

RESEARCH ARTICLE

# Sexual dysfunction in Spanish women with breast cancer

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## Abstract

### Purpose

To determine whether there are changes in sexuality after breast cancer, to better understand the sexual function of women with breast cancer, and to investigate the potential relationship between sexual dysfunction and socio-demographic and clinical variables.

### Methods

A cross-sectional study. This study included 514 women with breast cancer between 21- and 66-years-old. The cases were gathered between June 2016 and January 2017. The instruments used were the questionnaire on Women's Sexual Function and a questionnaire to collect socio-demographic and clinical data.

### Results

The average age ( $\pm$  standard deviation, SD) of participants was  $46.34 \pm 8.28$  years. Their average age at date of diagnosis was  $42.26 \pm 8.56$  years, and the average time suffering from cancer was  $4.05 \pm 5.23$  years. There were significant differences ( $p = 0.002$ ) in the presence of sexual dysfunction before (32.1%) and after (91.2%) cancer. The primary sexual dysfunctions were due to penetration pain (50.6%), lubrication (50.6%), dysfunctional desire (44.6%), and dysfunctional excitement (44.6%). Two-thirds of participants were satisfied with their sexual relations. The women who presented most sexual dysfunction were those that had a bilateral mastectomy ( $p = 0.009$ ) and those who received chemotherapy, radiotherapy and hormonal-therapy ( $p < 0.001$ ).

### Conclusion

Sexual function was changed in women with breast cancer. The main problems included penetration pain, desire, lubrication, and dysfunctional excitement. It is important that Health professionals recognize which circumstances influence the sexual function of women with breast cancer and to make interventions that facilitate sexual adjustment.

## OPEN ACCESS

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## Introduction

Breast cancer is the second most common cancer worldwide. In 2012, the estimated number of new cases was 1.67 million (25% of all cancers). In Western Europe, there are 96 per 100,000 women with breast cancer [1].

According to the Spanish Society for Medical Oncology [2], the cancer incidence in Spain during the year 2015 was 247,771 cases (148,827 men and 98,944 women). Breast cancer has a greater incidence (27,747), a greater prevalence over 5 years, and a greater mortality rate (6,213 deaths during 2014) than other cancers [3]. The prevalence of breast cancer is increasing due to increased life expectancy and advanced diagnostic techniques for cancer [2, 3, 4].

The Spanish healthcare system is public with universal access. This system includes programs for the prevention, screening, and treatment of breast cancer [4]. Furthermore, there are associations that offer support to patients with cancer. For breast cancer, the most important association is the Spanish Federation of Breast Cancer (FECMA, by its initials in Spanish). FECMA has 27 centers in Spain.

Breast cancer treatment affects women's sexual function. These treatments, which include hormonal therapy, chemotherapy, and surgical treatment, can produce vaginal dryness, vasomotor symptoms, and loss of sexual satisfaction, loss of desire, and changes in self-image [5,6,7]. Studies addressing women's suffering from breast cancer have found that between 30 and 70% of patients present sexual dysfunction [5, 6, 7].

In Spain, no recent studies have addressed sexual dysfunction in women with breast cancer. Sexual function depends on several biological, psychological, and sociocultural factors. Here we investigate sexuality in women with breast cancer in Spain.

The aims of this study were: to determine if there are changes in the sexuality of women after breast cancer; to understand the sexual function of women with breast cancer in Spain; and to describe the relationship between socio-demographic and clinical variables with sexual dysfunction.

## Methods

### Participants and design

This is a cross-sectional study carried out from June 2016 to January 2017. The population of the study consisted of 514 women with breast cancer who belonged to FECMA. Inclusion criteria: women with breast cancer, 18-years-old or older, and completed chemotherapy, radiotherapy or surgical intervention at least 3 months before the present study. Exclusion criteria: women with other cancers, metastases, and terminal conditions.

### Sample size

The sample size was determined using Granmo software (version 7.12, Barcelona, Spain, 2012). This was calculated using a population estimate based on the study carried out by Panjari et al. (2011) [6], in which 70% of women with breast cancer suffered from sexual dysfunction, as well as the data offered by the Spanish Society for Medical Oncology [2] in which 27,747 women had breast cancer in Spain. Therefore, a sample of 355 women would be expected to be sufficient for an expected prevalence of 70%, a precision of 5%, a level of confidence of 95%, and a replacement rate of 10%.

### Instruments

An online questionnaire was used to collect the different socio-demographic and clinical variables. This online questionnaire also included the *Questionnaire on Women's Sexual Function*

(WSF) of Sánchez et al. (2004) [8]. This scale was created and validated to evaluate sexual function in Spanish women. It is a self-administered scale consisting of 14 items with a Likert scale with five options. Women were asked to answer in relation to the past 4 weeks. The first six questions refer to the different phases of the sexual response. Questions 7 and 8 assess the relational aspects of sexual activity. Questions 9 and 10 assess sexual satisfaction. The remaining questions address relevant aspects of sexual activity. The cut-points for the score range were: desire, excitation or arousal, penetration pain [severe problem (1–3), moderate problem (4–7), without problem (8–15)]; sexual satisfaction [no satisfaction (1–2), moderate satisfaction (3–5), satisfaction (6–10)]; lubrication, orgasm, and anticipatory anxiety [severe problem (1), moderate problem (2), without problem (3–5)]; sexual initiative [absence of initiative (1), moderate initiative (2), without problem (3–5)]; and communication [absence of sexual communication (1), moderate sexual communication (2), without problem (3–5)]. This scale demonstrated an internal consistency of 0.895–0.897 and a reliability of 0.597–0.743 [8].

