

Evaluation of sexual functions and quality of life in female patients after hysterectomy for benign symptomatic diseases

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Summary

Objective: To evaluate selected quality of life parameters among sexually active patients who underwent a total abdominal hysterectomy and bilateral salpingo-oophorectomy (TAH-BSO) for benign symptomatic disease. **Materials and Methods:** Fifty-six TAH-BSO patients (20 menopausal + 36 premenopausal hysterectomized women) were evaluated between September 2017 and May 2018 using the FSFI, ASEX and SF-36 scores with individual interviews before and six months after TAH + BSO surgery. **Results:** The preoperative and postoperative period scores from three different validated questionnaires were found to be significantly different for all patients. Scores in the postoperative periods were better in all patients. Also, scores in the preoperative and postoperative periods were higher among premenopausal patients than menopausal patients. **Conclusion:** Our results showed that sexual function and quality of life improved in all patients who underwent TAH-BSO for benign symptomatic disease. Also, menopausal status is very important.

Key words: Female sexual function; Quality of life; Hysterectomy; FSFI; ASEX; SF-36.

Introduction

Hysterectomy (surgical removal of the uterus) is a commonly performed major surgical procedure in gynecology and is often performed together with bilateral salpingo-oophorectomy in necessary patients [1, 2]. Hysterectomies are performed for gynecological problems such as dysfunctional uterine bleeding, leiomyoma, endometriosis, severe pelvic infections and pain, uterine rupture, uterine prolapse, and gynaecologic malignant tumors [3, 4, 5]. In women with benign uterine diseases, many symptoms such as physical and menstrual symptoms, pain, emotional and sexual dysfunction can occur and may reduce their quality of life and general health [6, 7]. Generally, quality of life is adversely affected by the severity of these symptoms, leading women to seek surgical treatment. While most hysterectomies are done for benign symptomatic disease to improve quality of life, the surgery itself may cause some postoperative problems [8-10]. When patients elect hysterectomy, they should be counseled by their doctor about their medical condition, reason for surgery, the planned surgical procedure, the expected recovery process, and any potential long-term problems [11]. Other non-clinical factors may also influence this decision including the opinion and attitude of the patient's partner [12].

Theoretically, uterine removal brings the potential to affect the anatomical structures of the pelvic including the regional nerve supply. Lubrication and orgasm are thought to be related to the nerve supply for the upper vagina [11, 12] and many nerves pass through the operative field via the uterovaginal plexus. This plexus may be damaged during a hysterectomy, consequently, changes in sexual arousal and orgasm may occur after hysterectomy [13]. There are many theories regard-

ing sexual functioning, such as dyspareunia resulting from reducing the vaginal length and modification of the uterovaginal innervation, vaginal dryness owing to the absence of cervical mucus, decrease in sexual arousal and impaired orgasm depending on the degree of injury to sexually sensitive tissue [14-16]. The effect of hysterectomy on sexual life thus has always been a major concern to patients and is an important cause of preoperative anxiety [17, 18].

Hysterectomy may also be associated with loss of body integrity, loss of fertility (if ovaries are removed), as well as psychosexual and socio-cultural problems including diminished partner intimacy and feelings of femininity loss [19, 20, 21]. Retrospective studies from the 1970's to 1990's have reported sexual function may be adversely affected in 10-53% of women after hysterectomy. In prospective researches conducted subsequently sexual function in most women after hysterectomy showed significant improvement, although 10-25% of patients reported new symptoms [22]. Various work has suggested sexual function is not affected after hysterectomy [23], yet other evidence exists to support improvement in postoperative sexual function. Not surprisingly, improvements in quality of life and general health frequently depend on reduction of pain and physical symptoms after hysterectomy [24, 25].

As it is seen that it may be concluded that hysterectomy operation seems to be very important for female sexual functions. After this operation, the life of women may be affected in different domains and it is very important to assess the extent of this issue. The aim of this prospective study is to evaluate sexual function and quality of life features using three validated questionnaires Female Sexual Function Index (FSFI), Arizona Sexual Experiences Scale (ASEX) and Short-Form

Health Survey (SF-36) in sexually active patients after total abdominal hysterectomy and bilateral salpingo-oophorectomy (TAH-BSO) performed for benign indications.

