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A Prospective Study Assessing Sexual Function and Body Image Among Cervical Cancer Survivors: Exploring Treatment Modality Differences

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ABSTRACT

Background & Objective: We aimed to compare sexual function and body image among cervical cancer survivors.

Materials & Methods: Between August 1, 2016 and January 31, 2019, we conducted a prospective study with 104 participants. The FSFI and the FACT-Cx v.4.0 (B4 and C7) were the measurement tools.

Results: Forty–seven and twelve hundredths percent reported sexual activity, with the surgical group considerably less sexually active than the non-surgical group (63% vs. 100%, P=0.0003). Throughout the follow-up, we found no significant changes in sexual function (P>0.05). A diagnosis of sexual dysfunction was made in 60.58% of cervical cancer survivors, 80.65% following surgery alone, and in 100% after radiotherapy and chemotherapy. In comparison with survivors who did not receive radiotherapy, irradiated survivors had lower FSFI total scores (1.2 vs. 21.4, P T1=0.0001; 2.1 vs. 21.75, P T2=0.0002). In comparison with the non–chemotherapy group, the chemotherapy group's scores were considerably lower (1.2 vs. 21.15, P T1 <0.0001; 2.4 vs. 18.95, P T2=0.004). We detected no significant changes in body image scores (P=0.184). Except for T1 time assessment (2 vs. 3, P T1=0.016), no differences in body image between the surgical and non-surgical groups were found throughout the follow-up (P T2=0.992; P T3=0.207; P T4=0.139).

Conclusion: The rate of female sexual dysfunction was 60.58%, prevailing after therapeutic multimodality, radiotherapy, and chemotherapy. Throughout the follow–up, we discovered no significant changes in sexual activity and function, or in body image. In terms of body image, there were no significant differences between the surgical and non–surgical groups.

Keywords: Self–image, Sexuality, Surveys and Questionnaires, Trends, Uterine Cervical Neoplasms

Introduction

According to the definition of sexual dysfunction provided by the American Psychological Association, it is "the persistent and recurrent sexual desire and psychophysiological disorders that characterize the sexual response cycle, causing discomfort and difficulties in interpersonal relationships" **(1)**. After receiving oncological treatment, 40–100% of cervical cancer survivors experience female sexual dysfunction **(2, 3)** and, particularly, 28.6% experience a decrease in sexual desire **(4)**.

The evaluation of sexual function becomes extremely important because patients with cervical cancer are often relatively young **(5–8)** and sexually active at the time of diagnosis. Dyspareunia and hypoactive sexual desire significantly have the worst scores **(9, 10)**. It has been observed that the evaluation of sexual function presents a number of challenges. The prevalence of female sexual dysfunction varies significantly, which may be due to the definition of female sexual dysfunction, the types of diagnostic tests, and the questionnaires that are used, as well as the impact of organic, neurological, psychological, socioeconomic, religious, ethical, and racial factors **(11–25)**. The evolution of sexual behavior and function is more favorable during active cancer therapy than it is during follow–up time **(5, 26)**. On the other hand, increased sexual activity is associated with a longer follow-up period **(27)**. Sixty eight percent of survivors had regular sexual activity five

years following the end of treatment, according to Tramacere et al. 's research **(28)**.

Regarding sexual dysfunction following surgery, Wang et al. discovered that rates of preoperative female sexual dysfunction for patients submitted to radical hysterectomy were of 50.5%, and 86.9% and 92.3% at 1 and 2 years after surgery, respectively **(29)**. Fourteen and seven hundredths percent, 42.1%, and 51.9% of patients reported having hypoactive sexual desire, respectively. Preoperative prevalence rates for orgasmic disorders, dyspareunia, and hypoactive sexual desire are of 18.4%, 51.1%, and 10.9%, respectively. These rates rise to 38.8%, 81%, and 24.4% and to 49.1%, 84.6%, and 30.2% in the first and second postoperative years, respectively. Surgery may also result in sterility, dyspareunia, and a loss of femininity **(30)**.

Among different surgical techniques, sexual function remains unaffected **(18, 31, 32)**. However, according to other studies, surgical radicality has a significant impact on how surgery affects sexual function **(33–37)**. Patients who underwent type II radical hysterectomy have higher levels of sexual activity, sexual function, and sexual satisfaction 24 months following surgery than patients who underwent type III radical hysterectomy **(38)**. Long–term sexual function and type of radical hysterectomy have not been associated **(18, 39)**. Between survivors who underwent nerve sparing and those who did not, there are no significant changes in the frequency of female sexual dysfunction **(34, 40)**. However, Bogani et al. found that the nerve-sparing group has significantly higher postoperative Female Sexual Function Index (FSFI) total, lubrication, and sexual satisfaction scores **(41)**. Postoperative sexuality is negatively impacted by bilateral oophorectomy **(42)**. Uterine preservation, however, does not enhance sexual function **(43, 44)**. Carter et al. **(31)** compared sexual disorders between patients with early-stage cervical cancer who underwent radical trachelectomy and those who underwent radical hysterectomy Unexpectedly, the radical hysterectomy group had higher mean orgasm scores at one year following surgery, despite the fact that the overall sample had scores in the range of sexual dysfunction after two years.