To determine whether the women had any sexual problem before cancer, the online survey had two questions: 1) “Before suffering cancer, have you had any sexual problem?”; 2) If your answer is “YES”, could you specify what type of sexual problem you have had?”

### Variable Sociodemographic and clinical

Age (quantitative), level of education (categorical), profession (categorical), civil status (categorical), type of surgical intervention (categorical), breast reconstruction (categorical), adjuvant treatment (categorical), sexual dysfunction before breast cancer (categorical), age of women at date of diagnosis (quantitative), and time elapsed after diagnosis (quantitative).

### Variable of type of sexual dysfunction

Desire, excitation or arousal, lubrication, orgasm, penetration pain, anticipatory anxiety, sexual initiative, communication and sexual satisfaction (categorical variables).

### Procedure

Before the study, the FECMA directors were contacted and invited to participate in the study. They sent to their members an email with information about the study. The email included a direct access link to fulfill the online questionnaire available on Google Forms. When clicking on the link, the participants had to read the information sheet and provide informed consent to proceed with the questionnaire. The application respected the participant’s anonymity.

This study conformed to the main principles of the Helsinki Declaration, the Universal Declaration of the UNESCO, and the Spanish Organic Law 15/1999, 13<sup>th</sup> of December, on the Protection of Personal Data. The study was approved by FECMA. The participants were provided with an information sheet and gave informed consent. We respected the participants’ anonymity at all times. The Ethical Committee authorized this study (CEITO N° Exp 138).

### Data analysis

The statistics program IBM SPSS (version 22.0, licensed by the University of Castile La-Mancha, IBM Corp, Armonk, NY, USA) was used for statistical analysis. A descriptive analysis of the variables was performed by counting of recounts (n) and proportions (%) of the qualitative variables and by the average (m) and the standard deviation (SD) of quantitative variables.

Also, a proportional comparison of categorical variables through chi-square tests for contingency tables was provided. The variables, which were significant with sexual dysfunction in the contingency tables, were included in the regression model. A multiple logistic regression

was performed to identify possible factors related to sexual dysfunction after suffering from breast cancer. We used the Wald statistic, such that the variables for which  $p \geq 0.15$  were eliminated one-by-one from the model. The odds ratios (OR) was calculated with their confidence intervals. All hypotheses were bilateral, and the level of confidence was 95% ( $p < 0.05$ ).

## Results

Five-hundred-twenty-seven women responded to the questionnaire, 13 of these completed the test incorrectly or incompletely. Finally, 514 women with breast cancer composed the size. The study participants were aged between 21- and 66-years-old (mean  $46.34 \pm 8.276$  years), an average age at the date of diagnosis of  $42.26 \pm 8.563$  years, and time suffering cancer of  $4.05 \pm 5.226$  years. [Table 1](#) shows the socio-demographic characteristics related to cancer treatment.

Regarding sexual activity ([Table 2](#)), the majority of women did not present any sexual dysfunction before breast cancer diagnosis (66.9%). However, after having breast cancer (when the data were collected), 91.2% suffered from some type of sexual dysfunction. There are significant differences ( $p = 0.002$ ) between the presence of sexual dysfunction before and after cancer.

[Table 2](#) shows the types of sexual dysfunctions that women suffer after breast cancer. The most frequent dysfunctions were dysfunction due to penetration pain (50.6% of participants), dysfunction due to lubrication (50.6%), dysfunctional desire (44.6%), and dysfunctional excitation or arousal (44.6%). Regarding their sexual activity in the last 4 weeks, the majority usually had 1–2 instances of sexual activity per month (60.7%) and were satisfied with their sexual relations (66.3%). Finally, the most frequent reasons why these women did not want penetration during their sexual relations were a lack of interest in vaginal penetration (34.1%) and pain (30.3%).

The relationship between socio-demographic and clinical variables and the different types of sexual dysfunction in participants after cancer were studied ([Table 3](#)). We found that women who received adjuvant treatments, radiotherapy, and hormonal therapy had a higher percentage of sexual dysfunction ( $p < 0.001$ ) compared to women who received other adjuvant treatments. Women who had a bilateral mastectomy ( $p = 0.009$ ) had greater dysfunction than those who had a lumpectomy.

Using the significant variables, we created a multiple logistic regression model to understand whether the variables affected every type of sexual dysfunction ([Tables 4 and 5](#)). In general, sexual dysfunction after cancer is associated with the age of women at the date of diagnosis (OR = 0.959;  $p = 0.029$ ; 95%CI = 0.923–0.006) and surgical intervention. The probability of sexual dysfunction in women who have had a bilateral mastectomy is 4.684-times greater than those that had a lumpectomy (OR = 0.042; 95%CI = 1.056–20.784).

After analyzing the data related to the type of sexual dysfunction ([Table 5](#)), we observed the following:

Sexual dysfunction related to desire is associated with the age of women at date of diagnosis, the type of surgical intervention (women who had a bilateral mastectomy had a 2.28-fold greater probability of dysfunction than those who had a lumpectomy), breast reconstruction (women who did not receive breast reconstruction had a 1.84-fold greater probability than those who did) and cohabitation (women with a partner but who are not living together had a 0.54-fold reduction in probability compared to women living with a partner).

