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ORIGINAL RESEARCH

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Testicular cancer and its impact on male sexual quality of life: a cross-sectional study

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Abstract

Background: This study assessed sexual quality of life and related issues among men with testicular cancer in Turkey using a standardized questionnaire, while examining differences by treatment method and cancer stage. **Methods**: A total of 168 men undergoing treatment at Erciyes University Urology Outpatient Clinic were included. Eligible participants were aged 18 or older, cognitively able to complete questionnaires, and either in active treatment or follow-up. Data were collected through a descriptive questionnaire, a sexual problems form, and the Sexual Quality of Life Scale-Male (SQLS-M). Descriptive statistics summarized demographics and clinical characteristics. One-way ANOVA with *post-hoc* tests evaluated differences in SQLS-M by treatment type and stage. Pearson correlation and independent *t*-tests were used to examine associations. Statistical significance was set at $p < 0.05$. **Results**: Younger age was significantly associated with higher SQLS-M scores ($r = -0.16$, $p = 0.001$). Patients with seminoma and those in Stage I reported significantly higher sexual quality of life than non-seminoma and advanced-stage patients ($p < 0.05$). Treatment type also had a significant effect ($F = 12.09$, $p < 0.001$); men who underwent surgery alone reported higher scores than those receiving chemotherapy, radiotherapy, or combined therapies. *Post-hoc* analyses confirmed surgery as the most favorable modality ($p < 0.05$). **Conclusions**: Sexual quality of life in men with testicular cancer is influenced by age, cancer type, stage, and treatment. Younger patients, those with seminoma, early-stage disease, and those treated with surgery alone reported better outcomes, while chemotherapy, radiotherapy, and combined therapies were associated with more dysfunction and lower satisfaction. These findings highlight the importance of addressing sexual health in cancer care and incorporating supportive strategies into treatment planning to preserve long-term quality of life.

Keywords

Testicular cancer; Sexual problems; Sexual quality of life; Urooncology

Cáncer testicular y su impacto en la calidad de vida sexual masculina: un estudio transversal

Resumen

Antecedentes: Este estudio evaluó la calidad de vida sexual en hombres con cáncer testicular en Turquía mediante un cuestionario estandarizado, analizando las diferencias según tipo de tratamiento y estadio de la enfermedad. **Métodos**: Se incluyeron 168 pacientes atendidos en la Clínica de Urología de la Universidad de Erciyes, mayores de 18 años y capaces de responder cuestionarios, en tratamiento activo o seguimiento. Los datos se obtuvieron con un cuestionario descriptivo, un formulario de problemas sexuales y la Escala de Calidad de Vida Sexual-Masculina (SQLS-M). Se aplicaron estadísticas descriptivas, ANOVA de una vía con pruebas *post-hoc*, correlaciones de Pearson y pruebas *t*. Se consideró significativo $p < 0.05$. **Resultados**: La menor edad se asoció con mayores puntuaciones en la SQLS-M ($r = -0.16$, $p = 0.001$). Los pacientes con seminoma y en estadio I presentaron mejor calidad de vida sexual que los de no seminoma y estadios avanzados ($p < 0.05$). El tipo de tratamiento mostró un efecto significativo ($F = 12.09$, $p < 0.001$): quienes recibieron solo cirugía obtuvieron puntuaciones superiores frente a los tratados con quimioterapia, radioterapia o terapias combinadas. Los análisis *post-hoc* confirmaron la cirugía como modalidad más favorable ($p < 0.05$). **Conclusiones**: La calidad de vida sexual en el cáncer testicular se ve influida por edad, tipo y estadio tumoral, así como por el tratamiento. Los hombres jóvenes, con seminoma, en estadios iniciales y tratados únicamente con cirugía reportaron mejores resultados. En contraste, quimioterapia, radioterapia y terapias combinadas se relacionaron con mayor disfunción y menor satisfacción. Estos hallazgos resaltan la necesidad de integrar la salud sexual en la atención oncológica y de planificar estrategias de apoyo para preservar la calidad de vida a largo plazo.