Approximately, 26% of cervical cancer survivors complain about vaginal shortening and vaginal sequelae at five years following radical hysterectomy, which results in hypoactive sexual desire and reduced sexual activity, according to Tramacere et al. **(28)**. Instead, Baessler et al. **(45)** discovered that only a low percentage of survivors experience vaginal dryness after surgery or radiation therapy. When patients are only submitted to radical surgery, sexual function initially declines following surgery, returning to baseline levels between one and two years later, with 92.4% of patients recovering sexual activity **(28)**.

After a radical hysterectomy, the body image of cervical cancer survivors worsens six months later **(46)**. The surgical approach used for a radical hysterectomy has not been associated with body image **(18, 39)**.

More than 25% of irradiated survivors evaluate negatively their sexual function **(47)**. On the contrary, Pasek, Urbański, and Suchocka **(48)** discovered that irradiated survivors rate their sexual relationships as satisfying during all phases of radiation therapy, despite feeling unsatisfied with their sexual activity at five to six months after therapy. One year after the conclusion of radiation therapy, according to some authors, sexual activity, sexual satisfaction, and sexual function drastically improve **(49)**, returning to baseline levels or even improving them **(32)**. Radiation therapy is associated with late adverse effects, such as vaginal dryness, decreased elasticity, shortening, and stenosis **(50–52)**, that frequently result in dyspareunia, anorgasmia, hypoactive sexual desire, sexual dissatisfaction, and decreased sexual activity **(3, 26, 46, 47, 51)**. The most typical sign of acute vaginal toxicity is dyspareunia, which can even make it impossible to engage in sexual activity **(9, 53)**. According to Lammerink et al., **(54)** approximately 55% and 35% of patients, respectively, develop dyspareunia and a moderate-severe loss in vaginal lubrication following radiation therapy. Patients receiving chemoradiotherapy are more likely to experience severe late vaginal toxicity three years after treatment than those receiving radiation therapy alone (35.1% vs. 20.2%) **(55)**. Finally, body image is impaired in 33% of irradiated survivors **(47)**.

Female sexual function is typically worse in irradiated cervical cancer survivors compared with those submitted to surgery **(5, 10, 27, 56, 57)**. Compared with radiation therapy, sexual activity is higher following a radical hysterectomy alone. Although there has been a marked drop in the frequency of sexual encounters, 63% and 91% of women who were sexually active before radiation therapy and surgery, respectively, recovered their sexual activity at 12 months after treatment **(8)**. Sexual satisfaction remained unchanged one year following surgery or radiation therapy, according to Schultz et al. **(58)**. Kaneyasu et al. **(59)** found that patients with early-stage cervical cancer who received surgery or radiotherapy do not exhibit significantly different sexual function, while dyspareunia and vaginal dryness are significantly more common in the surgical group.

Nearly half of patients with early–stage cervical cancer who receive surgery and radiation therapy experience female sexual dysfunction **(60)**. More severe and long-lasting consequences in sexual function are caused by radiation therapy combined with other treatment modalities than by surgery alone **(5, 57)**. Actually, compared with patients who received radiation therapy alone, simultaneous

chemoradiotherapy has a long-term prevalence of female sexual dysfunction of 70% **(55, 59)**. Patients receiving radiation therapy or concurrent chemoradiotherapy have better body images **(59)**, feel more attractive, and have higher self–esteem than those submitted to surgical treatment **(57, 61)**, since the presence of the uterus, ovaries, vagina, and vulva has been directly associated with self–identity and femininity **(42)**. However, irradiated survivors report a considerable decrease in body image that reverses very slowly to approximate baseline scores at one year after treatment, in contrast to those who underwent surgery alone **(32)**.

In contrast to surgery alone, we expected that the use of therapeutic multimodality, which includes radiation therapy, would have a higher detrimental effect on survivors' sexual function. In any case, as the follow–up time extends, sexual function would improve.

We aimed to perform a comparative and longitudinal exploration of the sexual function and body image among cervical cancer survivors that underwent different oncological treatments.