Sexual dysfunction related to excitation is associated with the age of women at date of diagnosis, the type of surgical intervention (women who had a bilateral mastectomy had a 2.02-fold greater probability than those who had a lumpectomy), cohabitation (women with a partner but who are not living together have a 0.45-fold reduction in probability compared to women living

**Table 1. Socio-demographic and clinical variables of participants (n = 514).**

| Qualitative variables                  | Frequency (N) | Percentage (%)          |
|--|---------------|-------------------------|
| <b>Marital Status</b>                  |               |                         |
| Single without partner                 | 33            | 6.4                     |
| Single with long-term partner          | 47            | 9.2                     |
| Married women or living with a partner | 346           | 67.3                    |
| Divorced women with long-term partner  | 28            | 5.4                     |
| Divorced women without partner         | 53            | 10.3                    |
| Widowed without long-term partner      | 4             | 0.8                     |
| Widowed with partner                   | 3             | 0.6                     |
| <b>Education</b>                       |               |                         |
| Incomplete elementary                  | 3             | 0.6                     |
| Elementary                             | 61            | 11.8                    |
| High school                            | 225           | 43.8                    |
| University                             | 225           | 43.8                    |
| <b>Occupation</b>                      |               |                         |
| Unemployed                             | 106           | 20.6                    |
| Employed                               | 257           | 50                      |
| Sick leave                             | 94            | 18.3                    |
| Retired                                | 57            | 11.1                    |
| <b>Surgical intervention</b>           |               |                         |
| Lumpectomy                             | 195           | 37.9                    |
| Mastectomy                             | 214           | 41.7                    |
| Bilateral Mastectomy                   | 86            | 16.7                    |
| Lymphadenectomy                        | 19            | 3.7                     |
| <b>Adjuvant treatment</b>              |               |                         |
| Radiotherapy                           | 12            | 2.3                     |
| Chemotherapy                           | 30            | 5.8                     |
| Hormonal therapy                       | 25            | 4.9                     |
| Radiotherapy and chemotherapy          | 63            | 12.2                    |
| Radiotherapy and HT                    | 45            | 8.8                     |
| Chemotherapy and HT                    | 64            | 12.5                    |
| Radiotherapy, chemotherapy and HT      | 254           | 49.4                    |
| No adjuvant treatment                  | 21            | 4.1                     |
| <b>Breast reconstruction</b>           |               |                         |
| Yes                                    | 208           | 40.5                    |
| No                                     | 185           | 36                      |
| Not necessary                          | 121           | 23.5                    |
| <b>Quantitative Variables</b>          |               |                         |
|  | Mean (M)      | Standard Deviation (SD) |
| Age                                    | 46.3          | 8.3                     |
| Age at diagnosis                       | 42.3          | 8.6                     |
| Time elapsed following diagnosis       | 4.0           | 5.2                     |

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with a partner) and profession (women who work have a 0.48-fold reduction in probability than those who are retired).

Sexual dysfunction related to lubrication is associated with the age of women at date of diagnosis, the time elapsed after cancer diagnosis, the type of surgical intervention (women who had a bilateral mastectomy had a 2.30-fold greater probability than those that had a lumpectomy), cohabitation (women with a partner but who are not living together have a 0.51-fold

**Table 2. Types of Sexual function of participants (n = 514).**

| <b>Sexual Function</b>                           | <b>Frequency (N)</b> | <b>Percentage (%)</b> |
|--|----------------------|-----------------------|
| Sexual Dysfunction before cancer                 |                      |                       |
| No   | 344                  | 66.9                  |
| Yes  | 170                  | 33.1                  |
| Sexual Dysfunction after cancer                  |                      |                       |
| No   | 45                   | 8.8                   |
| Yes  | 469                  | 91.2                  |
| Dysfunction Desire after cancer                  |                      |                       |
| Severe problem                                   | 43                   | 8.4                   |
| Moderate problem                                 | 186                  | 36.2                  |
| Without problem                                  | 285                  | 55.4                  |
| Dysfunction Excitation after cancer              |                      |                       |
| Severe problem                                   | 57                   | 11.1                  |
| Moderate problem                                 | 177                  | 34.4                  |
| Without problem                                  | 280                  | 54.5                  |
| Dysfunction due to Lubrication after cancer      |                      |                       |
| Severe problem                                   | 122                  | 23.7                  |
| Moderate problem                                 | 138                  | 26.9                  |
| Without problem                                  | 254                  | 49.4                  |
| Orgasm Dysfunction after cancer                  |                      |                       |
| Severe problem                                   | 121                  | 23.5                  |
| Moderate problem                                 | 57                   | 11.1                  |
| Without problem                                  | 336                  | 65.4                  |
| Dysfunction due to penetration pain after cancer |                      |                       |
| Severe problem                                   | 50                   | 9.7                   |
| Moderate problem                                 | 210                  | 40.9                  |
| Without problem                                  | 254                  | 49.4                  |
| Dysfunction anticipatory Anxiety after cancer    |                      |                       |
| Severe problem                                   | 256                  | 49.8                  |
| Moderate problem                                 | 86                   | 16.7                  |
| Without problem                                  | 172                  | 33.5                  |
| Initiative sexual after cancer                   |                      |                       |
| Absence of initiative                            | 232                  | 45.1                  |
| Moderate Initiative                              | 96                   | 18.7                  |
| Without problem of initiative                    | 186                  | 36.2                  |
| Communication after cancer                       |                      |                       |
| Absence of sexual communication                  | 132                  | 25.7                  |
| Moderate sexual Communication                    | 80                   | 15.5                  |
| Without problem of Sexual communication          | 302                  | 58.8                  |
| Level of satisfaction of sexual activity         |                      |                       |
| No satisfaction                                  | 86                   | 16.7                  |
| Satisfaction moderate                            | 100                  | 19.5                  |
| Satisfactory                                     | 328                  | 63.8                  |
| Level of Sexual General Satisfaction             |                      |                       |
| Sexual general no satisfaction                   | 94                   | 18.3                  |
| Moderate Satisfaction                            | 79                   | 15.4                  |
| Satisfaction general                             | 341                  | 66.3                  |
| Motive no penetration                            |                      |                       |