Palabras Clave

Cáncer testicular; Problemas sexuales; Calidad de vida sexual; Urooncología

1. Introduction

Testicular cancer is the second most common malignancy of the male genital organs after prostate cancer, yet accounts for less than 1% of all male cancers worldwide. It is the most frequent malignant tumor in young men aged 20–34 [1]. According to GLOBOCAN 2020, approximately 74,458 new cases and 9334 deaths occur annually, representing 0.4% and 0.1% of all cancer cases and deaths, respectively [2]. Incidence varies geographically, being highest in Scandinavian countries and lowest in many Asian and African regions. Although incidence has increased in recent decades, mortality has declined due to advances in early diagnosis and effective treatments [3]. In Turkey, 1878 new cases were reported in 2020, with a crude incidence of 4.48 per 100,000. It is the leading cancer among males aged 15–24 and ranks third in the 25–49 age group [4]. While mortality remains low, the young age of many patients makes it a significant urological and oncological concern.

Testicular cancer predominantly affects younger men, who may face lasting physical and psychological effects from both the disease and its treatments. These can include challenges related to body image, sexual identity, and fertility, all of which impact quality of life for patients and their families [5]. Orchiectomy, often the initial step in treatment, can alter self-perception, sense of masculinity, and emotional well-being, potentially leading to reduced self-esteem, anxiety, and depression [6].

Treatment can affect sexual function via both physical and psychological pathways. Surgical interventions such as retroperitoneal lymph node dissection may cause ejaculatory dysfunction through nerve damage. Orchiectomy can lead to hormonal changes, particularly decreased testosterone, which is essential for sexual desire and erectile function. Systemic therapies like chemotherapy and radiotherapy can further impair spermatogenesis and hormonal balance, sometimes resulting in infertility and sexual dysfunction [7].

Despite its clinical significance, the impact of testicular cancer on male sexuality remains underexplored compared to other malignancies [8, 9]. In sociocultural contexts where sexuality is considered private or taboo, such as in Turkey, open discussion of sexual health is further limited [10]. This highlights the need for research aimed at understanding patient experiences and improving clinical support.

Addressing sexual health consequences of surgical and oncological treatments is essential to enhancing survivors' quality of life [11, 12]. However, existing data are limited and methodologically heterogeneous [13], with few comparative studies across treatment modalities. Given these gaps, identifying factors affecting sexual well-being in men with testicular cancer is critical to provide tailored counseling and optimize treatment decisions [14].

Primary Objective:

To assess sexual quality of life and related factors among men diagnosed with testicular cancer in Turkey, examining associations with treatment type, cancer stage, age, sexual dysfunction, and body image concerns.

Secondary Objectives:

To explore the psychosocial impact of testicular cancer and its treatment on patients' emotional well-being and intimate relationships.

Research Question:

How do treatment type, cancer stage, sexual dysfunction, body image concerns, and age influence the sexual quality of life of men diagnosed with testicular cancer?

Hypotheses:

- H0: No significant differences exist in sexual quality of life based on treatment, cancer stage, or demographic/clinical

variables.

• H1: Sexual quality of life differs significantly by treatment modality (surgery, chemotherapy, radiotherapy, combined therapy).

• H2: Patients receiving surgery alone report higher sexual quality of life scores than those receiving other therapies; advanced cancer stages, sexual dysfunction, and body image concerns predict lower scores.

• H3: There is a negative correlation between age and sexual quality of life.

2. Materials and methods

The study was carried out with 168 men who voluntarily consented to participate and were undergoing treatment for testicular cancer at the Urology Outpatient Clinic at Erciyes University from December 2024–July 2025. Inclusion criteria were: (1) a confirmed diagnosis of testicular cancer, (2) age 18 years or older, (3) currently receiving active treatment or follow-up care, and (4) having the cognitive ability to complete the questionnaire independently. Exclusion criteria included: (1) presence of severe psychiatric disorders (*e.g.*, psychosis, severe depression) that could interfere with questionnaire completion, (2) inability to provide informed consent, (3) concurrent diagnosis of another malignancy, and (4) incomplete questionnaire responses.

In addition to the demographic and clinical data, the pharmacological history of the participants—such as current and past medications related to cancer treatment, pain management, and supportive therapies—was recorded as part of patient anamnesis.

Limitations related to self-reported data: Given that sexual health is a culturally sensitive topic in Turkey, participants may have underreported or omitted certain experiences due to discomfort or social desirability bias. This potential limitation should be considered when interpreting the findings.