Methods

Study design and population

Between 1 January, 2010, and January 31, 2019, we conducted a prospective cohort study on patients with cervical cancer at various clinical stages who underwent various treatment regimens and were monitored at the Outpatient Gynecologic Oncology and Radiation Oncology Clinics of a tertiary hospital. On August 1, 2016, we began distributing the FSFI questionnaire **(62, 63)**. We enrolled 229 patients in the study after applying the exclusion criteria to 263 prospective study participants who were chosen using a successive sampling technique. One hundred and four subjects were gathered for the study. The study's flow diagram is depicted in Figure 1.

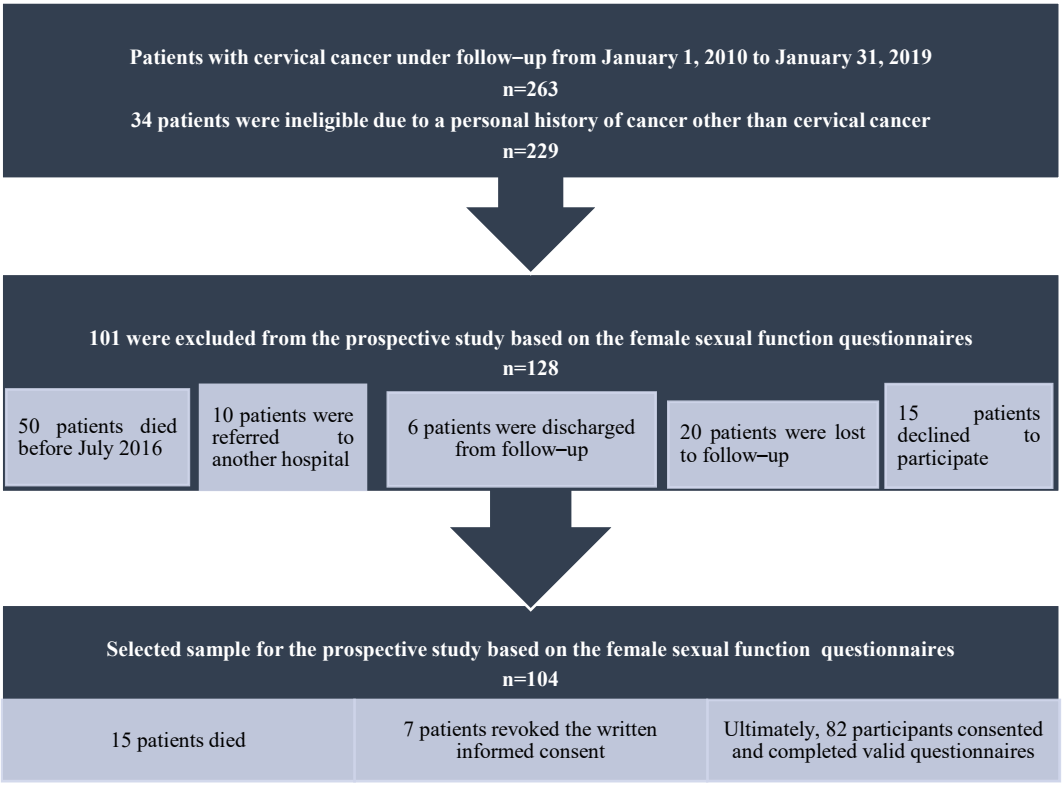

Figure 1. Flow diagram of the study

Participant selection and assignment

Inclusion criteria

- Women 18 years or older at the time of the cervical cancer diagnosis
- Histological confirmation of invasive cervical cancer
- Absence of current therapy for cervical cancer
- Ability to read and understand written and/or spoken Spanish
- Normal cognitive function

Exclusion criteria

- Personal history of or concomitant preneoplastic lesion or cancer other than cervical cancer
- Radiotherapy and/or chemotherapy prior to the cervical cancer diagnosis
- Failure to complete questionnaires
- Inability to conduct a regular follow-up of the cervical cancer

Data collection: study variables, measures, and instruments

We extracted data on sociodemographic and clinical variables and collected clinicopathologic data (stage, treatment modalities, therapy compliance, adverse effects, and routine follow–up visits) from electronic medical records. Age, menopausal state, follow-up duration, and oncological treatment modality acted as potential confounders.

The participants were given relevant, clear, and concise information about the study before signing the informed consent document for participating and accepting publication. Each participant in the prospective study was provided with the following to complete: a sociodemographic survey **(64)**, the Functional Assessment Cancer Therapy–Cervix (FACT-Cx) **(65)** version 4.0, and the FSFI questionnaires **(62, 63)**.