(Continued)

**Table 2.** (Continued)

| Sexual Function                         | Frequency (N) | Percentage (%) |
|---|---------------|----------------|
| Pain                                    | 63            | 30.3           |
| Afraid to penetration                   | 6             | 2.9            |
| Lack of interest in vaginal penetration | 71            | 34.1           |
| Without sexual partner                  | 54            | 26             |
| Incapacity of sexual partner            | 14            | 6.7            |
| Sexual activity                         |               |                |
| Yes                                     | 361           | 70.2           |
| No                                      | 153           | 29.8           |
| Frequency                               |               |                |
| 1–2 times a month                       | 312           | 60.7           |
| 3–4 times a month                       | 110           | 21.4           |
| 5–8 times a month                       | 69            | 13.4           |
| 9–12 times a month                      | 23            | 4.5            |

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reduction in probability compared to women living with a partner), and hormonal therapy (women who had hormonal therapy have a 1.63-fold increased probability compared to those who have not been treated with hormones).

Sexual dysfunction related to orgasm is associated with the age of women at date of diagnosis, the type of surgical intervention (women who had a bilateral mastectomy have a 2.93-fold greater probability than those who had a lumpectomy), breast reconstruction (women who have not received a breast reconstruction have a 2.57-fold greater probability than those who had), and cohabitation (women with a partner but who are not living together have a 1.79-fold increased probability compared to women living with a partner).

Sexual dysfunction related to penetration is associated with the age of women at date of diagnosis, the time elapsed after cancer diagnosis, cohabitation (women with a partner but who are not living together have a 2.55-fold reduction in probability compared to women living with a partner), and hormonal therapy (women who have had hormonal therapy have a 0.58-fold increased probability compared to those who have not been treated with hormones).

Anticipatory sexual anxiety is associated with the time elapsed after cancer diagnosis, cohabitation (women with partner but who are not living together have a 2.01-fold reduction in probability compared to women living with a partner), occupation (women who work have a 2.10-fold increase in probability than those who have retired), and hormonal therapy (women who have had hormonal therapy have a 0.62-fold reduction in probability compared to those who have not been treated with hormones).

## Discussion

According to other studies [6, 9, 10, 11, 12], women who have suffered from breast cancer report that their sexuality is changed. However, before cancer, 66.9% did not have any type of sexual difficulty. After breast cancer, 91.2% reported that they had some type of sexual difficulty. This incidence is higher than other studies, where it was found to vary from 40 to 80% [5, 6, 9, 13, 14]. This could be because women participating in this study were young; the average age was 46.34-years-old.

After cancer, the majority of women in this study (70.2%) confirmed that they continued to have sexual activity, with is consistent with the literature [14, 15, 16]. Although the frequency

**Table 3. Socio- demographic variables of participants and relation with dysfunction sexual after cancer (n = 514).**

| Qualitative Variables                             | Sexual dysfunction after cancer |                        | P      |
|---|---------------------------------|------------------------|--------|
|   | NO (n = 45)<br>n (%)            | YES (n = 469)<br>n (%) |        |
| Civil Status                                      |                                 |                        | 0.138  |
| Single without partner                            | 3 (6.7)                         | 30 (6.4)               |        |
| Single with long-term partner                     | 2 (4.4)                         | 45 (9.6)               |        |
| Married women/ living with a partner              | 28 (62.2)                       | 318 (67.8)             |        |
| Divorced women with partner                       | 6 (13.4)                        | 22 (4.7)               |        |
| Divorced without partner                          | 5 (11.1)                        | 48 (10.2)              |        |
| Widowed without partner                           | 0                               | 4 (0.9)                |        |
| Widowed with partner                              | 1 (2.2)                         | 2 (0.4)                |        |
| Studios Level                                     |                                 |                        | 0.003  |
| Incomplete elementary                             | 0                               | 3 (0.6)                |        |
| Elementary  | 13 (28.8)                       | 48 (10.2)              |        |
| High School                                       | 16 (35.6)                       | 209 (44.6)             |        |
| University  | 16 (35.6)                       | 209 (44.6)             |        |
| Occupation  |                                 |                        | 0.414  |
| Unemployed  | 8 (17.8)                        | 98 (20.9)              |        |
| Employed  | 23 (51.1)                       | 234 (49.9)             |        |
| Sick leave  | 6 (13.3)                        | 88 (18.8)              |        |
| Retired   | 8 (17.8)                        | 49 (10.4)              |        |
| Surgical Intervention                             |                                 |                        | 0.009  |
| Lumpectomy  | 26 (57.8)                       | 169 (36)               |        |
| Mastectomy  | 17 (37.8)                       | 197 (42)               |        |
| Bilateral Mastectomy                              | 2 (4.4)                         | 84 (17.9)              |        |
| Lymphadenectomy                                   | 0                               | 19 (4.1)               |        |
| Adjuvant Treatment                                |                                 |                        | <0.001 |
| Radiotherapy                                      | 5 (11.1)                        | 7 (1.5)                |        |
| Chemotherapy                                      | 1 (2.2)                         | 29 (6.2)               |        |
| Hormonal treatment                                | 2 (4.4)                         | 23 (4.9)               |        |
| Radiotherapy and chemotherapy                     | 3 (6.7)                         | 60 (12.8)              |        |
| Radiotherapy and hormonal treat.                  | 9 (20)                          | 36 (7.7)               |        |
| Chemotherapy and hormonal treat.                  | 5 (11.1)                        | 59 (12.6)              |        |
| Radiotherapy, chemotherapy and hormonal treatment | 17 (37.8)                       | 237 (50.5)             |        |
| Nor adjuvant treatment                            | 3 (6.7)                         | 18 (3.8)               |        |
| Reconstruction                                    |                                 |                        | 0.593  |
| Yes   | 15 (33.3)                       | 193 (41.2)             |        |
| No  | 18 (40)                         | 167 (35.6)             |        |
| Not necessary                                     | 12 (26.7)                       | 109 (23.2)             |        |
| Quantitative Variables                            |                                 |                        |        |
|   | NO<br>M (SD)                    | YES<br>M (SD)          |        |
| Age   | 49 (±7.3)                       | 46.0 (±8.3)            | 0.006  |
| Age at diagnosis                                  | 45.93 (±7.8)                    | 41.94 (±8.5)           | 0.003  |
| Time elapsed following diagnosis                  | 3.64 (±4.0)                     | 4.09 (±5.3)            | 0.584  |

