim & Kim, 2017). Nurses can educate patients about sexual dysfunction due to the treatment process and how they can relieve it through regular physical activity, diet therapy, pelvic floor exercises, and relaxation (Huri, Akel, & Şahin, 2016; Mardani et al., 2020).

The mean scores of HRQoL in most dimensions in the PCa survivors was lower than those of other studies in different countries in this study, but no studies in the international literature were available to be used for the comparison of findings.

Strengths and Limitations: This was the first study on PCa survivors in the Iranian cultural context. Studies with larger sample sizes in

multicenter are needed to improve our understandings of the study concept and help with the generalizability of our findings. There was a lack of access to the Gleason scores as a strong predictor of outcome for men diagnosed with prostate carcinoma (Pierorazio et al., 2013) and clinical stage of PCa in the participants' medical files to assess the disease risk in patients (Mapelli & Picchio, 2015), that should be considered in future studies. Also, older age is generally associated with low HRQoL. However it was impossible to assess HRQoL associated with age and compare it with that in the participants in the younger age group. In addition, the cross-sectional design of this study hindered a longitudinal assessment of HRQoL among PCa.

Conclusion and Implication for practice: With a growing number of PCa survivors, it is important to monitor HRQL in patients after treatment. In this study, HRQoL in the PCa survivors was influenced by the patients' age at diagnosis and time passed from cancer diagnosis. This study highlights the importance of paying attentions to disease-related symptoms such as fatigue, and dyspnea, financial difficulties, urinary symptoms in such patients. Nurses need to recognize the extent of side effects of treatment modalities experienced by cancer survivors. PCa survivors have significant information needs about HRQoL after treatment and nurses are well-placed to provide appropriate care in term of the provision of information and supportive care to them for improving their HRQoL. In addition, the findings of this study can provide knowledge regarding symptoms and consequences of treatment in PCa survivors with the consideration of age at diagnosis and time passed from cancer diagnosis. Also, our findings call for the integration of the science of geriatric oncology into clinical practice and health sciences to meet older patients' needs similar to younger patients.

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