Materials and Methods

Study population

This prospective study was conducted between September 2017 and May 2018 at the Obstetrics and Gynaecology Department in the hospital of Pamukkale University Medical Faculty, which is a tertiary health center hospital in Denizli province (Turkey). The research design was approved by the Institutional Ethics Committee of the Non-Invasive Clinical Trials (Protocol Ref No: 10, Date: 01/08/2017) in compliance with the Declaration of Helsinki. Sample size was based on previous work by Gokpınar *et al.* [26]. Specifically, at least 44 cases were required to reach 80% power at 95% confidence level. Considering subjects lost to follow up, it was planned to add at least 25% additional patients. Accordingly, seventy-five sexually active, healthy women aged 30-78 years with planned TAH-BSO operation due to benign reasons were enrolled. Menopausal status determined by pre-operative serum FSH values > 40 pg/mL with a diagnosis of amenorrhea for at least one year [27-39]. Written informed consent was obtained from each patient before surgery and study entry.

In this study, consecutive samples of female patients who underwent hysterectomy operation who met the exclusion criteria were used. Patients with complicated diseases such as endometriosis, malignancy or symptomatic prolapse requiring additional surgical procedures apart from simple hysterectomy or patients diagnosed with chronic pelvic pain were excluded. In addition, patients with known sexual dysfunction or infertility, severe depression or history of antidepressant use, refused participation or limited capacity to understand the questionnaires (verbal or mental impairment) were not included for study. Patients who developed complications during the operation or in the postoperative period ($n = 2$), who required change of hysterectomy method immediately before the operation ($n = 5$), who declined surgery ($n = 3$), who withdrew from survey or interview participation after the operation ($n = 7$), or those whose partner experienced recent severe medical disease or death ($n = 2$) were excluded. Among premenopausal study participants, the primary indications for TAH-BSO included leiomyoma (19), abnormal uterine bleeding (13), and benign endometrial hyperplasia (4). Fibroids (15), ovarian cysts (4) and postmenopausal bleeding (1) were the indications for surgery in menopausal patients.

Sociodemographic features of the women participating and their partners in the study were evaluated through a routine "Gynecological Evaluation Form" provided by the authors. The Responses to FSFI, ASEX and SF-36 were recorded during direct patient interviews. Based on some studies in the literature showing that six months may be needed to document meaningful improvement in pelvic innervation [30, 31], patients were invited for interview at a six month postoperative interval for assessment. A total of 56 patients completed these surveys to assess sexual function and quality of life pre-operatively and

again six months post-hysterectomy.

Female sexual function index

The FSFI questionnaire (Rosen *et al.*) is a 19 item instrument used to evaluate six different domains including sexual desire (1-2 question) and arousal (3-6 question), lubrication (7-10 question), orgasm (11-13 question), overall sexual satisfaction (14-16 question) and pain (17-19 question) over the preceding four weeks [32]. The first two questions have scales from 1 to 5 and following questions have scales from 0 to 5 for scoring. The highest and lowest raw scores possible from this questionnaire are 95 and 2, respectively. Scores obtained for each domain are then multiplied by a specified coefficients for questions 1-2 : 0.6; 3-10 : 0.3; 11-19 : 0.4) that homogenizes the effects of each domain. Then, the total FSFI scores are obtained by the cumulative of each score in the homogenized domain. The total FSFI score ranges from 1.2 to 36 with higher scores defining a better sexual life. Total FSFI scores ≤ 26.5 are typically associated with sexual dysfunction [28, 33, 34]. Of note, use of FSFI was previously validated for a Turkish population in previous studies [35].

The Arizona Sexual Experiences Scale

The Arizona Sexual Experiences Scale (ASEX) is a five-item questionnaire developed by McGahuey *et al.* to evaluate sexual function for the preceding one week [36]. ASEX assesses domains such as sexual desire, arousal, vaginal lubrication, ability to reach orgasm and satisfaction with orgasm; each domain is scored using a six-point Likert scale and the total score ranges from 5 to 30 (higher values denoting "better sexual experience"). Higher scores define a better sexual life. This questionnaire was also validated for the Turkish population in previous studies [37].

