



Original Research

Health-related quality of life, depression, anxiety and sexual dysfunction in patients with testicular cancer

Türev Demirtaş^{1,2} , Zekeriya Temircan³ * ¹Department of Medical Ethics and History, Erciyes University School of Medicine, Erciyes University, 38150 Kayseri, Turkey²The Stem Cell and Genome Department, Erciyes University School of Medicine, Erciyes University, 38150 Kayseri, Turkey³Independent Researcher, Yenidoğan Mahallesi Mehmet Akif Ersoy Caddesi, Talas, 38280 Kayseri, Turkey***Correspondence:** drzekeriyatemircan@gmail.com (Zekeriya Temircan)**Abstract**

Background and objective: Testicular cancer is one of the most common cancer types among young men. Although there is high percentage of cure rates for the patients, there is a lack of knowledge regarding health-related quality of life, psychological problems and sexual dysfunction. The aim of this study was to examine health-related quality of life, anxiety, depression and sexual dysfunction in patients with testicular cancer.

Methods: Data were collected from 160 patients diagnosed with testicular cancer at age 20–60 years. The survey method was used to collect information.

Results: The results showed that the mean scores of SF-12v2 physical component ($p = 0.02$), HADS-anxiety ($p < 0.011$) and HADS-depression ($p = 0.01$) were significantly different between marital status groups. The mean scores of IIEF-5 were significantly different between income groups ($p = 0.01$) and employment status ($p = 0.02$). Participants who earned low income, had primary or lower education, and were not employed reported significantly poorer erectile function than their higher earning, higher educated and employed counterparts. Also, HADS anxiety and HADS depression scores were found to be moderate and positively correlated with IIEF-5 ($p < 0.01$). However, SF-12v2 physical component summary and mental component summary scores were negatively correlated with IIEF-5 ($p < 0.01$).

Conclusion: The current study findings provided knowledge on health-related quality of life, anxiety, depression and sexual dysfunction in patients with testicular cancer. Health-related quality of life, psychological mental health and sexual life were poorer among the participants.

Keywords

Testicular cancer; Anxiety; Depression; Quality of life

1. Introduction

Testicular cancer is the most common type of cancer in almost 1% of men between the ages of 20 and 40 [1]. The treatment and sexual results of testicular cancer, which has pur-seminoma and seminoma types, are different. Family history could be important risk factor in a man with testicular cancer [2]. The most common problems faced by patients diagnosed with testicular cancer are erection, ejaculation disorders and fear of infertility [3]. However,

these problems may cause mental problems among patients such as anxiety and depression. In the literature, it has been stated that depression and anxiety are the most common psychological problems that have impact on the health-related quality of life (HRQoL) in patients [4]. Also, factors such as the diagnosis of cancer, age, family history, smoking, alcohol use and psychological endurance are among the important factors affecting the treatment process of the disease as well as health-related quality of life [5]. Depression, anxiety and sexual dysfunction often associated with poorer

health-related quality of life as the patients' life satisfaction, functional ability and physiological and psychological well-being affected by the disease negatively. Studies reported that surgeries and other treatment methods improve the HRQoL of cancer patients such as prostate cancer and breast cancer [6]. But, there is a gap in the literature about the association between HRQoL, depression, anxiety and sexual dysfunction in testicular cancer patients. Therefore, the aim of the study was to examine the health-related quality of life, depression, anxiety and sexual dysfunction in patients with testicular cancer so that the results provide new information and findings to the literature.

2. Methods and materials

A cross-sectional, descriptive and survey research method were used. The study was conducted in a urology outpatient department at a university research hospital in Kayseri. The data were collected from each participant through different survey questionnaires. A total of 160 men the aged of 20–60 years showed interest to participated in this study. Those who participated in the study signed the informed consent form, and then completed the survey questionnaires. The inclusion criteria consisted of the patients diagnosed with testicular cancer, being male, the aged of 18 years old and above and read/write the questions. Exclusion criteria consisted of being not male, below 18 years old, not being diagnosed with testicular cancer and can not read and understand the questions.