2.1 Data collection tools

Data for the study were gathered through the use of a descriptive characteristics' questionnaire, a sexual problems assessment form, and the Sexual Quality of Life Scale-Male (SQLS-M). The descriptive characteristics questionnaire included items regarding participants' sociodemographic information, disease-related factors, as well as questions pertaining to aspects of their sexual health. In the sexual problems section of the data collection form, patients reported issues such as erectile dysfunction, reduced sexual desire, difficulty or inability to achieve orgasm, premature ejaculation, and painful intercourse. Ejaculatory problems like retrograde ejaculation, body image concerns due to testicle loss, hormonal-related sexual dysfunction, psychological factors affecting sexual desire or performance, and fertility difficulties were also evaluated based on patient self-reports.

2.2 Sexual quality of life scale-male (SQLS-M)

The SQLS-M was developed by Abraham *et al*. [15] by modifying the Sexual Quality of Life Scale-Female, with certain items removed to adapt it for men. The scale consists of 11 items rated on a six-point Likert scale. The response options range from 1 = Strongly agree, 2 = Mostly agree, 3 = Partially agree, 4 = Partially disagree, 5 = Mostly disagree, to 6 = Strongly disagree. The total score obtained from the scale is converted to a 0–100 scale, with higher scores indicating better sexual quality of life in men. The original scale's internal consistency reliability coefficient (Cronbach's alpha) was reported as 0.82. The validity and reliability study of the scale in Turkey was conducted by researchers [16], who reported an internal consistency reliability coefficient (Cronbach's alpha) of 0.91. In the current study, Cronbach's alpha value for the scale was found to be 0.91.

2.3 Statistical analysis

Data analysis was conducted using Statistical Package for the Social Science (SPSS) for Windows version 23.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics summarized demographic and clinical variables, along with SQLS-M. Prior to inferential analyses, the normality of continuous variables, including SQLS-M and age, was assessed using the Shapiro-Wilk test. Variables meeting normality assumptions were analyzed using parametric tests, while non-parametric alternatives were planned if assumptions were violated. Pearson correlation coefficients were calculated to examine relationships between continuous variables, such as age, and SQLS, given that normality assumptions were satisfied. For comparisons across multiple groups (*e.g.*, treatment modalities, cancer stages, educational levels), one-way ANOVA tests were employed when parametric assumptions were met, accompanied by *post-hoc* analyses using Tukey's Honestly Significant Difference (HSD) to identify specific group differences.

Where normality assumptions were not met or for categorical data, chi-square tests were used to analyze associations between treatment type and severity of sexual dysfunction. Independent samples *t*-tests were applied for comparisons between two groups, such as presence versus absence of sexual dysfunction or body image concerns, assuming normal distribution. If normality was violated in these cases, non-parametric alternatives such as the Mann-Whitney U test would be considered. Given the multiple statistical tests performed throughout the study, a Bonferroni correction was applied to control for Type I error inflation. The significance level (alpha) was adjusted accordingly in interpreting results, and adjusted *p*-values are reported where applicable. An alpha level of $p < 0.05$ was considered statistically significant before correction, and adjusted thresholds were applied following correction procedures.

3. Results

Table 1 presents demographic and clinical characteristics of 168 testicular cancer patients alongside their Sexual Quality of Life Scores (SQLS). The average SQLS was moderate (65.2 $\pm$ 14.8). A small but significant negative correlation was observed between age and SQLS ($r = -0.16$, $p = 0.001$), indicating better sexual quality of life among younger patients, while time since diagnosis showed a positive but non-significant association ($r = 0.12$, $p = 0.092$). Marital status significantly

TABLE 1. Demographic characteristics and sexual quality of life of testicular cancer patients (N = 168).