Short-Form Health Survey (SF-36) quality of life scale

The Short-Form Health Survey (SF-36) developed by Ware and Sherbourne evaluates quality of life with 36 questions [38]. It is perhaps the most widely used method to measure general wellness or quality of life on a global scale. This questionnaire assesses eight different domains such as physical functioning, role-physical, vitality, role-emotional, bodily pain, general health, social functioning, and mental health. Every domain has a score of 0-100 and a higher score defines a better quality of life. This questionnaire was also validated in a Turkish population in previous studies [39].

Statistical analysis of the data

Continuous variables were expressed as mean \pm standard deviation (SD), median (minimum-maximum values) and categorical variables with number and percent. A Shapiro-Wilk test was used to test for normality. Independent Student's *t*-test was used for comparisons among groups when the parametric test conditions were satisfied. In other cases, the Mann-Whitney U test was used when the parametric test conditions were not satisfied. Wilcoxon Signed Rank test was used to analyze before vs. after conditions. All statistical data were analyzed by SPSS, 24.0 and *p*-value < 0.05 were considered statistically significant.

Table 1a. —Demographic characteristics of the female patients.

	All Patients (n = 56)		Menopausal women (n = 20)		Pre-menopausal women (n = 36)		Between Groups <i>p</i>
	Mean ± SD	Med (min – max)	Mean ± SD	Med (min – max)	Mean ± SD	Med (min – max)	
Age	49.32 ± 9	47 (30 - 78)	58.05 ± 8.79	54.5 (47 - 78)	44.47 ± 4.21	45 (30 - 51)	0.0001* (z = -5.675)
Gravida	3.14 ± 1.52	3 (1 - 9)	3.9 ± 1.92	3 (2 - 9)	2.72 ± 1.06	3 (1 - 6)	0.01* (z = -2.563)
Parity	2.48 ± 1.21	2 (1 - 9)	2.9 ± 1.65	2 (2 - 9)	2.25 ± 0.81	2 (1 - 5)	0.117 (z = -1.569)
Children number	2.41 ± 1.16	2 (1 - 9)	2.8 ± 1.64	2 (1 - 9)	2.19 ± 0.71	2 (1 - 4)	0.134 (z = -1.5)

**p* < 0.05 statistically significant; SD: Standard Deviation; Med: Median; z: Mann Whitney *U* test.

Table 1b. —Demographic characteristics of the female patients.

		Number (n)	Percentage (%)
Employment status	Not working	39	69.6
	Working	17	30.4
Education	Primary school	40	71.4
	Midde school	5	8.9
	High school	6	10.7
	Undergraduate	5	8.9
Sports	No	38	67.9
	Yes	18	32.1
Alcohol consumption	No	54	96.4
	Yes	2	3.6
Total		56	100

Results

Summaries of patient demographics are presented in Table 1a and 1b. In this prospective study, a clinical follow-up of 56 sexually active and healthy patients who underwent TAH-BSO due to benign reason was performed. The study was completed on 20 menopausal and 36 premenopausal women. The mean ages of the participants were 49.32 ± 9 (30-78) years. The mean age of menopausal women was 58.05 ± 8.79 (47-78) years; mean age of the premenopausal women was 44.47 ± 4.21 (30-51) years. Also, their number of pregnancy, parity and number of children were 3.14 ± 1.52 (1-9), 2.48 ± 1.21 (1-9) and 2.41 ± 1.16 (1-9), respectively. The majority of the participants were reported a primary school education (71.4%), were unemployed (69.6%), were nonsmokers (92.8%) and did not use alcohol (96.4%).

As noted from FSFI scores recorded in preoperative and postoperative assessments (see Table 2), there is a statistically significant difference between total score and each domain among premenopausal patients. In the menopausal subgroup, a statistically significant difference in arousal (1.71 ± 1.6 to 2.15 ± 1.63, *p* = 0.032, respectively), sexual satisfaction (2.08 ± 1.77 to 2.38 ± 1.87, *p* = 0.033, respectively) and pain (1.98 ± 2.22 to 2.76 ± 2.29, *p* = 0.027, respectively) were measured. Overall, there was a statistically significant difference in the FSFI score of each domain and total FSFI score.

