Archives of Gynecology and Obstetrics (2019) 300:993–1005
https://doi.org/10.1007/s00404-019-05253-2

GYNECOLOGIC ONCOLOGY

Anxiety in caregiving partners of breast cancer patients

Friederike Hoellen[1] · Julian Frederik Wagner[2] · Dörte W. Lüdders[3] · Achim Rody[1] · Constanze Banz-Jansen[4]

Received: 22 April 2019 / Accepted: 11 July 2019 / Published online: 23 July 2019

Abstract

Purpose The aim of the present study was to determine the levels of anxiety of partners of breast cancer patients and to evaluate the differences of anxiety levels between patients and partners according to the stage of treatment, age and education level.

Methods 57 spouses or domestic partners of breast cancer patients and 148 breast cancer patients participated in this prospective cohort study and filled out the questionnaires including the Spielberger state-trait-anxiety-inventory, as well as questions based on stress-triggering procedures during breast cancer diagnosis and therapy.

Results State anxiety levels of partners were highest in partners who accompanied their patients when presenting for examinations and operations and tumorboard decisions (Mean State-Scores 52, 45 and 46.5). Anxiety scores were lowest at the stage of ongoing chemotherapy or follow-up. The 25% quartile of partners with the highest state anxiety levels had a significantly higher educational level ($p = 0.023$). Young men aged 18–35 years showed the highest levels of both trait and state anxiety. Partners showed significantly higher levels of anxiety than the patients for anesthetic complications ($p < 0.001$), e.g., fear of not waking up from general anesthetic and postoperative pain ($p < 0.001$). Patients showed significantly higher levels of anxiety for hairloss ($p < 0.001$), weight gain during chemotherapy ($p < 0.001$) and postoperative scars ($p = 0.027$).

Conclusion Breast cancer patients are much more concerned about body image issues than their male partners. As these body image-associated concerns often arise from the fear of loosing attraction to their partner, these fears might be reduced by speaking about them openly. Partners are mostly concerned about surgery and anesthetic-related complications. Therefore, preoperative medical information to the partner is mandatory. Partners of breast cancer patients should be included in psycho-oncological support and medical briefings. Probably high anxiety levels of both partners and patients should be taken into account (due to younger age, lower educational level and procedures causing distress). These partners and patients should receive extra careful (clarification) counselling and (treatment support such as a psycho-oncologist) involvement of a psyco-oncologist.

Keywords Treatment · Anxiety · Breast cancer · Chemotherapy

Introduction

Breast cancer remains the most common cancer among women of all ages worldwide. German women face a lifetime risk of 12.8% to develop breast cancer [1]; about 70.000 women are annually newly diagnosed with breast cancer in Germany.

The impact of psychological disorders on quality of life in breast cancer patients is evident. Anxiety has been reported as the most important psychological effect in breast cancer patients, including fear of treatment, anxiety of death, concerns about day-to-day living, financial concerns and fear of recurrence [2]. Reported rates of anxiety in breast cancer patients range from 10 to 50% depending on different factors like diagnostic means, age, stage of disease and level of

Friederike Hoellen and Julian Frederik Wagner contributed equally.

✉ Friederike Hoellen
friederike.hoellen@uksh.de

1 Department of Gynecology and Obstetrics, University Hospital of Schleswig-Holstein, Campus Luebeck, 23538 Lübeck, Germany

2 Department of Cardiac Surgery, University Innsbruck, 6020 Innsbruck, Austria

3 Department of Gynecology and Obstetrics, Medical Campus Carl Von Ossietzky University Oldenburg, 26133 Oldenburg, Germany

4 Department of Gynecology and Obstetrics, Evangelisches Klinikum Bethel, 33617 Bielefeld, Germany

education [2]. Treatment of anxiety in breast cancer patients has lately been investigated by our group [3]. Besides, fear of recurrence, depression and psychological impact on relationships play an important role regarding the life-time course in breast cancer patients.

The support of a spouse or domestic partner plays a tremendous role in the psychological well-being in breast cancer patients and influences patients' anxiety levels and coping abilities. A supportive relationship is a major source of resilience in breast cancer patients. Resilience has a lifetime impact on psychological outcome features such as body image, sexual disturbances, depression and anxiety, independent from the course of the disease [2].