Variables	Categories/Mean ± SD	n (%)	Mean SQLS-M ± SD	*F*/*t*/*r*	*p*
Age (yr)	31.4 ± 8.2	-	-	$r = -0.16$	0.001**
Marital Status					
	Single	92 (54.8%)	61.3 ± 14.2		
	Married	66 (39.3%)	70.1 ± 13.9	5.32	0.002**
	Divorced/Widowed	10 (6.0%)	60.5 ± 15.0		
Education Level					
	Primary or below	14 (8.3%)	58.6 ± 12.7		
	High School	83 (49.4%)	63.9 ± 14.5	3.28	0.016*
	University and above	71 (42.3%)	69.2 ± 13.2		
Employment Status					
	Employed	141 (83.9%)	66.8 ± 14.3		
	Unemployed	18 (10.7%)	59.2 ± 13.7	2.66	0.022*
	Student	9 (5.4%)	64.4 ± 12.5		
Cancer Type					
	Seminoma	94 (56.0%)	68.1 ± 13.9	8.63	0.010*
	Non-seminoma	74 (44.0%)	61.8 ± 15.1		
Cancer Stage					
	Stage I	79 (47.0%)	70.3 ± 13.6		
	Stage II	56 (33.3%)	63.1 ± 14.7	8.79	<0.001**
	Stage III	33 (19.7%)	58.2 ± 13.9		
Treatment Type					
	Surgery	50 (29.8%)	71.4 ± 13.2		
	Chemotherapy	45 (26.8%)	60.2 ± 14.6	12.09	<0.001**
	Radiotherapy	40 (23.8%)	64.3 ± 13.8		
	Combined Therapy (Chemo + Radio)	33 (19.6%)	57.6 ± 15.3		
Repeated Sexual Dysfunction					
	Yes	86 (51.2%)	58.5 ± 13.8	6.93	0.001**
	No	82 (48.8%)	72.1 ± 12.9		
Body Image Concern					
	Present	93 (55.4%)	59.4 ± 13.7	4.54	<0.001**
	Absent	75 (44.6%)	71.3 ± 14.2		
Types of Sexual Dysfunction					
	Erectile Dysfunction	64 (38.1%)	58.3 ± 13.5		
	Reduced Sexual desire	71 (42.3%)	59.9 ± 14.1		
	Difficulty/Inability to Orgasm	47 (28.0%)	61.2 ± 12.8	8.73	<0.001**
	Premature Ejaculation	39 (23.2%)	63.5 ± 13.9		
	Painful Intercourse (Dyspareunia)	21 (12.5%)	57.6 ± 14.4		
Time Since Diagnosis (yr)	2.1 ± 1.3	-	-	$r = 0.12$	0.092
Sexual Quality of Life Score-Male	65.2 ± 14.8 (out of 100)	-	-	-	-

*$p < 0.05$, **$p < 0.01$. SQLS-M: Sexual Quality of Life Scores-Male; SD: Standard deviation.*

influenced SQLS ($F = 5.32$, $p = 0.002$), with married patients reporting higher scores than single or divorced/widowed individuals. Higher education and employment status were also linked to better sexual quality of life ($F = 3.28$, $p = 0.016$; $F = 2.66$, $p = 0.022$). Clinically, patients with seminoma tumors had higher SQLS compared to non-seminoma cases ($F = 8.63$, $p = 0.010$). Cancer stage affected SQLS ($F = 8.79$, $p < 0.001$), with Stage I patients reporting the highest scores and Stage III the lowest. Treatment type was a significant factor ($F = 12.09$, $p < 0.001$), where surgery-only patients reported better sexual quality of life than those receiving combined chemotherapy and radiotherapy. Additionally, repeated sexual dysfunction and body image concerns were associated with lower SQLS ($t = 6.93$, $p = 0.001$; $t = 4.54$, $p < 0.001$). All types of sexual dysfunction correlated with poorer sexual quality of life ($F = 8.73$, $p < 0.001$), especially erectile dysfunction and painful intercourse.