The total ASEX score for all study patients in the postoperative evaluation (see Table 3) was significantly higher than the total ASEX score of all patients in the preoperative phase (17.34 ± 5.72 to 16.54 ± 5.56, *p* = 0.0001, respectively). Of

note, the mean total ASEX score of premenopausal patients in the postoperative periods was also significantly higher than the mean total ASEX score of premenopausal patients in the preoperative periods (18.83 ± 5.23 to 17.92 ± 5.07, *p* = 0.0001 respectively). Among menopausal patients, there were no statistically significant differences noted across total ASEX scores when preoperative and postoperative questionnaire responses were compared (14.05 ± 5.65 and 15.65 ± 5.69, *p* = 0.2, respectively). However, there was a slight increment in the total ASEX scores between the preoperative and postoperative periods.

Comparison of the summary of data from SF-36 questionnaires is shown in Table 4. Each domain of the SF-36 score of all patients in the postoperative period was significantly higher than each domain of the SF-36 score for patients in the preoperative period. For premenopausal patients, there was a significant difference in the SF-36 score of each domain except role-emotional score. In the menopausal group, there was a statistically significant difference only in the domain of role emotional (28.33 ± 40.86 to 58.33 ± 45.75, *p* = 0.021, respectively) and mental health (54 ± 19.36 to 59 ± 18.16, *p* = 0.01, respectively).

Discussion

In this study, the preoperative and postoperative scores of three different validated questionnaires (FSFI, ASEX, and SF-36) were compared among 56 women undergoing TAH-BSO for benign indications. The study population consisted of 20 menopausal and 36 premenopausal women. These data re-

Table 2. — The FSFI scores of the patients in the preoperative and postoperative periods.

	All patients (n = 56)		Menopausal group (n = 20)		Pre-menopausal group (n = 36)		Between Groups <i>p</i>
	Mean ± SD	Med (min - max)	Mean ± SD	Med (min - max)	Mean ± SD	Med (min - max)	
FSFI Total Score(Pre)	15.78 ± 9.56	16.7 (1.8 - 33.5)	12.18 ± 8.29	7.2 (3.8 - 28.4)	17.78 ± 9.74	21.45 (1.8 - 33.5)	0.049* (z = -1.967)
FSFI Total Score(Post)	20.51 ± 8.77	22.7 (1.2 - 33.8)	14.07 ± 9.88	15.7 (1.2 - 29.6)	24.1 ± 5.54	24.45 (9.7 - 33.8)	0.0001* (z = -3.566)
Within Groups <i>p</i>	0.0001* (z = -4.949)		0.239 (z = -1.179)		0.0001* (z = -4.939)		
Desire(Pre)	2.52 ± 1.17	2.4 (1.2 - 4.8)	1.98 ± 1.03	1.2 (1.2 - 4.2)	2.82 ± 1.15	3 (1.2 - 4.8)	0.011* (z = -2.528)
Desire(Post)	2.82 ± 1.12	3 (1.2 - 4.8)	2.25 ± 1.01	2.4 (1.2 - 4.2)	3.13 ± 1.06	3.6 (1.2 - 4.8)	0.005* (z = -2.796)
Within Groups <i>p</i>	0.006* (z = -2.747)		0.131 (z = -1.51)		0.02* (z = -2.33)		
Arousal(Pre)	2.28 ± 1.76	2.25 (0 - 5.7)	1.71 ± 1.6	1.2 (0 - 4.8)	2.59 ± 1.79	2.85 (0 - 5.7)	0.092 (z = -1.686)
Arousal(Post)	3.08 ± 1.44	3.45 (0 - 6)	2.15 ± 1.63	2.4 (0 - 4.8)	3.59 ± 1.01	3.6 (1.2 - 6)	0.001* (t = -3.599)
Within Groups <i>p</i>	0.0001* (z = -4.579)		0.032* (z = -2.149)		0.0001* (z = -4.07)		
Lubrication(Pre)	2.63 ± 2.15	3.15 (0 - 6)	1.95 ± 2.21	0.45 (0 - 6)	3.01 ± 2.05	3.9 (0 - 6)	0.074 (z = -1.786)
Lubrication(Post)	3.77 ± 1.76	4.2 (0 - 6)	2.43 ± 2.12	2.7 (0 - 6)	4.52 ± 0.92	4.5 (2.1 - 6)	0.0001* (z = -3.795)
Within Groups <i>p</i>	0.0001* (z = -4.763)		0.059 (z = -1.886)		0.0001* (z = -4.221)		
Orgasm(Pre)	2.98 ± 1.49	2.4 (0 - 5.6)	2.48 ± 0.74	2.2 (1.6 - 4.4)	3.26 ± 1.72	3.4 (0 - 5.6)	0.077 (z = -1.768)
Orgasm(Post)	3.46 ± 1.87	4 (0 - 6)	2.1 ± 1.87	2.6 (0 - 5.6)	4.22 ± 1.39	4.4 (1.2 - 6)	0.0001* (z = -4.027)
Within Groups <i>p</i>	0.004* (z = -2.886)		0.273 (z = -1.095)		0.0001* (z = -4.687)		
Satisfaction(Pre)	3.04 ± 2.07	3 (0 - 6)	2.08 ± 1.77	2 (0 - 5.2)	3.58 ± 2.05	4.4 (0 - 6)	0.009* (z = -2.607)
Satisfaction(Post)	3.64 ± 1.81	4.4 (0 - 6)	2.38 ± 1.87	2.4 (0 - 6)	4.33 ± 1.35	4.8 (1.2 - 6)	0.0001* (z = -3.557)
Within Groups <i>p</i>	0.0001* (z = -3.774)		0.033* (z = -2.132)		0.002* (z = -3.157)		
Pain(Pre)	2.34 ± 2.23	2 (0 - 6)	1.98 ± 2.22	1 (0 - 6)	2.53 ± 2.24	2 (0 - 6)	0.324 (z = -0.985)
Pain(Post)	3.75 ± 1.77	4 (0 - 6)	2.76 ± 2.29	3.6 (0 - 6)	4.3 ± 1.1	4.4 (2 - 6)	0.02* (z = -2.335)
Within Group <i>p</i>	0.0001* (z = -4.829)		0.027* (z = -2.207)		0.0001* (z = -4.338)		