Interpretation of FSFI

Higher scores correlate with better female sexual function **(66)**. A total score less than or equal to 26.55 or less than or equal to 3.6 in any domain is diagnostic of female sexual dysfunction **(67)**. This questionnaire has been validated among cervical cancer survivors **(68)**.

We assessed female sexual function and body image prospectively at various times points throughout the follow-up: baseline scores (recorded when the patient first attended a consultation before the beginning of the oncological treatment) and subsequent evaluations with time intervals of 0–6 (T1), 7–12 (T2), 13–24 (T3), 25–60 (T4), and more than 60 months (T5) after the end of the treatment for cervical cancer. For patients who did not fill in the baseline questionnaires, the intervals for the follow-up visits were 0 (T1), 6 (T2), 7–12 (T3), 13–24 (T4), and more than 24 months (T5) since the first consultation. Female sexual function was also studied using the respondents as controls throughout the follow-up period.

Statistical analyses

The sample size calculation for detecting statistically significant differences in the within–subject FSFI total scores was performed by the statistical software program R (R Foundation for Statistical Computing, Vienna, Austria. R Core Team [2017]) employing the pwr.t.test function according to conventional effect size from J. Cohen **(69)** and clinical studies **(70)** (d Cohen=0.5; size=medium, effect size=0.5). For a desired power (type 2 error) of 80%, type I error tolerance of 0.05 (level of significance), and a hypothesized effect size of 0.5, we ought to sample at least 64 subjects.

The female sexual function scores did not have a normal distribution. Throughout the follow–up, the changes in female sexual function scores were expressed using a nonparametric analysis of variance for repeated measures (Friedman test) for the within-subject longitudinal assessment of questionnaire scores to examine whether the differences were due to chance fluctuations or not.

The loss of follow-up and the impossibility of abstracting information on the sexual function of the women who did not agree to participate or who could not be recruited was a limiting factor resulting in an information bias. However, we performed an attrition analysis **(8, 71)** with a weighting strategy for coping with drop-out **(72)** and a sensitive analysis employing the function of the R package called sense mark.

We used Spearman's correlation coefficient (ρ) to measure the linear dependence between two quantitative variables with non-parametric distribution or two ordinal variables with five levels or more.

All hypothesis tests were 2–tailed. To compare two qualitative or quantitative variables with a non-normal distribution, we employed the Wilcoxon test. However, if the variables were normally distributed, we used Student's t–test. To contrast three or more qualitative or quantitative variables with a non-normal distribution in at least one of them, we used the Kruskal–Wallis test. We defined the limit of statistical significance as a P–value less than 0.05.

Results

Sociodemographic and disease characteristics

Table.1 summarizes the sociodemographic, clinical characteristics, and follow–up duration of the patients with cervical cancer.

Table 1. Sociodemographic, clinical characteristics, and follow-up of the patients with cervical cancer

SOCIODEMOGRAPHIC VARIABLES	T	SD	R
Age at diagnosis of cervical cancer, years	51.85	13.62	22–88
- Early stage	47.62	13.35	
- Locally advanced stage	54.51	13.63	
- Advanced stage	59.88	11.62	
Parity	2.44	1.86	0–10
- Nulliparous	32	13.73	-
SOCIODEMOGRAPHIC VARIABLES	**N**	**%**	
Follow-up, months			-
<12	34	14.85	
12–24	39	17.03	
25–60	72	31.44	
>60	78	34.06	
Not available	6	2.62	
Nationality			-
- Spanish	208	90.82	
- Romanian	6	2.61	
- Colombian	3	1.31	
- Bolivian	2	0.87	
- Ecuadorian	1	0.44	
- Peruvian	1	0.44	
- Argentinian	1	0.44	
- Bulgarian	1	0.44	
- Ukrainian	1	0.44	
- Russian	1	0.44	
- Chinese	1	0.44	
- Japanese	1	0.44	
- Not available	2	0.87	
Origin			-
- Rural	123	53.71	
- Urban	106	46.29	
Social stratum			-
- Low	20	8.73	
- Middle	66	28.82	
- High	3	1.31	
- Not available	140	61.14	
Educational level			-
- Illiterate	7	3.06	
- Primary	47	20.52	
- Secondary	25	10.92	
- University	11	4.80	
- Not available	139	60.70	