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of sexual relations is lower after cancer, 60.7% reported that they have sexual relationships 1–2 times per month [5, 9, 12, 16].

The main sexuality problems are decreased sexual desire [6, 9, 11, 14, 17, 18, 19], lubrication [5, 6, 11, 18, 19], excitation or arousal [10, 11, 16, 18, 19, 20], and penetration pain [12, 19].

**Table 4. Logistic regression of sexual dysfunction after cancer (n = 514).**

|                       | OR (95% CI)          | p     |
|-----------------------|----------------------|-------|
| Age at diagnosis      | 0.959 (0.923–0.996)  | 0.029 |
| Surgical Intervention |                      |       |
| Lumpectomy            | Reference            |       |
| Mastectomy            | 1.629 (0.847–3.133)  | 0.143 |
| Mastectomy bilateral  | 4.684 (1.056–20.784) | 0.042 |
| Lymphadenectomy       | 22371 (0.007–0)      | 0.998 |

Note. Introduced variables: age at diagnosis, surgical intervention.

OR = Odds ratio; CI = confidence interval.

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Regarding the treatment and presence of sexual dysfunction, participants who had received chemotherapy presented more sexual problems than those who were not treated with chemotherapy [9, 21, 22]. However, these results are different from other studies reporting that chemotherapy is not associated with sexual dysfunction [6, 14]. Our data agree with Malinowsky et al. [23], in which premenopausal women with breast cancer who had received chemotherapy declared that they suffered decreased sexual pleasure and increased discomfort [23].

In our study, the majority of women were treated with hormonal therapy (75.7%) (e.g., aromatase inhibitors or tamoxifen), which led to early menopause. As found in other studies, the use of these drugs is related to reduced vaginal lubrication, decreased sexual satisfaction, and loss of sexual desire [6, 13, 17, 18, 24, 25].

The type of surgical intervention is associated with the presence of sexual dysfunction. Women with lumpectomy present fewer dysfunctions than those who have a unilateral mastectomy or a bilateral mastectomy [6, 9, 26, 27]. Women without breast reconstruction have the greatest probability of sexual dysfunction [28].

Women who were old at the age of diagnosis reported that they had more sexual problems [29, 30]. However, the young women after treatment had less sexual dysfunction, because their ovaries can continue to work properly. On the other hand, in premenopausal and perimenopausal women, ovarian function is usually affected for a long period following chemotherapy and hormonal therapy [31].

Civil status is associated with the presence of several sexual dysfunctions. Women without a partner do not have problems related to orgasm and penetration. Another finding is that women who have a steady partner but do not cohabit have fewer problems related to desire, excitement, and lubrication compared to married women or couples living together. Although we found no study similar to ours, Morais et al. [14] reported that women without a steady partner have better sexual satisfaction due to multiple partners.

The study has some limitations. First, a cross-sectional design was used, so it is not possible to establish causal relationships. Second, a convenience sample was used. Finally, the online questionnaire prevents women from asking about any doubts they might have, and the analyzed data are self-reported information. However, on the other hand, the online questionnaire has the strength that the women can provide detailed answers about their sexuality more freely and without shame, which is not always possible in a face-to-face interview.

Furthermore, although the sample was recruited for convenience, it has a large size (more than 500 women). Also, we believe that the women can adequately respond to questions addressing their clinical situation. This is because, in Spain, the Health System is public and the physicians are obligated to give to their patients (in this case, women with breast cancer) a report that includes specific information about their type of cancer, type of surgery, and type of treatment.