**p* < 0.05 statistically significant; SD: Standard Deviation; Med: Median; Pre: Preoperative; Post: Postoperative; "For Between Groups comparisons" *t*: Independent samples *t* test; *z*: Mann Whitney U test; "For Within Groups comparisons" *t*: Paired samples *t* test; *z*: Wilcoxon signed rank test.

Table 3. — The total ASEX scores of the patients in the preoperative and postoperative periods.

	All patients (n = 56)		Menopausal group (n = 20)		Pre-menopausal group (n = 36)		Between Groups <i>p</i>
	Mean ± SD	Med (min - max)	Mean ± SD	Med (min - max)	Mean ± SD	Med (min - max)	
ASEX Total score (Pre)	18.46 ± 5.56	18 (7 - 30)	20.95 ± 5.65	19.5 (9 - 30)	17.08 ± 5.07	16.5 (7 - 30)	0.011* (t = 2.626)
ASEX Total score (Post)	17.66 ± 5.72	16.5 (6 - 30)	20.35 ± 5.69	19 (9 - 30)	16.17 ± 5.23	15.5 (6 - 30)	0.007* (t = 2.779)
Within Group <i>p</i>	0.0001* (z = -3.585)		0.2 (z = -1.282)		0.0001* (z = -3.903)		

**p* < 0.05 statistically significant; SD: Standard Deviation; Med: Median; Pre: Preoperative; Post: Postoperative; "For Between Groups comparisons" *t*: Independent samples *t* test; *z*: Mann Whitney U test; "For Within Groups comparisons" *t*: Paired samples *t* test; *z*: Wilcoxon signed rank test.

veal that total and each domain FSFI questionnaire scores measured in the postoperative period were significantly higher than those in the preoperative period for women not yet in menopause. In contrast, the total FSFI questionnaire scores between preoperative vs. postoperative periods were similar among menopausal women in this study. Similarly, total ASEX score and many domains of the SF-36 (physical functioning, vitality, pain, general health, and social functioning) were higher postoperatively in the premenopausal group but not in the menopausal group.

Hysterectomy is among commonly performed gynaecological surgical procedures. After hysterectomy, it is possible for some patients to experience problems due to altered anatomical integrity and injury of uterovaginal plexus [40]. Such negative effects have been previously reported [41] although the exact sequence of events underlying the possible sexual dysfunction following hysterectomy remains controversial [42, 43]. Moreover, studies regarding sexual function and lifestyle changes after TAH-BSO have reported conflicting findings and the controversy concerning this issue is not new [16, 24,

Table 4. — Comparison of the SF-36 scores in the patients in the preoperative and postoperative periods.