SOCIODEMOGRAPHIC VARIABLES	T	SD	R
Occupation			
- Homemaker	42	18.34	
- Working outside the home	39	17.03	
- Disabled	3	1.31	-
- Other	4	1.75	
- Not available	141	61.57	
Marital status			
- Single	14	6.11	
- Civil union	4	1.75	
- Married	45	19.65	
- Separated	6	2.62	-
- Divorced	10	4.37	
- Widowed	11	4.80	
- Not available	139	60.70	
Menopausal state			
- Premenopausal	116	50.66	-
- Postmenopausal	113	49.34	
Sexually active			
- Yes	50	21.83	
- No	56	24.45	-
- Not available	123	53.72	
QUALITATIVE CLINICAL VARIABLES	**N**	**%**	
Age groups, years			
≤40	48	20.96	
- Early stage	23	43.64	
- Locally advanced stage	32	24.84	
- Advanced stage	2	11.76	-
<60	167	72.93	
≥60	64	27.95	
Not available	2	0.87	
Nutritional status based on WHO BMI 2019 classification, kg/m^2			
- Underweight (<18.50)	11	4.80	
- Normal weight (18.50–24.99)	59	25.76	
- Pre-obesity (25.00–29.99)	51	22.27	
- Obesity class I (30.00–34.99)	26	11.35	-
- Obesity class II (35.00–39.99)	2	0.87	
- Obesity class III (≥40.00)	12	5.24	
- Not available	68	29.69	
Comorbidities			
- No	114	49.78	
- Yes	115	50.22	-
FIGO stage			

SOCIODEMOGRAPHIC VARIABLES	T	SD	R
- Early	53	23.14	
- Locally advanced	130	56.77	
- Advanced	16	6.99	
- Not available	30	13.10	
Histological grade			
- Low	24	10.48	
- Moderate	11	4.80	
- High	19	8.30	
- Not available	175	76.42	
Lymphovascular invasion			
- No	57	24.89	
- Yes	12	5.24	
- Not available	160	69.87	
Stromal invasion depth			
<1/3	15	6.55	
1/3-<2/3	2	0.87	
2/3	48	20.96	
>2/3	2	0.87	
Not available	162	70.74	
Parametrial invasion			
- Negative	133	58.08	
- Positive	96	41.92	
Maximum tumor diameter, mm (groups)			
<40	86	37.55	
≥40	75	32.75	
Not available	68	29.70	
Lymph node metastases	93	40.61	
Pelvic lymph node metastases	50	21.83	
Para–aortic lymph node metastases	3	1.31	
Pelvic and para–aortic lymph node metastases	12	5.24	
Distant disease	28	12.23	
Baseline performance status score (ECOG)			
0	157	68.56	
1	31	13.54	
2	6	2.62	
3	2	0.87	
4	2	0.87	
Not available	31	13.54	
Treatment			
- Primary surgery (monotherapy)	49	21.03	
- Surgery among the treatments	75	31.19	

SOCIODEMOGRAPHIC VARIABLES	*T*	SD	R
- Primary surgery + adjuvant radiation therapy exclusively	13	5.58	
- Surgery + radiation therapy among the treatments	196	84.12	
- Radiation therapy among the treatments	161	69.10	
- Primary surgery + radio–chemotherapy	27	11.59	
- Surgery + radiation therapy + chemotherapy	98	42.06	
- Radio–chemotherapy exclusively	3	1.29	
- Rescue surgery after concomitant radio–chemotherapy	26	11.16	
- Radiation therapy + chemotherapy among the treatments	111	47.64	
- Radiation therapy or chemotherapy among the treatments	161	70.31	
- Radiation therapy without chemotherapy among the treatments	114	48.93	
- Chemotherapy among the treatments	138	59.23	
- Concomitant/adjuvant chemotherapy among the treatments	98	42.06	
- Palliative chemotherapy among the treatments	35	15.02	
- Palliative radiation therapy among the treatments	19	8.30	
Pelvic lymphadenectomy in primary surgery	50	59.52	
Ovarian transposition before radiation therapy			
- No	13	13.27	
- Yes	85	86.73	
Surgical complications	54	72	
Radiation therapy toxicity	116	72.05	
Cisplatin–based regimen	96	97.96	
Chemotherapy toxicity	93	67.39	
Post–treatment performance status score (ECOG)			
0	54	23.58	
1	16	6.99	
2	5	2.18	
3	3	1.31	
4	3	1.31	
Not available	148	64.63	
Recurrence	32	13.97	
Patients' status during the last contact			
- Alive	164	71.62	
- Disease–free	151	65.94	-
- Death unrelated to cervical cancer	5	2.18	
- Death related to cervical cancer	60	26.20	
QUANTITATIVE CLINICAL VARIABLES	***T***	**SD**	**R**
Maximum tumor diameter, mm	41.48	22.27	1–100
Number of metastatic pelvic lymph nodes extirpated	0.647	1.05	0–6
Number of metastatic para–aortic lymph nodes extirpated	0.060	0.33	0–1
Number of concomitant/adjuvant chemotherapy cycles	4.33	1.65	1–9