Table 2 compares the prevalence and severity of sexual dysfunctions among testicular cancer patients based on treatment modality (surgery, chemotherapy, radiotherapy, and combined therapy). Sexual problems were classified as "Very", "Moderate", or "Little" severity, and chi-square tests evaluated their associations with treatment types. Mean SQLS-M scores were compared across groups using ANOVA. The analysis revealed that chemotherapy and radiotherapy were significantly associated with increased severity of erectile dysfunction ($\chi^2 = 68.02$, $p = 0.041$; $\chi^2 = 14.54$, $p = 0.002$), while surgery and combined therapy showed no significant differences. Reduced sexual desire was more prevalent and severe among chemotherapy ($p = 0.022$) and radiotherapy ($p < 0.001$) groups, with no significant effects observed for surgery or combined therapy. Orgasmic difficulties were significantly linked to surgery, chemotherapy, and radiotherapy, but not combined therapy. Premature ejaculation was associated with surgery and chemotherapy, whereas radiotherapy and combined therapy showed no significant relationships. Painful intercourse correlated strongly with chemotherapy and radiotherapy but not with other treatments. Mean SQLS-M scores differed significantly by treatment type ($F = 8.35$, $p < 0.001$), with surgery-only patients reporting the highest scores (46.14 ± 14.3) and combined therapy patients the lowest (29.3 ± 6.1). These findings suggest that more intensive or multimodal treatments are linked to greater sexual dysfunction and poorer sexual quality of life. Overall, chemotherapy and radiotherapy were associated with higher rates and severity of sexual dysfunction compared to surgery alone, and combined therapy patients had the poorest sexual quality of life (see Table 2).

Post-hoc Tukey HSD tests showed that patients treated with surgery only had significantly higher sexual quality of life scores than those receiving chemotherapy ($p = 0.001$), radiotherapy ($p = 0.038$), or combined therapy ($p < 0.001$). Additionally, a significant difference was observed between radiotherapy and combined therapy groups ($p = 0.049$), with combined therapy patients reporting lower quality of life. No significant differences were found between chemotherapy and radiotherapy ($p = 0.284$) or chemotherapy and combined therapy ($p = 0.701$) (see Table 3). Fig. 1 presents a box plot illustrating the distribution of SQLS across different treatment types, highlighting the central tendency, variability, and potential outliers within each group.

4. Discussion

This study investigated factors affecting sexual quality of life in men with testicular cancer, focusing on treatment type, cancer stage, age, sexual dysfunction, and body image concerns. Our findings partially confirmed the hypotheses, showing that sexual quality of life varies significantly by treatment modality, cancer stage, and the presence of sexual and psychological difficulties. Specifically, patients treated with surgery alone reported better sexual quality of life compared to those receiving chemotherapy, radiotherapy, or combined therapy, supporting Hypothesis 2. Advanced cancer stages, recurrent sexual dysfunction, and body image concerns were also associated with poorer sexual quality of life, confirming the predictive role of these clinical and psychosocial factors. Consistent with Hypothesis 3, younger patients reported higher sexual quality of life than older patients.

The sociocultural context, particularly the taboo surrounding male sexuality in Turkey, likely influenced patients' openness about sexual problems and data reporting, emphasizing the need for culturally sensitive clinical and research approaches. The study results highlight the multifactorial nature of sexual health in testicular cancer survivors, underscoring the importance of integrating medical and psychosocial care. From a biological perspective, differences across treatment types may relate to hormonal changes, especially testosterone deficiency. Bilateral orchiectomy results in loss of endogenous testosterone, leading to decreased libido, erectile dysfunction, and fatigue. Testosterone replacement therapy may mitigate these effects, improving sexual function and overall well-being, consistent with previous findings linking hypogonadism to sexual dysfunction in male cancer survivors [17, 18].

Body image concerns significantly predicted lower sexual quality of life. Participants distressed by testicular loss had reduced confidence and impaired emotional intimacy, echoing research in prostate [19] and breast cancer populations [20, 21]. The symbolic role of testes in male sexual identity means their alteration can provoke shame and social withdrawal, underscoring the importance of addressing body image in post-treatment psychological care [22, 23]. Psychosocial factors such as partner support also emerged as crucial. Sexual dysfunction affects relationships and emotional closeness, with patients lacking supportive partners experiencing greater distress [24]. Prior studies highlight the benefits of couple-based interventions to improve sexual outcomes in cancer survivorship [25, 26]. Patients with more advanced cancer stages reported worse sexual quality of life, likely due to more aggressive treatments and greater physical and psychological burdens. While some literature reports inconsistent findings [27], our results align with studies showing progressive sexual well-being decline with disease severity [28].