Table 5. Logistical regression of type sexual dysfunction (n = 514).

|   | Desire              |        | Excitation          |       | Lubrication         |        | Orgasm              |        | Penetration         |        | Anxiety             |       |
|---|---------------------|--------|---------------------|-------|---------------------|--------|---------------------|--------|---------------------|--------|---------------------|-------|
|   | OR (95% CI)         | p      | OR (95% CI)         | p     | OR (95% CI)         | p      | OR (95% CI)         | p      | OR (95% CI)         | p      | OR (95% CI)         | p     |
| <i>Age at diagnosis</i>                 | 1.04<br>(1.02–1.07) | <0.001 | 1.04<br>(1.02–1.07) | 0.001 | 1.06<br>(1.04–1.09) | <0.001 | 1.05<br>(1.02–1.08) | <0.001 | 1.03<br>(1.01–1.06) | 0.006  |                     |       |
| <i>Time elapsed f. diagnosis</i>        |                     |        |                     |       | 1.04<br>(0.99–1.08) | 0.057  |                     |        | 1.06<br>(1.02–1.10) | 0.007  | 1.06<br>(1.02–1.11) | 0.004 |
| <i>Surgical Intervention</i>            |                     |        |                     |       |                     |        |                     |        |                     |        |                     |       |
| Lumpectomy                              | Reference           |        | Reference           |       | Reference           |        | Reference           |        |                     |        |                     |       |
| Mastectomy                              | 1.59<br>(0.92–2.76) | 0.1    | 1.25<br>(0.83–1.88) | 0.29  | 1.08<br>(0.72–1.62) | 0.724  | 1.62<br>(0.91–2.87) | 0.105  |                     |        |                     |       |
| Bilateral Mastectomy                    | 2.88<br>(1.39–5.95) | 0.004  | 2.02<br>(1.14–3.57) | 0.015 | 2.30<br>(1.29–4.11) | 0.005  | 2.93<br>(1.36–6.32) | 0.006  |                     |        |                     |       |
| Lymphadenectomy                         | 2.02<br>(0.76–5.36) | 0.159  | 2.37<br>(0.86–6.52) | 0.094 | 2.26<br>(0.81–6.31) | 0.12   | 1.25<br>(0.45–3.44) | 0.671  |                     |        |                     |       |
| <i>Reconstruction</i>                   |                     |        |                     |       |                     |        |                     |        |                     |        |                     |       |
| Yes                                     | Reference           |        |                     |       |                     |        | Reference           |        |                     |        |                     |       |
| No                                      | 1.84<br>(1.13–2.98) | 0.013  |                     |       |                     |        | 2.57<br>(1.54–4.29) | <0.001 |                     |        |                     |       |
| Not necessary                           | 1.31<br>(0.65–2.63) | 0.454  |                     |       |                     |        | 1.83<br>(0.87–3.86) | 0.113  |                     |        |                     |       |
| <i>Civil Status</i>                     |                     |        |                     |       |                     |        |                     |        |                     |        |                     |       |
| Single/divorced/widowed without partner | 0.78<br>(0.48–1.26) | 0.308  | 0.99<br>(0.62–1.61) | 0.98  | 0.78<br>(0.48–1.26) | 0.313  | 1.79<br>(1.09–2.92) | 0.021  | 2.55<br>(1.54–4.21) | <0.001 | 1.05<br>(0.65–1.69) | 0.84  |
| Single/divorced/widowed with partner    | 0.52<br>(0.29–0.9)  | 0.02   | 0.45<br>(0.25–0.80) | 0.006 | 0.51<br>(0.30–0.88) | 0.015  | 0.77<br>(0.42–1.40) | 0.338  | 1.18<br>(0.70–1.97) | 0.54   | 2.01<br>(1.19–3.39) | 0.009 |
| Married women/living with a partner     | Reference           |        | Reference           |       | Reference           |        | Reference           |        | Reference           |        | Reference           |       |
| <i>Occupation</i>                       |                     |        |                     |       |                     |        |                     |        |                     |        |                     |       |
| Unemployed                              |                     |        | 0.53<br>(0.27–1.05) | 0.07  |                     |        |                     |        |                     |        | 1.39<br>(0.71–2.74) | 0.241 |
| Employed                                |                     |        | 0.48<br>(0.26–0.90) | 0.021 |                     |        |                     |        |                     |        | 2.10<br>(1.14–3.86) | 0.017 |
| Sick leave                              |                     |        | 0.78<br>(0.39–1.58) | 0.495 |                     |        |                     |        |                     |        | 1.22<br>(0.60–2.48) | 0.576 |
| Retired                                 |                     |        | Reference           |       |                     |        |                     |        |                     |        | Reference           |       |
| <i>Hormonal Treatment</i>               |                     |        |                     |       |                     |        |                     |        |                     |        |                     |       |
| No                                      |                     |        |                     |       | Reference           |        |                     |        | Reference           |        | Reference           |       |
| Yes                                     |                     |        |                     |       | 1.63<br>(1.06–2.51) | 0.27   |                     |        | 0.58<br>(0.38–0.88) |        | 0.62<br>(0.41–0.95) | 0.028 |

Note. Introduced variables = age at diagnosis, Time elapsed f diagnosis: time elapsed following diagnosis, Surgical intervention, reconstruction, civil status, occupation and hormonal treatment:

OR = Odds ratio; CI = confidence interval.

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Our findings highlight the impact of breast cancer treatments on female sexuality and the impact in women with breast cancer.

Based on our findings, it is necessary that health professionals recognize which variables influence sexual function in women with breast cancer. A multidisciplinary team should plan interventions to facilitate sexual adjustment.

Furthermore, women with breast cancer are capable of choosing whether to be sexually active or not. It is the duty of health professionals to guarantee that women with breast cancer and their partners receive accurate information about sexuality, treatment, and emotional support [32].