Sample Size Calculation: Sample in the universe formula was used to calculate the sample size. The minimum 117 participants were needed and 160 of participants participated in the study. The sample size calculation formula was below:

$$n_o = Z_2pq / B^2$$

n_o = initial sample size, $Z = 1.96$ (for $\alpha = 0.05$, if we use 95% Confidence level), $p = 0.50$, $q = (1-p)$, B is the accepted bias for p in the sample may be 0.05 according to the study accuracy and the last sample size $n = n_o / (1 + (n_o / N))$, where N is population size.

2.1 Socio-demographic and clinical data form

Participants' socio-demographic characteristics such as age, marital status, educational level, income and other clinical characteristics were collected and evaluated.

2.2 12-item Short Form Healthy survey version 2 (SF-12v2)

The Health Questionnaire survey version 2 form is a questionnaire that consists of 12 items and is widely used to measure health-related quality of life. This version of short and practical form was developed by Ware *et al.* [7] in 1995. With this form, the scores of the physical and mental components of the participants can be obtained. The form, which has 8 sub-scales, measures the participants' general health, physical function, role—physical, bodily pain, vitality, role—emotional, mental health and social function. Evaluation is made with Likert type except for some items and

the last four weeks are taken into consideration. Subscales evaluate health between 0 and 100, with 0 indicating poor health and 100 indicating good health. Life expectancy of these subscales in patients with physical illness can be used to evaluate the quality of Turkish validity and reliability. Turkish validity and reliability study was done by Kocuyigit *et al.* [8]. A shorter form, SF-12 Brief Health Scale, was created by taking 12 different items from 8 different subheadings of SF-36. Comparisons of SF-12 and SF-36 have been made and it has been reported that SF-12 is more advantageous in terms of its ease of application and shorter completion time. The "cronbach alpha" values calculated for the internal consistency of the scale were 0.70 in the physical functionality area, 0.72 in the physical role area, 0.67 in the pain area, 0.68 in the general health area, 0.70 in the mental role area, and 0.70 in the mental role area, 0.66 for social functionality, and 0.70 for vitality.

2.3 Hospital Anxiety and Depression Scale (HADS)

The Hospital Anxiety and Depression Scale is a commonly use for the participants to measure anxiety and depression levels. The Hospital Anxiety and Depression Scale (HADS) was devised 30 years ago by Zigmond and Snaith [9] to measure anxiety and depression in a general medical population of patients. Consisting of 14 items, HADS measures both anxiety (HADS-A) and depression (HADS-D) levels with an equal number of questions. Patients rank the question on a Likert scale ranging from 0 to 3 and the subscale from 0 to 21. A total score of 8 or above was defined as an optimal cut-off score for comfort for both anxiety and depression.

The adaptation of the scale to the Turkish sample was carried out by Aydemir [10], and the Cronbach Alpha internal consistency coefficient was 0.78 for depression and 0.85 for anxiety. In this study, the Cronbach Alpha internal consistency coefficient was found to be 0.87. For anxiety in the scale, "I have a fear as if something bad is going to happen" can be shown as an example item, and for depression, "I still enjoy the things I used to enjoy".

2.4 5-Item International Index of Erectile Function (IIEF-5)

The original language of the IIEF, which was developed by Rossen *et al.* [11], was translated into various languages and a validation study was conducted. The International Index of Erectile Function (IIEF-5) is a 5-item questionnaire that assesses the sexual dysfunction of the participants. This questionnaire, which was developed to correctly evaluate the sexual function functions of the participants, consists of five categories. The score rating for IIEF-5 ranges from 5 to 25. Score evaluation; severe: range 5–7; middle: range 8–11; light to medium: range 12–16; mild: range 17–21; and no ED: range 22–25.