Borstelmann et al. stated that partner support might play a key role in young women's adjustment to a serious stressor such as breast cancer [4]. The authors found that women in an unsupported-partnered relationship had higher levels of anxiety symptoms compared to women in a supported-partnered relationship.

Apart from the patients' own psychological state, anxiety in patients' families has been shown to have a negative impact on patients' recovery and vice versa [5, 6]. Partners of breast cancer patients show higher levels of emotional distress and a decline in quality of life in comparison to spouses or domestic partners whose female partners were healthy. On the other hand, psychosocial intimacy in the relationship among partners who faced a breast cancer diagnosis was increased. This higher level of intimacy was associated with increased quality of life [7].

In a study by Nik Jafaar et al., caregivers of breast cancer patients presented with major depression in 12.3% and 5.4% were diagnosed with dysthymia [8]. Factors associated with depression included duration of caregiving, the patients' functional status and the caregivers' education level. Caregivers with a lower educational level had a higher risk to develop depression.

The social impact of breast cancer on women's families and social networks has two dimensions: the responsibility of caring for a family during breast cancer treatment may cause anxiety in patients and, at the same time, support of the families and social network are important in the course of the disease. Partners of breast cancer patients are confronting fears, stresses and challenges. Although patients' and partners' ability to cope with the diagnosis of cancer has been shown to improve during the first year after diagnosis, couples reported a decline in communication and support [9]. Partner avoidance, withdrawing from discussions and criticism, can be dimensions of distressful behavior patterns in relationships [10]. However, psychological, emotional and practical support from partners are substantial. On the other hand, partnership conflicts or lack of emotional support and empathy cause distress in breast cancer patients and might increase patients' vulnerability to psychological disorders. Thus, the partners' ability to cope with the women's breast cancer diagnosis is considerable [4].

Data regarding anxiety levels of partners of breast cancer patients are scarce. However one could assume that partners' emotional support is related to partners' vulnerability to anxiety. In the present study, we aimed at focusing on anxiety levels of partners of breast cancer patients during different stages of treatment. We analyzed differences in anxiety levels and focus on anxiety in patients and partners according to age, educational level, different stages of cancer diagnosis and therapy and according to specific breast cancer-related therapeutical procedures. By defining the differences regarding the focus of anxiety in patients and partners and by becoming aware of the stages of cancer diagnosis and treatment, when patients and partners are most vulnerable to anxiety, psychooncological support for families who face a breast cancer diagnosis can be improved.

Patients and methods

We conducted a prospective cohort study at the Breast Cancer Centre at University Hospital Schleswig–Holstein Campus Luebeck between August 2012 and September 2013. 57 male partners (spouses and domestic partners) of breast cancer patients answered a questionnaire including the Spielberger state-trait-anxiety-inventory (STAI) and questions concerning stress-triggering procedures during therapy. Questioning took place once in the course of the therapy at different stages: examination, before tumor board decision, before surgery, during chemotherapy and at follow-up screening. Partners of patients with first diagnosis as well as patients with relapse or in a metastatic stages were included. The primary aim of this study was to evaluate the anxiety levels of partners of breast cancer patients according to different stages of the breast cancer therapy. Second, we aimed at defining the focus of anxiety regarding breast cancer-specific procedures and therapy-associated side effects. Third, the differences of anxiety characteristics between partners of breast cancer patients and patients themselves were analyzed. Therefore, anxiety data of 148 breast cancer patients published before [3] were compared to partners' data. The institutional review board of the University Luebeck reviewed and monitored the study and granted full approval.

Test design

The questionnaire consisted of seven pages: the first and second page contained the description of the study and the confirmation sheet for data use and anonymity, followed by the page for biometric data (age, stage of partner's treatment, education and own family history concerning breast cancer). The first part of the anxiety

questionnaire asked for anxiety levels in an imaginary situation, in which the test person accompanies his partner during a consultation of different doctors such as general practitioner, dentist and gynecologist.

The second part contained the STAI (state-trait-anxiety-inventory), which was developed by Spielberger et al. [11] and which was used in the German adapted version form [12]. This common test aims at momentary ('state') anxiety facing a particular situation and general ('trait') anxiety as a personal characteristic [13]. It consists of a visual analogue scale (VAS 1–4 Likert Scale) and 40 items, the score range is 20–80 points, a value over 45 is highly anxious [14].