## Conclusion

Sexual function changes after breast cancer. Ninety percent of cases suffer from some type of sexual dysfunction. The most frequent problems are dysfunction due to penetration pain, lubrication, desire, and excitation. The type of surgical intervention, hormonal therapy, age, and civil status are associated with the presence of sexual dysfunction.

## Supporting information

### S1 File. Available data files.

(SAV)

### S2 File. Questionnaire translated.

(DOCX)

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## References

1. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *International journal of cancer*. 2015; 136(5):e359–86. <https://doi.org/10.1002/ijc.29210> PMID: 25220842
2. Sociedad Española de Oncología Médica (SEOM). Las Cifras del Cáncer en España, 2017. Madrid: SEOM; 2017. Available from: [http://www.seom.org/seomcms/images/stories/recursos/Las\\_cifras\\_del\\_cancer\\_en\\_Esp\\_2017.pdf](http://www.seom.org/seomcms/images/stories/recursos/Las_cifras_del_cancer_en_Esp_2017.pdf)
3. Galceran J, Ameijide A, Carulla M, Mateos A, Quirós J, Rojas D, et al. Cancer incidence in Spain, 2015. *Clinical and Translational Oncology*. 2017; 19(7):799–825. <https://doi.org/10.1007/s12094-016-1607-9> PMID: 28093701
4. Carmona-Torres JM, Cobo-Cuenca AI, Martín-Espinosa NM, Píriz-Campos RM, Laredo-Aguilera JA, Rodríguez-Borrego MA. Prevalence in the performance of mammographies in Spain: Analysis by Communities 2006–2014 and influencing factors. *Atención Primaria*. 2017 Jul 18. pii: S0212-6567(16)30539-X. <https://doi.org/10.1016/j.aprim.2017.03.007> PMID: 28732722
5. Kedde H, Van de Wiel H, Schultz WW, Wijzen C. Sexual dysfunction in young women with breast cancer. *Supportive Care in Cancer*. 2013; 21(1):271–80. <https://doi.org/10.1007/s00520-012-1521-9> PMID: 22714701
6. Panjari M, Bell RJ, Davis SR. Sexual function after breast cancer. *The Journal of Sexual Medicine*. 2011; 8(1), 294–302. <https://doi.org/10.1111/j.1743-6109.2010.02034.x> PMID: 21199377
7. Sadovsky R, Basson R, Krychman M, Morales AM, Schover L, Wang R, et al. Cancer and sexual problems. *The Journal of Sexual Medicine*. 2010; 7(1 Pt 2):349–73. <https://doi.org/10.1111/j.1743-6109.2009.01620.x> PMID: 20092444
8. Sánchez F, Conchillo MP, Valls JB, Llorens OG, Vicentee JA, de las Mulas ACM. Design and validation of the questionnaire on Women's Sexual Function (WSF). *Atención Primaria*. 2004; 34(6):286–92. PMID: 15491520
9. Alicikus ZA, Gorken IB, Sen RC, Kentli S, Kinay M, Alanyali H, et al. Psychosexual and body image aspects of quality of life in Turkish breast cancer patients: a comparison of breast conserving treatment and mastectomy. *Tumori*. 2009; 95(2):212–218. PMID: 19579868
10. Cavalheiro JAC, da Costa Bittelbrunn AC, Menke CH, Biazús JV, Xavier NL, Cericatto R, et al. Sexual function and chemotherapy in postmenopausal women with breast cancer. *BMC women's health*. 2012; 12(1):28. <https://doi.org/10.1186/1472-6874-12-28> PMID: 22963155
11. Emilee G, Ussher J, Perz J. Sexuality after breast cancer: a review. *Maturitas*. 2010; 66(4):397–407. <https://doi.org/10.1016/j.maturitas.2010.03.027> PMID: 20439140
12. Ussher JM, Perz J, Gilbert E. Changes to sexual well-being and intimacy after breast cancer. *Cancer nursing*. 2012; 35(6):456–65. <https://doi.org/10.1097/NCC.0b013e3182395401> PMID: 22222680
13. Alder J, Zanetti R, Wight E, Urech C, Fink N, Bitzer J. Sexual dysfunction after premenopausal stage I and II breast cancer: do androgens play a role? *The Journal of Sexual Medicine*. 2008; 5(8):1898–906. <https://doi.org/10.1111/j.1743-6109.2008.00893.x> PMID: 18554258
14. Morais FD, Freitas-Junior R, Rahal RMS, Gonzaga CMR. Sociodemographic and clinical factors affecting body image, sexual function and sexual satisfaction in women with breast cancer. *Journal of clinical nursing*. 2016; 25(11–12):1557–65. <https://doi.org/10.1111/jocn.13125> PMID: 27139170
15. Cairo Notari S, Favez N, Notari L, Panes-Ruedin B, Antonini T, Delaloye JF. Women's experiences of sexual functioning in the early weeks of breast cancer treatment. *European Journal of Cancer Care*. 2018; 27:e12607. <https://doi.org/10.1111/ecc.12607> PMID: 29372622
16. Ussher JM, Perz J, Gilbert E. Perceived causes and consequences of sexual changes after cancer for women and men: a mixed method study. *BMC cancer*. 2015; 15:268. <https://doi.org/10.1186/s12885-015-1243-8> PMID: 25885443
17. Biglia N, Moggio G, Peano E, Sgandurra P, Ponzzone R, Nappi RE, et al. Effects of surgical and adjuvant therapies for breast cancer on sexuality, cognitive functions, and body weight. *The Journal of Sexual Medicine*. 2010; 7(5):1891–900. <https://doi.org/10.1111/j.1743-6109.2010.01725.x> PMID: 20233281
18. Safarinejad MR, Shafiei N, Safarinejad S. Quality of life and sexual functioning in young women with early-stage breast cancer 1 year after lumpectomy. *Psycho-Oncology*. 2013; 22(6):1242–8. <https://doi.org/10.1002/pon.3130> PMID: 22777952
19. Wang F, Chen F, Huo X, Xu R, Wu L, Wang J, et al. A neglected issue on sexual well-being following breast cancer diagnosis and treatment among Chinese women. *PLoS one*. 2013; 8(9):e74473. <https://doi.org/10.1371/journal.pone.0074473> PMID: 24086349
20. Vaidakis D, Panoskaltis T, Poulakaki N, Kouloura A, Kassanos D, Papadimitriou G, et al. Female sexuality after female cancer treatment: a clinical issue. *European journal of gynaecological oncology*. 2014; 35(6):635–40. PMID: 25556267