TABLE 1. Socio-demographic characteristics of participants.

	n	%
Age (Ave + SD)	32 (10.46)	
Marital Status		
Single	27	16.9
Married	133	83.1
Education		
Primary	41	25.7
Secondary	54	33.7
Tertiary	65	40.6
Job Status		
Private	82	51.2
Government	61	38.1
Not working	17	10.7
Income		
Low (below 5000 TL)	115	71.8
High (above 5000 TL)	45	28.2
Smoker		
Yes	56	35
No	104	65
Alcohol		
Yes	32	20
No	128	80
Surgery		
Yes	108	67.5
No	52	32.5
Other chronic illness		
Yes	47	29.4
No	113	70.6
Tumor type		
Seminom	92	57.5
Non-seminom	68	42.5
Type of treatment		
Chemotherapy	45	28.1
Radiation	56	35.1
Endocrine	35	21.8
Other	24	15
Stage of disease		
Stage I	63	39.3
Stage II	38	23.7
Stage III	28	17.5
Stage IV	31	19.5

The scale was translated into Turkish by the Turkish Society of Andrology [12], the validity study for Turkey was carried out only for the IIEF-5 form, which was quoted from the first 4 questions of the IIEF-15 form [13].

The IIEF-5 Index includes 5 main topics: sexual function, orgasmic function, sexual desire, sexual satisfaction and general satisfaction. Erectile function 6, orgasm function 2, sexual desire 2, sexual satisfaction 3 and general satisfaction are questioned with 2 questions. This form questions the quality of erectile function during the last 4 weeks [17]. The answers given to the questions asked were scored between 0 and 5 in this form. As a result of the internal reliability and test-retest reliability of the IIEF-5 form, the correlation coefficients were calculated as 0.896 for the first question,

0.924 for the second question, 0.892 for the third question, 0.907 for the fourth question, and 0.901 for the fifth question. The correlation coefficient for all questions was $r = 0.96$ ($p < 0.001$) [13].

2.5 Data analysis

The data was collected from socio-demographic form, 12-item Short Form Healthy survey version 2 form, Hospital Anxiety and Depression Scale and 5-Item International Index of Erectile Function. The obtained data were analyzed using SPSS 23.0 version (IBM Corp., Chicago, IL, USA) package program. The descriptive statistics including frequency, percentage, mean and standard deviation were summarized for each variable. In addition, independent *t*-test, ANOVA, Pearson correlation and multiple logistic regression analysis were used to summarize the results.

3. Results

A total of 173 testicular cancer patients were included in this study with a mean age of 32 (SD = 10.46). The majority of them (83.1%) were married, had tertiary education (40.6%) and low income (71.8%). Among the respondents 65% of them used cigarettes, 20% of them used alcohol and 70.6% of them had other chronic illness. The majority of the respondents (67.5%) had surgery (Table 1). Among the participants 92 of them had seminom tumor type (57.5%) and 68 of them had non-seminom tumor type (42.5%). The distribution of the type treatment among the participants is varied; 45 (28.1%) participants received chemotherapy, 56 (35.1%) participants received radiotherapy, 35 (21.8%) participants received endocrine treatment and 24 (15%) received other type of treatment. Almost half of the participants had Stage I (39.3%) and Stage II (23.7%). Also, among the participants 28 (17.5%) of them had Stage III and 31 (19.5%) of them had Stage IV. The mean scores, standard deviation and ranges of the SF-12, HADS and IIEF-5 were compared. The mean physical component of SF-12v2 score was 44.2 (SD = 8.2) while the mean mental component score was 54.6 (SD = 6.8). The HADS symptoms scores ranged from 0.0–21.0, with a mean of anxiety symptoms of 1.8 (SD = 2.9) and depression symptoms of 1.8 (2.6) (Table 2).

Using the cut-off point of 8 for the level of symptoms of anxiety and depression, the majority of the participants ($n = 122$, 76.2%) reported mild symptoms of anxiety, 20% ($n = 32$) reported moderate symptoms and a small fraction reported severe symptoms ($n = 6$, 3.7%). Similarly, the most of the participants ($n = 115$, 71.8%) reported mild symptoms of depression, 17.5% ($n = 28$) reported moderate symptoms and 10.6% ($n = 17$) reported severe symptoms, respectively. The mean score of erectile function of IIEF-5 reported 10.6 (SD = 4.8), the mean of satisfaction with sex life reported 8.6 (SD = 3.8) and the mean of sexual interest reported 9.2 (SD = 4.7), respectively. The majority of the participants ($n = 108$, 67.5%) reported mild erectile dysfunction, 21.2% ($n = 34$) reported moderate erectile dysfunction and 11.2% ($n = 18$) reported severe erectile dysfunction.