SOCIODEMOGRAPHIC VARIABLES	*T*	SD	R
Overall survival, months	53.32	46.17	1–264
Disease–free/progression–free survival, months	44.37	44.81	0–252

[a]**Abbreviations: *T*, arithmetic mean; SD, standard deviation; R, range; CC, cervical cancer; N, sample size; WHO, World Health Organization; BMI, body mass index; FIGO, International Federation of Gynecology and Obstetrics; ECOG, Eastern Cooperative Oncology Group**

Completion of questionnaires

The questionnaire response rate was 82.81% (median of the time elapsed between the end of the oncological treatment and the distribution of first questionnaire=24 months, interquartile range=63.5 months). Ten and forty–nine hundredths percent of the patients refused to fill in questionnaires and 6.6% revoked their informed consent to participate throughout the follow–up. Only 4.72% of the respondents agreed to fill out the baseline questionnaire. There was a severe drop-out in the response rate from T1 to T2, T3, T4 and T5 of 34.91%, 71.7%, 96.23%, and 99.06%, respectively. After the end of the treatment for cervical cancer, 8.49%, 5.71 %, 3.33%, and 16.67% of the respondents who filled out questionnaires at T1, T2, T3, and T4 died, respectively. The total number of statistically analyzed questionnaires was 213.

There were no significant differences among the completed questionnaires regarding educational level, except when comparing the illiterate respondents with those having a university education (2 *vs.* 3 questionnaires, P=0.013). We also found statistically significant differences between complete therapeutic response and partial response or progressive disease (2 *vs.* 0 questionnaires, P<0.0001), and between those with and without recurrences (2 *vs.* 0 questionnaires, P<0.0001).

FEMALE SEXUAL FUNCTION

Changes in sexual activity and female sexual function scores: analysis of variance for repeated measures

Forty–seven and twelve hundredths percent were sexually active, and there were statistically significant differences in the rates of sexual activity between the surgical group and the group submitted to radiation therapy +/- chemotherapy (63% *vs.* 100%; P=0.0003). The follow–up period (P=0.565) and the treatment groups of surgery alone (P=0.05), radiation therapy (P=0.264), and chemotherapy (P=0.264) did not show any statistically significant changes in sexual activity.

Both the participants who completed the baseline questionnaire (P=0.564) and those who only responded to the post–treatment questionnaires (P=0.773) did not show any statistically significant changes in the FSFI total scores. Throughout the follow–up, there were no significant changes in sexual desire (P=0.117). Throughout the follow–up following surgery alone, no significant changes in the FSFI scores were found (P>0.05).

Prevalence of female sexual dysfunction

The prevalence of female sexual dysfunction was of 60.58% in our study population. Eighty and sixty–five hundredths percent after surgery alone and 100% after radiation therapy +/- chemotherapy experienced female sexual dysfunction. Figure 2 presents the prevalence of female sexual disorders.