Comparing with other cancers, similar patterns arise: colorectal [29] and gynecological cancer survivors [30] often face physical impairments, emotional distress, and diminished sexual identity [31–33]. Gender differences in sexual dysfunction and psychosocial impact also suggest that cancer-related sexual dysfunction is a biopsychosocial issue requiring holistic

TABLE 2. Comparison of men's sexual problems based on treatment methods.

Sexual Problem	Severity	Surgery		Chemotherapy		Radiotherapy		Combined Therapy	
		Yes	No	Yes	No	Yes	No	Yes	No
Erectile Dysfunction									
	Very	12	5	16	4	13	5	10	4
	Moderate	10	10	12	8	11	8	9	6
	Little	6	7	5	7	4	9	5	8
	χ^2	0.68		68.02		14.54		36.12	
	p	0.422		0.041		0.002		0.352	
Reduced Sexual desire									
	Very	14	3	18	3	15	4	11	3
	Moderate	11	6	13	6	10	6	9	5
	Little	8	10	7	8	6	10	6	8
	χ^2	6.47		4.48		24.11		16.85	
	p	0.162		0.022		<0.001		0.096	
Difficulty/Inability to Orgasm									
	Very	10	5	11	5	8	6	9	5
	Moderate	7	8	9	7	7	7	8	6
	Little	4	11	3	10	2	12	4	10
	χ^2	9.44		18.65		39.77		58.07	
	p	0.016		0.006		<0.001		0.133	
Premature Ejaculation									
	Very	7	8	8	7	7	6	7	6
	Moderate	6	9	7	8	5	8	6	7
	Little	3	12	3	11	2	11	3	10
	χ^2	16.23		12.43		8.56		9.37	
	p	0.003		0.005		0.114		0.185	
Painful Intercourse (Dyspareunia)									
	Very	4	11	5	10	4	9	4	8
	Moderate	3	12	3	12	2	11	3	10
	Little	2	13	2	13	1	12	2	11
	χ^2	2.086		32.15		17.44		11.45	
	p	0.544		<0.001		0.002		0.322	
The SQLS-M, mean ± SD		46.14 ± 14.3		36.28 ± 8.7		38.8 ± 7.6		29.3 ± 6.1	
		$F = 8.352$, $p < 0.001$							

SQLS-M: Sexual Quality of Life Scale-Male; SD: Standard deviation.

TABLE 3. *Post-hoc* test (Tukey HSD) results: sexual quality of life by treatment type.

Treatment Groups Compared	Mean Difference	Standard Error	p-value
Surgery *vs.* Chemotherapy	71.4 − 60.2 = 11.2	2.7	0.001
Surgery *vs.* Radiotherapy	71.4 − 64.3 = 7.1	2.6	0.038
Surgery *vs.* Combined Therapy	71.4 − 57.6 = 13.8	3.4	<0.001
Chemotherapy *vs.* Radiotherapy	60.2 − 64.3 = −4.1	2.4	0.284
Chemotherapy *vs.* Combined Therapy	60.2 − 57.6 = 2.6	2.9	0.701
Radiotherapy *vs.* Combined Therapy	64.3 − 57.6 = 6.7	2.8	0.049