	All patients (n = 56)		Menopausal group (n = 20)		Pre-menopausal group (n = 36)		Between Groups <i>p</i>
	Mean ± SD	Med (min - max)	Mean ± SD	Med (min - max)	Mean ± SD	Med (min - max)	
Physical functioning(Pre)	59.68 ± 29.01	60 (0 - 100)	58.25 ± 29.17	62.5 (0 - 100)	60.47 ± 29.31	57.5 (0 - 100)	0.786 (<i>t</i> = -0.272)
Physical functioning(Post)	68.04 ± 23.41	72.5 (0 - 100)	60.5 ± 26	67.5 (0 - 100)	72.22 ± 21.06	77.5 (10 - 100)	0.068 (<i>z</i> = -1.828)
Within Groups <i>p</i>	0.001* (<i>z</i> = -3.226)		0.498 (<i>z</i> = -0.677)		0.001* (<i>z</i> = -3.277)		
Role-physical(Pre)	41.96 ± 43.72	25 (0 - 100)	36.25 ± 45.51	0 (0 - 100)	45.14 ± 43.02	37.5 (0 - 100)	0.445 (<i>z</i> = -0.763)
Role-physical(Post)	59.82 ± 41.47	75 (0 - 100)	55 ± 44.87	62.5 (0 - 100)	62.5 ± 39.87	75 (0 - 100)	0.54 (<i>z</i> = -0.613)
Within Groups <i>p</i>	0.004* (<i>z</i> = -2.868)		0.058 (<i>z</i> = -1.897)		0.023* (<i>z</i> = -2.278)		
Vitality(Pre)	45.89 ± 22.65	45 (10 - 90)	44 ± 21.13	40 (10 - 85)	46.94 ± 23.67	47.5 (10 - 90)	0.645 (<i>t</i> = -0.463)
Vitality(Post)	50 ± 21.7	50 (15 - 90)	48 ± 20.42	47.5 (15 - 85)	51.11 ± 22.59	52.5 (15 - 90)	0.612 (<i>t</i> = -0.511)
Within Groups <i>p</i>	0.003* (<i>z</i> = -2.955)		0.122 (<i>z</i> = -1.548)		0.01* (<i>z</i> = -2.58)		
Role-emotional(Pre)	36.3 ± 43.24	0 (0 - 100)	28.33 ± 40.86	0 (0 - 100)	40.73 ± 44.44	33.3 (0 - 100)	0.309 (<i>z</i> = -1.017)
Role-emotional(Post)	60.71 ± 45.44	100 (0 - 100)	58.33 ± 45.73	83.3 (0 - 100)	62.03 ± 45.88	100 (0 - 100)	0.784 (<i>z</i> = -0.274)
Within Groups <i>p</i>	0.0001* (<i>z</i> = -3.505)		0.021* (<i>z</i> = -2.315)		0.008* (<i>z</i> = -2.659)		
Bodily pain(Pre)	51.25 ± 26.82	42 (0 - 100)	47.7 ± 25.6	41.5 (0 - 100)	53.22 ± 27.64	51 (10 - 100)	0.508 (<i>z</i> = -0.662)
Bodily pain(Post)	59.63 ± 17.74	62 (21 - 100)	55.35 ± 14.25	58 (21 - 84)	62 ± 19.19	62 (41 - 100)	0.443 (<i>z</i> = -0.768)
Within Groups <i>p</i>	0.001* (<i>z</i> = -3.21)		0.088 (<i>z</i> = -1.706)		0.005* (<i>z</i> = -2.788)		
General health(Pre)	52.59 ± 21.45	51 (15 - 97)	46.15 ± 17.48	43.5 (20 - 77)	56.17 ± 22.81	55 (15 - 97)	0.094 (<i>t</i> = -1.703)
General health(Post)	55.2 ± 21.81	56 (15 - 95)	47.5 ± 21.5	43.5 (15 - 92)	59.47 ± 21.07	62 (22 - 95)	0.048* (<i>t</i> = -2.023)
Within Groups <i>p</i>	0.01* (<i>z</i> = -2.578)		0.156 (<i>z</i> = -1.418)		0.027* (<i>z</i> = -2.218)		
Social functioning(Pre)	55.8 ± 22.48	50 (12.5 - 100)	56.88 ± 19.65	50 (25 - 100)	55.21 ± 24.16	50 (12.5 - 100)	0.793 (<i>t</i> = 0.264)
Social functioning(Post)	66.96 ± 18.98	62.5 (25 - 100)	62.5 ± 22.58	62.5 (25 - 100)	69.44 ± 16.49	62.5 (50 - 100)	0.355 (<i>z</i> = -0.926)
Within Groups <i>p</i>	0.0001* (<i>z</i> = -4.12)		0.13 (<i>z</i> = -1.513)		0.0001* (<i>z</i> = -3.83)		
Mental health(Pre)	56.43 ± 19.68	56 (8 - 100)	54 ± 19.36	54 (20 - 100)	57.78 ± 20	56 (8 - 100)	0.496 (<i>t</i> = -0.685)
Mental health(Post)	59.79 ± 19.3	60 (20 - 100)	59 ± 18.16	60 (20 - 100)	60.22 ± 20.15	60 (24 - 100)	0.823 (<i>t</i> = -0.225)
Within Groups <i>p</i>	0.001* (<i>z</i> = -3.188)		0.01* (<i>z</i> = -2.585)		0.025* (<i>z</i> = -2.246)		