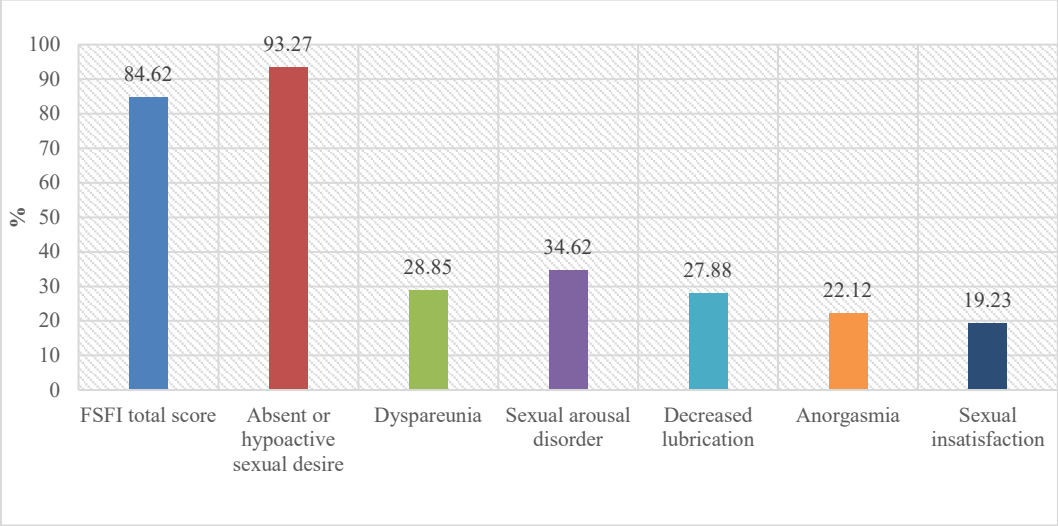

Figure 2. Prevalence of sexual disorders

Female sexual function and treatment modalities for cervical cancer

First, we conducted a sensitive analysis in order to evaluate the impact of covariates on the female sexual function and found the following variables acting as confounders: age (confounder–unadjusted estimate=-0.42; t–value=-4; 95% CI:-063, -0.22), follow-up duration (confounder–unadjusted estimate=4.04; t–value=2.52; 95% CI:0.89, 7.18), and ovary preservation (confounder–unadjusted estimate =-12.07; t–value=-2.67; 95% CI:-20.95, -3.2). We adjusted for confounders before comparing the female sexual function of survivors who had received various oncological therapies.

We did not find significant differences in the FSFI total scores among survivors submitted to radical trachelectomy vs. type C2 radical hysterectomy (P T1=0.4), radical trachelectomy vs. hysterectomy (P T1=0.06; P T2=0.375; P T3=0.598), and radical trachelectomy vs. radical trachelectomy plus ovary preservation (P T1=0.27; P T2=0.147). Survivors that underwent radical trachelectomy were significantly younger than those treated with radical hysterectomy (P<0.0001). However, neither menopausal state (P=0.251) nor sexual activity (P=0.22) showed any statistical significance.

All survivors that underwent radical surgery had a perception of vaginal shortening and lubrication scores in the range of sexual dysfunction, whereas there were no cases in the group of extrafascial hysterectomy. Sexual desire and orgasm had significantly better scores after extrafascial hysterectomy *vs.* radical surgery (3.6 vs. 2.4 points, P T2=0.032. 6 vs. 2.4 points, P T2=0.045, respectively). No significant differences were detected in the FSFI total scores between nerve–sparing and non–nerve-sparing surgery (P T1=0.195) or between ovary preservation vs. bilateral oophorectomy in premenopausal participants (P T1=0.06; P T2=0.375; P T3=0.598).

Survivors submitted to primary surgery plus adjuvant radiation therapy had lower sexual desire (1.2 vs. 3.6 points, P T1=0.009), more severe dyspareunia (2.8 vs. 5.2 points, P T1=0.031), and lower FSFI total scores (1 vs. 22.6 points, P T1=0.031) compared with the group that underwent surgery alone. Survivors submitted to primary surgery plus adjuvant radiation therapy and chemotherapy had lower sexual desire (1.8 vs. 3.6 points, P T1= 0.014) and FSFI total scores (1.8 vs. 22.6 points, P T1=0.037) than the group treated with surgery alone. Patients who received palliative chemotherapy obtained sexual desire (1.2 vs. 3.6 points, P T1=0.002) and FSFI total scores (1.2 vs. 22.6 points, P T1=0.005) significantly lower than the group submitted to surgery alone.

Dyspareunia was more severe in the non–surgical group compared with the surgical group (5.2 vs. 4 points, P T1=0.026; 5.6 vs. 4 points, P T2=0.033). Irradiated survivors had lower sexual desire (1.2 vs. 3.6 points, P T1<0.0001; 1.5 vs. 3.6 points, P T2=0.0003), more severe dyspareunia (3.6 vs. 5.2 points, P T1=0.008; 3.6 vs. 5.2 points, P T2=0.023), and lower FSFI total scores than those who were not irradiated (1.2 vs. 21.4 points, P T1=0.0001; 2.1 vs. 21.75 points, P T2=0.0002). The group submitted to chemotherapy reported significantly lower scores for sexual desire (1.2 vs. 3 points, P T1<0.0001; 1.8 vs. 3.6 points, P T2=0.003) and orgasm (3.6 vs. 5 points, P T2=0.026), more severe dyspareunia (4 vs. 5 points, P T1=0.03; 3.8 vs. 5 points, P T2=0.042; 3 vs. 4.4 points, P T3=0.001), and lower FSFI total scores than the group without chemotherapy (1.2 vs. 21.15 points, P T1<0.0001; 2.4 vs. 18.95 points, P T2=0.004). However, there were statistically more postmenopausal women in the group with chemotherapy.

BODY IMAGE

Influence of disease and emotional variables on body image

There were no significant differences in the FACT–Cx v4.0 (B4 and C7) body image score between FIGO stages (P>0.05) or between those with and without anxiety/depression (P T1–3=0.07).

Changes in body image scores: analysis of variance for repeated measures

No significant changes were found in the FACT–Cx v4.0 (B4 and C7) body image score (P=0.184) throughout the follow–up.