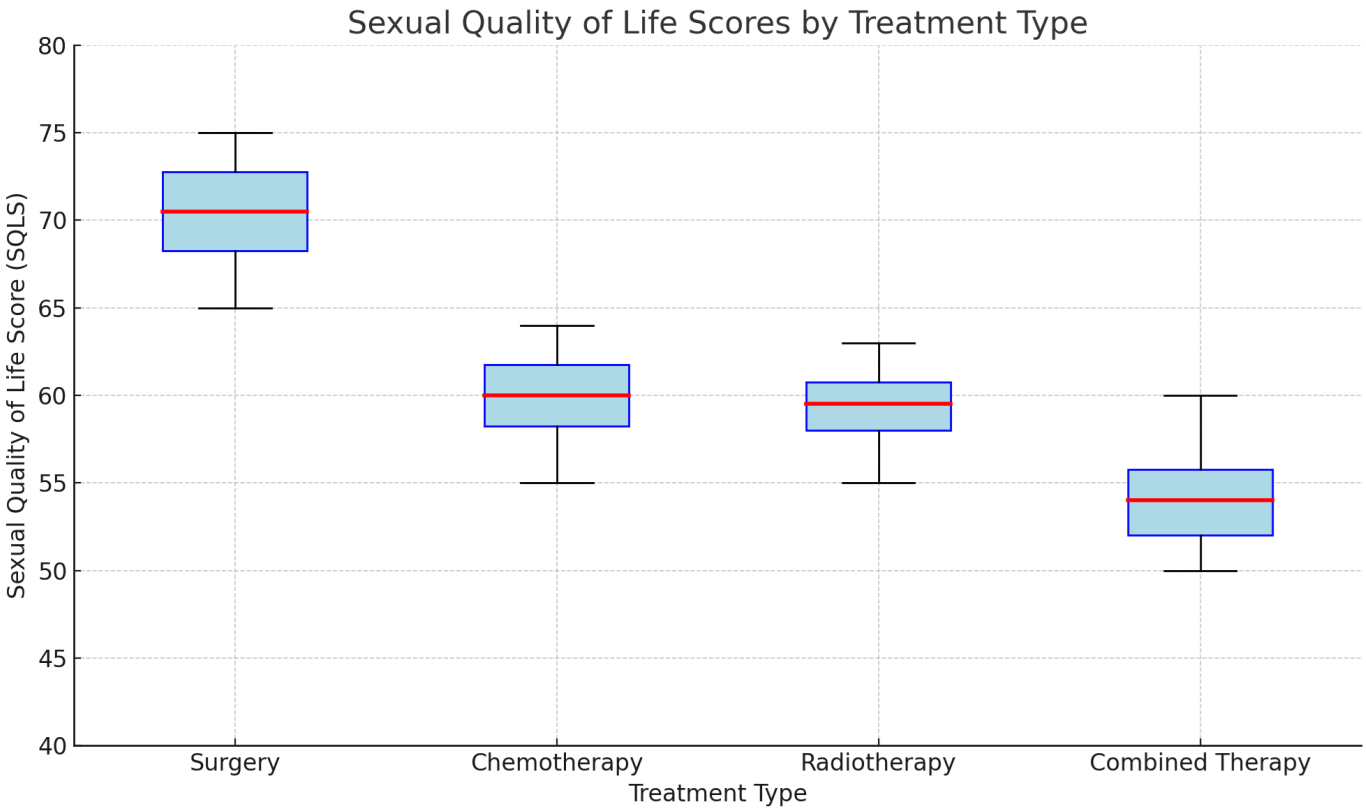

FIGURE 1. A box plot showing the distribution of Sexual Quality of Life Score (SQLS) by treatment types.

management [34–36]. Clinically, these findings emphasize incorporating sexual health into oncologic care. Treatment planning should anticipate sexual side effects and offer hormonal monitoring, psychoeducation, and early psychosocial support. Survivorship plans must include referrals for sex therapy, body image counseling, and partner interventions, especially in cultures where sexual topics are stigmatized. Training healthcare providers in open, nonjudgmental sexual health communication is also essential.

In summary, this study reinforces the complex interplay of biological, psychological, and social factors shaping sexual quality of life in testicular cancer survivors. Addressing these factors through personalized, multidimensional care is vital to improving patient well-being.

5. Conclusions

This study demonstrated that sexual quality of life in men with testicular cancer varies significantly by treatment type and cancer stage, with surgery-only patients reporting better outcomes. The study findings emphasize the urgent need for routine integration of sexual health assessment and tailored counseling into follow-up care. Healthcare providers should proactively address sexual dysfunction and body image concerns to improve survivorship quality of life. Future studies with larger samples are warranted to further explore targeted interventions, including pre-treatment sexual counseling.

6. Limitations

This study relied on self-reported data, which may be subject to recall bias and social desirability bias. Given the cultural context in Turkey, where discussions about sexual health are often considered private or taboo, participants might have underreported certain experiences or concerns. Such cultural sensitivities could influence the accuracy and completeness of responses, and the findings should therefore be interpreted with caution.

AVAILABILITY OF DATA AND MATERIALS

The data is available upon request.

AUTHOR CONTRIBUTIONS

ZT—conceived and designed the research study, analyzed and interpreted the data, contributed in writing and revising the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was reviewed and approved by the Cappadocia University Ethics Committee (22.08/2024) and complied with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants after the participants were fully informed about the study procedures and possible complications.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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