TABLE 2. Mean, standard deviation, and range of domains of SF-12, HADS, IIEF-5 (n = 160).

Domains	Mean (SD)	Range
SF-12		
Physical component summary	44.2 (8.2)	26.0–58.0
Mental component summary	54.6 (6.8)	30.2–68.8
HADS		
HADS-anxiety score	1.8 (2.9)	0–14.0
HADS-depression score	1.8 (2.6)	0–13.0
IIEF-5		
Erectile function	10.6 (4.8)	0–5.0
Satisfaction with sex life	8.6 (3.8)	0–13.0
Sexual interest	9.2 (4.7)	5.0–21.0

SF-12, 12-item Short-Form Health Survey; HADS, Hospital Anxiety and Depression Scale; IIEF-5, 5-Item International Index of Erectile Function.

TABLE 3. Predictive factors of health-related quality of life of multiple logistic regression.

Variables	Physical component of SF-12			p value	95% CI for B
	B	Std.error	t		
Age	-0.18	0.06	-1.88	0.08	-0.28 to -0.03
Marital status	1.78	1.54	0.67	0.01 ^a	-1.45 to -4.55
Income	-0.34	0.34	-2.76	0.02 ^a	-0.34 to -0.01
HADS-Anxiety	-0.61	0.41	-2.21	0.01 ^a	-0.91 to -0.03
HADS-Depression	-0.78	0.56	-1.81	0.09	-1.61 to -0.87
IIEF-5	0.25	0.27	0.73	0.461	-0.22 to 0.55
R ² : 0.633; Adjusted R ² : 0.376; F = 9.45, p < 0.01					
Variables	Mental component of SF-12			p value	95% CI for B
	B	Std.error	t		
Age	0.02	0.09	0.76	0.548	-0.01 to -0.17
Marital status	0.65	1.54	0.23	0.01 ^a	-1.34 to -2.65
Income	0.03	0.17	0.18	0.65	-0.01 to -0.22
HADS-Anxiety	0.71	0.01	0.22	0.03 ^a	-0.43 to -0.66
HADS-Depression	-0.45	0.43	-2.17	0.01 ^b	-1.78 to -0.55
IIEF-5	0.23	0.67	0.66	0.451	-0.13 to -0.38
R ² : 0.352; Adjusted R ² : 0.216; F = 12.58, p < 0.01					

^a: significant at p < 0.05, ^b: significant at p < 0.01.

One-way ANOVA test and independent *t*-test were analyzed for the variables. Thus, the mean scores of SF-12v2 physical component ($t = -2.1$, $p = 0.02$), HADS-anxiety ($t = 2.08$, $p < 0.011$) and HADS-depression ($t = 2.76$, $p = 0.01$) were significantly different between marital status groups. Participants who were single significantly lower mean scores of SF-12v2 physical component. The mean scores of IIEF-5 were significantly different between income groups ($F = 4.89$, $p = 0.01$) and employment status ($t = 3.67$, $p = 0.02$). Participants who earned low, had primary or lower education, and were not employed reported significantly poorer erectile function than their higher earning, higher educated and employed counterparts. In addition, Pearson's correlation analysis was used to show relationships between the subscales of the SF-12v2, HADS and IIEF-5. HADS anxiety and HADS depression scores were found to be moderate and positively correlated with IIEF-5 ($p < 0.01$). However, SF-

12v2 physical component summary and mental component summary scores were negatively correlated with IIEF-5 ($p < 0.01$).

Multiple logistic regression was used to analyze the relationship between SF-12v2 physical component and mental component as dependent variables and age, marital status, income, HADS-anxiety and depression as well as IIEF-5. Among the variables, marital status ($B = 1.78$, $p = 0.01$), income ($B = -0.34$, $p = 0.01$) and HADS-anxiety ($B = -0.61$, $p = 0.01$) were significant in predicting SF-12v2 physical component which showed 63.3% for variance ($R^2: 0.633$; Adjusted $R^2: 0.376$; $F = 9.45$, $p < 0.01$). In addition, among the variables, marital status ($B = 0.65$, $p = 0.01$), HADS-anxiety ($B = 0.71$, $p = 0.03$) and HADS-depression ($B = -0.45$, $p = 0.01$) were significant in predicting SF-12v2 mental component which showed 35.2% for variance ($R^2: 0.352$; Adjusted $R^2: 0.216$; $F = 12.58$, $p < 0.01$), respectively (Table 3).