Body image and treatment modalities for cervical cancer

Except for T1 time assessment (2 vs. 3 points, P T1=0.016), there were no significant changes in body image between the surgical and non–surgical groups (P T2=0.992; P T3=0.207; P T4=0.139).

No significant differences in body image scores were found between the various surgical approaches (P=0.793), between survivors who underwent a hysterectomy alone and those who also had fertility preservation (P T1=0.414; P T2=0.692; P T3=0.082), or between the hysterectomized premenopausal survivors who had associated ovary preservation or not (P T1=0.414; P T2=0.692; P T3=0.082).

Discussion

FEMALE SEXUAL FUNCTION

Changes in sexual activity and female sexual function scores

Throughout the follow-up and regardless of the oncological treatments cervical cancer survivors received, we did not see any significant difference in their sexual function. On the one hand, Jensen et al. **(8)** revealed a decline in sexual activity. However,

Derks et al. **(27)** found a beneficial relationship between follow-up time and sexual activity. Tramacere et al. **(28)** found that 68% of cervical cancer survivors continue to engage in regular sexual intercourse after a 5–year follow–up, reaching baseline levels (92.4%) after 1–2 years following the operation, which is consistent with our findings.

Throughout the follow–up, we detected no significant changes in FSFI overall scores. According to Hellsten, Lindqvist, and Sjöström **(73)** sexual satisfaction remains unchanged 1 year after finishing radiation therapy or surgery. After radiation therapy, female sexual dysfunction may actually last a long time **(74)**. On the other hand, according to other research, female sexual function improves, returning to baseline levels between 1 and 2 years following surgery, or even better in the case of irradiated survivors **(32)**.

Prevalence of female sexual dysfunction

According to several research, female sexual dysfunction affects from 40% to 100% of cervical cancer survivors **(2, 3)**. In our study, the prevalence was 60.58%; more specifically, it was of 80% in the case of surgery alone and 100% in the case of radiation therapy +/- chemotherapy. Female sexual dysfunction was reported to occur at rates of 5–45% after radiation therapy and 70% during concurrent chemoradiotherapy, according to Gondi et al. **(55)** Our findings showed that hypoactive or absence of sexual desire, with a prevalence of 93.27%, was the most common sexual disorder. Wenzel et al. **(4)**, however, reported a rate of 28.6%.

Sexual activity, female sexual function, and treatment modalities for cervical cancer

Compared with surgery, sexual inactivity is more frequently caused by radiation therapy **(9)** and concurrent chemoradiotherapy **(51)**. According to Jensen et al. **(8)**, 48% of cervical cancer survivors who have received radiation are not sexually active. However, all of our irradiated study participants had higher levels of sexual activity than those who underwent surgery.

We discovered no variations in the female sexual function between those undergoing or refraining from fertility–sparing procedures, which is consistent with the findings of earlier research **(31, 43)**. Patients treated with extrafascial total hysterectomy had better sexual function than those who underwent radical surgery, according to Song et al. **(18)** and Wang et al. **(29)**. In our study, extrafascial total hysterectomy was associated with much higher scores for sexual desire and orgasm than radical surgery. Better female sexual function is related to nerve–sparing procedures and ovarian preservation **(41, 42)**. No differences, though, were discovered in our study.

Irradiated survivors had lower sexual desire, more severe sexual dysfunction, and a worse FSFI total score than those who were not irradiated. These findings were in concordance with those reported by Derks et al. **(27)**. However, Kaneyasu et al. **(59)** found no differences.

BODY IMAGE

Influence of disease variables on body image

According to Yavas et al. **(49)** disease stage had a detrimental impact on body image. However, regarding our results, disease stage did not have any effect on body image.

Changes in body image scores

Korfage et al. reported worse body image after a 6–10 year follow–up. However, no significant changes in body image score during follow–up were found in our study.

Body image and treatment modalities for cervical cancer

Except for a negative body image for the non-surgical group at short–term follow–up, no significant differences in body image were found between the surgical and non–surgical groups of our study. However, Kaneyasu et al. **(59)** discovered that the surgery group experienced a worse body image. In line with Xiao et al. **(39)** and Song et al. **(18)** we found no differences in body image between hysterectomized survivors and those undergoing fertility preservation, nor between premenopausal hysterectomized survivors undergoing or not ovarian preservation, in contrast to Juraskova et al. **(42)**.

Conclusion

We found no significant changes in sexual activity, sexual function, and body image over follow–up. The surgical group was significantly less sexually active than the non–surgical group, whereas irradiated patients and those who received chemotherapy had lower sexual desire, more severe dyspareunia, and worse sexual function. No significant differences were detected in body image between the surgical and the non–surgical groups.

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Conflict of Interest

The authors declare no conflict of interest.

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