21. Ganz PA, Kwan L, Stanton AL, Krupnick JL, Rowland JH, Meyerowitz BE, et al. Quality of life at the end of primary treatment of breast cancer: first results from the moving beyond cancer randomized trial. *Journal of the National Cancer Institute*. 2004; 96(5):376–87. PMID: [14996859](https://pubmed.ncbi.nlm.nih.gov/14996859/)
22. Webber K, Mok K, Bennett B, Lloyd AR, Friedlander M, Juraskova I, et al. If I am in the mood, I enjoy it: an exploration of cancer-related fatigue and sexual functioning in women with breast cancer. *The oncologist*. 2011; 16(9):1333–44. <https://doi.org/10.1634/theoncologist.2011-0100> PMID: [21835897](https://pubmed.ncbi.nlm.nih.gov/21835897/)
23. Malinowszky K, Gould A, Foster E, Cameron D, Humphreys A, Crown J, et al. Quality of life and sexual function after high-dose or conventional chemotherapy for high-risk breast cancer. *British journal of cancer*. 2006; 95(12):1626–31. <https://doi.org/10.1038/sj.bjc.6603454> PMID: [17160080](https://pubmed.ncbi.nlm.nih.gov/17160080/)
24. Dizon DS, Suzin D, McIlvenna S. Sexual health as a survivorship issue for female cancer survivors. *The oncologist*. 2014; 19(2):202–10. <https://doi.org/10.1634/theoncologist.2013-0302> PMID: [24396051](https://pubmed.ncbi.nlm.nih.gov/24396051/)
25. Ochsenkühn R, Hermelink K, Clayton AH, von Schönfeldt V, Gallwas J, Ditsch N, et al. Menopausal status in breast cancer patients with past chemotherapy determines long-term hypoactive sexual desire disorder. *The Journal of Sexual Medicine*. 2011; 8(5):1486–94. <https://doi.org/10.1111/j.1743-6109.2011.02220.x> PMID: [21366876](https://pubmed.ncbi.nlm.nih.gov/21366876/)
26. Aerts L, Christiaens M, Enzlin P, Neven P, Amant F. Sexual functioning in women after mastectomy versus breast conserving therapy for early-stage breast cancer: a prospective controlled study. *The breast*. 2014; 23(5):629–36. <https://doi.org/10.1016/j.breast.2014.06.012> PMID: [25082211](https://pubmed.ncbi.nlm.nih.gov/25082211/)
27. Raggio GA, Butryn ML, Arigo D, Mikorski R, Palmer SC. Prevalence and correlates of sexual morbidity in long-term breast cancer survivors. *Psychology & health*. 2014; 29(6):632–50. <https://doi.org/10.1080/08870446.2013.879136> PMID: [24404999](https://pubmed.ncbi.nlm.nih.gov/24404999/)
28. Andrzejczak E, Markocka-Mączka K, Lewandowski A. Partner relationships after mastectomy in women not offered breast reconstruction. *Psycho-Oncology*. 2013; 22(7):1653–7. <https://doi.org/10.1002/pon.3197> PMID: [23045167](https://pubmed.ncbi.nlm.nih.gov/23045167/)
29. Lopes JdSO, Costa LL, Guimarães JV, Vieira F. The sexuality of women undergoing treatment for breast cancer. *Enfermería global*. 2016; 15(3):350–406.
30. Kirshbaum MN, Dent J, Stephenson J, Topping AE, Allinson V, McCoy M, et al. Open access follow-up care for early breast cancer: a randomised controlled quality of life analysis. *European journal of cancer care*. 2017; 26(4):e12577. <https://doi.org/10.1111/ecc.12577> PMID: [27717057](https://pubmed.ncbi.nlm.nih.gov/27717057/)
31. Burwell SR, Case LD, Kaelin C, Avis NE. Sexual problems in younger women after breast cancer surgery. *Journal of Clinical Oncology*. 2006; 24(18):2815–2821. <https://doi.org/10.1200/JCO.2005.04.2499> PMID: [16782919](https://pubmed.ncbi.nlm.nih.gov/16782919/)
32. Gilbert E, Perz J, Ussher JM. Talking about sex with health professionals: the experience of people with cancer and their partners. *Eur J Cancer Care (Engl)*. 2016; 25(2):280–93. <https://doi.org/10.1111/ecc.12216> PMID: [25040442](https://pubmed.ncbi.nlm.nih.gov/25040442/)