4. Discussion

The results from present study show that the majority of patients diagnosed with testicular cancer report psychological problems and sexual problems. Among study participants, about 1 in 2 reported a different level of anxiety and depression symptoms among the patients due to diagnosis of testicular cancer. Similarly, among the participants, about 1 in 2 reported dissatisfactions with sex life or sexual dysfunction. The result revealed that being testicular cancer patient is associated with high symptoms of depression, anxiety and dysfunction. The patients could experience high level of anxiety and depression during the treatment. As the process takes longer for cancer treatment, the patients should have experienced more anxiety due to uncertainty of the disease. The results of the study showed that the patients experience different level of sexual dysfunction. There could be negative association between sexual dysfunction and high level of psychological problems, which could have negative impact on the health-related quality of life. Previous studies reported that the prevalence of erectile dysfunction rates in the general population varied between 8–16% [14, 15]. This result consisted with this study finding that erectile dysfunction among the participants with diagnosed testicular cancer was 32.4%. As it shows in the results, testicular cancer has negative impact on erectile function among the participants. 23.7% of patients in the current study reported moderate severity of anxiety while 28.1% of suffered moderate and severe symptoms of depression. The health-related quality of measured by SF-12v2, was found to be a significant with anxiety and depression assessed by HADS. Also, among the variables, erectile dysfunction as measured by IIEF-5 found to be significant among different variables such as marital status, income groups and education level. Participants who earned low, had primary or lower education, and were not employed reported significantly poorer erectile function than their higher earning, higher educated and employed counterparts. In the literature, the findings are varied between erectile dysfunction, age and marital status for men with testicular cancer [16]. The study results reported that older

age could be factor on sexual interest and satisfaction with sex life, which has negatively associated with health-related quality of life [17]. In addition, having a partner has positive impact on sexual function for men diagnosed with testicular cancer [8, 18]. Our results are consistent with the literature that marital status has impact on sexual life and satisfaction. It is important to acknowledge that income, educational level as significant predictors as marital status for men diagnosed with testicular cancer. Another important result is that men diagnosed with testicular cancer suffered from anxiety and depression as psychological problems. In previous studies demonstrated that the level of anxiety and depression increases as the level of psychological resilience decreases in patients diagnosed with testicular cancer and treated, which has a negative effect on the quality of life. This could be a factor explaining a higher level of sexual dysfunction and lower level of health-related quality of life for the participants. These results support the idea that psychological support may be more important factor in relation to sexual function as well as health-related quality of life.

5. Conclusions

The current study findings provided knowledge on health-related quality of life, anxiety, depression and sexual dysfunction in patients with testicular cancer. Overall, health-related quality of life, psychological mental health and sexual life were poorer among the participants. Marital status and income were identified as predictive factors of health-related quality of life for men with diagnosed testicular cancer. The current study contributes new findings and data and tried close a gap in the literature.

6. Limitation

The data were collected from hospital during the data collection process, which could be a confounding factor and there was a limitation. Considering that the patients cannot fully remember the information about the disease such as the type of ongoing treatment and the stage of the cancer, this information is considered as the limit for the study, since there is a possibility that this information is filled incompletely by the participants. Also, the further research may consider to investigate the effects of other comorbidities and anxiety and depression level among the participants.

Author contributions

ZT and TD designed the research study. ZT performed the research. TD provided help and advice on data collection. ZT and TD analyzed the data. ZT and TD wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The informed consent form was obtained from all participants. Ethical approval was obtained from the Erciyes University Medical School Ethic Committee. The ethic approval number is 2021/418. The study design has been organized in accordance with the Helsinki Declaration principles. All confidentiality and conflict of interest procedures were followed during this research.

Acknowledgment

We would like to extend our special thanks and gratitude to Abdullah Demirtaş for his support, guidance and help during this research.

Funding

This research received no external funding.

Conflict of interest

The authors declare no conflict of interest.