**p* < 0.05 statistically significant; SD: Standard Deviation; Med: Median; Pre: Preoperative; Post: Postoperative; "For Between Groups comparisons" *t*: Independent samples *t* test; *z*: Mann Whitney *U* test; "For Within Groups comparisons" *t*: Paired samples *t* test; *z*: Wilcoxon signed rank test.

44]. In a review on this issue, it was concluded that gynecological surgery might affect sexual function. However, there is little available evidence to support this conclusion [45]. Here, scores from three different validated questionnaires (FSFI, ASEX and SF-36) were evaluated in parallel to investigate sexual function and quality of life in sexually active patients who had recently undergone TAH + BSO for benign symptomatic disease. The preoperative and postoperative scores of the female patients were compared for each questionnaire. The sexual life was assessed by using the FSFI and ASEX questionnaires which have been used in several different studies in the Turkish population. Also, the quality of life was assessed by using only the SF-36 questionnaire. In this way, it was evaluated how the quality of life affects sexual life. All patients were examined in two groups as the premenopausal and the menopausal. Thus, patients were divided into similar age groups.

Using this multiplex approach, we observed a significant difference in both of each domain of the FSFI and in the total ASEX scores of all patients in preoperative and postoperative phases. Consistent with findings reported previously, two different questionnaire scores were found to be better in the postoperative period for all study patients. The present research

finds both preoperative and postoperative scores to be higher in the premenopausal group when the premenopausal and the menopause groups were compared. The total ASEX and FSFI scores of the premenopausal patients after surgery were significantly higher than the total ASEX score of the premenopausal patients in the preoperative periods. There was a significant difference in postoperative sexual life in patients with better preoperative sexual life such as the premenopausal patients. One explanation for the improvements observed here could be the absence of vaginal bleeding, resolution of dyspareunia, as well as a possible "contraceptive effect" (i.e., disappearance of unplanned pregnancy anxiety) [23]. One can speculate that ongoing sexual activity is more frequent and satisfying in the premenopausal group, and therefore this group experienced improved satisfaction with respect to sexual life after hysterectomy. Larger studies with more detailed subgroup analysis will be helpful to characterize quality of life and/or sexual factors after hysterectomy more completely. Data from the current study agree with earlier work which reported the same or better postoperative sexual life following hysterectomy [46].

Several investigators have shown considerable improvements in sexual life with prominent positive lifestyle changes after hysterectomy due to benign symptomatic diseases [16,

24, 44]. For example, Kayatas *et al.* [30] analyzed outcomes after hysterectomies without oophorectomy with three different questionnaires (Libido Scoring System, ASEX and FSFI). They compared pre- and postoperative values in two hysterectomy groups (abdominal *vs.* laparoscopic), which revealed similar results with regards to all three scores. However, they did not observe improvement of scores after hysterectomy. One reason for this discrepancy with our results may be the difference between intrinsic factors of the study population. Similar to their results, we observed comparable scores postoperatively only in the menopausal group.