References

- [1] Roy RK, Casson K. Attitudes toward Testicular Cancer and Self-Examination among Northern Irish Males. *American Journal of Men's Health*. 2017; 11: 253–261.
- [2] Wang G, Zhao D, Spring DJ, DePinho RA. Genetics and biology of prostate cancer. *Genes & Development*. 2018; 32: 1105–1140.
- [3] Carpentier MY, Fortenberry JD. Romantic and Sexual Relationships, Body Image, and Fertility in Adolescent and Young Adult Testicular Cancer Survivors: a Review of the Literature. *Journal of Adolescent Health*. 2010; 47: 115–125.
- [4] Schepisi G, De Padova S, De Lisi D, Casadei C, Meggiolaro E, Ruffilli F, et al. Psychosocial Issues in Long-Term Survivors of Testicular Cancer. *Frontiers in Endocrinology*. 2019; 10: 113.
- [5] Adams WB, Rovito MJ, Craycraft M. The Connection between Testicular Cancer, Minority Males, and Planned Parenthood. *American Journal of Men's Health*. 2018; 12: 1774–1783.
- [6] Ryan SJ, Hoyt MA. Adult self-image and well-being after testicular cancer: the role of agency and meaning. *Psychology & Health*. 2018; 33: 1049–1061.
- [7] Ware JE, Kosinski M, Keller SD. SF-12: How to Score the SF-12 Physical and Mental Health Summary Scales. The Health Institute, New England Medical Center: Boston. 1995.
- [8] Koçyiğit H, Aydemir Ö, Ölmez N, Memiş A. SF-36'nın Türkçe için Güvenilirliği ve Geçerliliği. *Ege Fizik Tedavi ve Rehabilitasyon Dergisi*. 1999; 12: 102–106. (In Turkish)
- [9] Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*. 1983; 67: 361–370.
- [10] Aydemir Ö. Hastane Anksiyete Ve Depresyon Ölçeği Türkçe Formunun Geçerlilik Ve Güvenilirliği. *Türk psikiyatri dergisi*. 1997; 8: 280–287. (In Turkish)
- [11] Rossen P, Pedersen AF, Zachariae R, von der Maase H. Sexuality and body image in long-term survivors of testicular cancer. *European Journal of Cancer*. 2012; 48: 571–578.
- [12] Yıldız H., Pınar R. Miyokard Enfarktüsünde cinsel fonksiyon bozukluğunun irdelenmesi. *Anadolu Kardiyoloji Dergisi*. 2004; 4: 309–317. (In Turkish)
- [13] Turunç T, Deveci S, Güvel S, Peşkirioğlu L. Uluslar arası cinsel işlev indeksinin 5 soruluk versiyonunun (IIEF-5) Türkçe geçerlilik

- çalışmasının değerlendirilmesi. Türk Üroloji Dergisi. 2007; 33: 45-49. (In Turkish)
- [14] Friedman GD, Schwalbe J, Achacoso N, Meng MV, Kroenke CH, Habel LA. Antidepressants and testicular cancer. *Cancer Causes & Control*. 2014; 25: 251-258.
- [15] Travis LB, Beard C, Allan JM, Dahl AA, Feldman DR, Oldenburg J, *et al*. Testicular Cancer Survivorship: Research Strategies and Recommendations. *JNCI Journal of the National Cancer Institute*. 2010; 102: 1114-1130.
- [16] Tuinman MA, Hoekstra HJ, Sleijfer DT, Fleer J, Vidrine DJ, Gritz ER, *et al*. Testicular cancer: a longitudinal pilot study on stress response symptoms and quality of life in couples before and after chemotherapy. *Supportive Care in Cancer*. 2007; 15: 279-286.
- [17] Rovito MJ, Bruzzone A, Lee E, López Castillo H, Talton W, Taliaferro L, *et al*. Assessing Health-Related Quality of Life among Survivors of Testicular Cancer: a Systematic Review. *American Journal of Men's Health*. 2021; 15: 155798832098218.
- [18] Capogrosso P, Boeri L, Ferrari M, Ventimiglia E, La Croce G, Capitanio U, *et al*. Long-term recovery of normal sexual function in testicular cancer survivors. *Asian Journal of Andrology*. 2016; 18: 85-89.