Controversial results regarding the potential risks and benefits of premenopausal oophorectomy on female sexuality with hysterectomy can be found in different studies. Some experts have concluded that premenopausal oophorectomy may improve female sexual function, while others concluded that it had no effect or was associated with deterioration [47, 48, 49]. When hysterectomy is performed for other indications, it can be concluded that effects of hormonal change are more prominent in elective TAH-BSO for younger women without symptoms. On the other hand, there are also favorable results as an outcome of the operation performed due to pain bleeding symptoms such as dysmenorrhea.

One can propose that hysterectomy would eventually improve sexual function due to surgical correction of symptoms that previously had negative effects [24]. Yang *et al.* [50] observed that the postoperative quality of life was higher than before hysterectomy. Similarly, most patients who underwent hysterectomy experienced an improvement in quality of life, their general health perception increased, pain and physical symptoms and depression diminished, and relationships with partners and others improved [51, 52, 53]. Other studies focusing on the aftermath of hysterectomy have also reported that sexual life may be positively affected after this operation [41, 52, 54]. Indeed, earlier research has identified the most significant predictive factor is the quality of the preoperative sexual relationship, a finding which is in agreement with our data [55].

When results were compared between preoperative and postoperative FSFI scores among menopausal patients, a significant difference was found only for arousal, sexual satisfaction and pain. Also, better FSFI postoperative scores were measured for all domains in the present study. We found no significant difference in total ASEX scores of menopausal patients group when preoperative *vs.* postoperative data were compared. However, better ASEX postoperative scores were noted in the menopausal group. As can be seen from these results, the FSFI questionnaire consisting of more extensive questions will provide a more detailed understanding of the patient's condition. When the SF-36 scores were evaluated for the menopausal group, a significant difference was found only in the domains of role emotional and mental health. From this study, it appears that there are positive effects on sexual functions for menopausal women after hysterectomy. Some studies have described different results about sexual function of menopausal women following hysterectomy. In a study con-

ducted by Çelik *et al.* [27], it was mentioned that negative effects of both vaginal and abdominal hysterectomy on sexual life were identified in postmenopausal women for at least the first 6 months after surgery. Also, in another study evaluating the post-hysterectomy FSFI scores, women were divided into groups according to their menopause status and the lowest scores were noted in the menopause group. Moreover, female age was identified as a key risk factor for lower sexual function only in the domains of desire and arousal [32]. In another study evaluating the sexual function of women who had undergone TAH-BSO for benign disease by using the FSFI questionnaire, it was shown that postoperative sexual function was adversely affected in all patients irrespective of menopause status [56]. The above-mentioned literature results show adverse effects on conclusions regarding the influence of hysterectomy on sexual function in menopausal women. Therefore, although there are studies reporting negative effects on sexual life in women with menopause, it is seen that more research is needed to investigate this issue.

We also observed here that there is a major difference in each domain of the SF-36 scores of all patients in the preoperative and postoperative periods. Better SF-36 scores in the postoperative periods were also observed across all domains. The highest SF-36 mean scores in all patients in the postoperative periods were found in physical and social functioning domains. The higher SF-36 mean scores could be explained by the improvement of physical complaints of women before the hysterectomy. Physical function and emotional role function domains as measured by the SF-36 questionnaire can remain high after surgery [57]. In contrast, Berlitz *et al.* [34] reported that patient expectations regarding sexual life also affected postoperative response.

The current study has several limitations should be acknowledged. Limited sample size and short-term postoperative follow-up are the primary limitations. Inability to follow up the patients' sexual status at different times after surgery, inability to compare the scores with socio-demographic and psychosocial profiles, inability to involve husbands and their attitudes on a relationship are the other limitations. However, these limitations are also common in other literature studies. Despite these, the main strengths of this study are that there are limited studies comparing sexual functions and quality of life with three different methods in the literature with validated assessing tools, prospective observational design and the patients were chosen homogeneously.

In conclusion, these data find that hysterectomy does not adversely affect the sexual function and quality of life of women. A healthy and satisfying sexual life is an integral component of life, and the impact of any hysterectomy sequela on the quality of life and sexual life are likely to differ on an individual basis. Patients should be informed about their expectations and concerns about their sexual life should be thoughtfully discussed before the operation. Additional qualitative study will be helpful in gaining a better understanding of this complex issue.

Ethics Approval and Consent to Participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional committee and with the 1964 Helsinki Declaration (and later amendments) or comparable ethical standards. Written informed consent was obtained from all patients included for analysis.

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Conflict of Interest

The authors have no conflict of interest to disclose.

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