The third part was a 25-item long questionnaire asking for the most common and possible anxiety/stress-triggering procedures during the course of the partner's breast cancer treatment in a common chronological order from diagnosis to surgery, chemotherapy and radiation in the form of a VAS Likert scale 1–4 (no anxiety to highest anxiety).

Statistical analysis

The testing was accomplished with the Mann–Whitney *U* test, the significance level was set to 0.05. Data were analyzed using SPSS, version 18 (SPSS Inc. Released 2009). Sample size was calculated according to the Mann–Whitney *U* test for the patient collective ($n = 148$), sample calculation for the partners aimed at $n = 50$ as specified by a statistician.

Results

57 male partners of breast cancer patients were included in the study; 148 breast cancer patients participated. Thus, in our collective of 205 anxiety test persons, 72.2% of the test persons were patients and 27.8% were male partners. Partners' mean age was 59.6 years (range 24–79) and patients' mean age was 57 (range 21–85). The majority of participating partners participated in the study when accompanying the patients for follow-up examinations ($n = 19$, 33.3%), followed by chemotherapy ($n = 14$, 24.6%) and diagnostic procedures ($n = 11$, 19.3%) (see Table 1).

STAI

Trait anxiety

As trait anxiety refers to an individuals' general level of anxiety, only minor fluctuations according to the therapeutical stages at the time of participation in the study were supposed, as shown in Table 1.

Age

Partners' state anxiety was analyzed according to age. State anxiety levels showed two peaks according to age in age groups 18–35 years and 36–45 years. Especially young male partners of breast cancer patients at the age of 18 to 35 showed a high mean level of state anxiety of 53.66 points, which was 11.3 points higher compared to men aged 56–65,

Table 1 Trait anxiety in patients and partners according to different stages of breast cancer diagnosis and treatment; *SD* standard deviation

Test person	Stage of breast cancer diagnosis and treatment	Number	Mean and SD	Median	Minimum	Maximum
Patient	Examination	20	35.3 $\sigma = 9.19$	33	24	54
	Surgery	30	36.62 $\sigma = 10.32$	35	22	69
	Tumorboard	11	40.01 $\sigma = 10.48$	37	27	57
	Chemotherapy	42	39.57 $\sigma = 11.38$	38	22	70.53
	Radiation	3	31 $\sigma = 2$	31	29	33
	Follow-up	27	40.37 $\sigma = 9.62$	42	22.11	58
	No statement	11	41 $\sigma = 11.57$	39	26	67
	Total	144	38.48 $\sigma = 10.43$	37	22	70.53
Partner	Examination	11	39.75 $\sigma = 9.59$	40	25.26	56
	Surgery	4	38.51 $\sigma = 6.76$	39.02	30	46
	Tumorboard	7	31.99 $\sigma = 6.32$	31	24.21	40
	Chemotherapy	14	40.77 $\sigma = 8.96$	41.55	26	58
	Follow-up	19	35.759 $\sigma = 10.34$	32	23	57.89
	No statement	1	35 $\sigma = 0$	35	35	35
	Total	56	37.5 $\sigma = 9.29$	36.5	23	58

High anxiety is defined as scores above 45

who showed the lowest state anxiety levels (42.31 points) (see Table 2). Trait anxiety levels in partners of these age groups also showed higher levels in young men in comparison to elderly (47.5 points vs. 36.8 points).

Patients' state and trait anxiety levels did not differ remarkably according to age (state anxiety levels range 43.68 points to 47.63 points, see Table 2). Mean levels of state anxiety at all ages did not differ significantly between patients and partners (difference 0.3 points, see Table 2). Mean levels of trait anxiety did also not differ significantly between patients and partners (mean level 37.5 points in partners and 38.48 points in patients).

Level of education

In our patient collective, partners of breast cancer patients with higher levels of education showed a tendency for higher levels of state anxiety. Partners who have a college degree showed the highest levels of state anxiety (51.8 points) with a tendency to decline with decreasing education. However, male partners with the lowest educational grade according to the German educational system stated higher levels of anxiety compared to the second lowest grade (see Fig. 1).

Regarding quartiles of state anxiety, the 25% quartile of partners with the highest anxiety levels had a significantly

Table 2 State anxiety in patients and partners according to age; *SD* standard deviation

Test person	Age	Number	Mean and SD	Median	Minimum	Maximum
	18–35	11	44.27 $\sigma = 13.16$	47	23	62
	36–45	19	46.2 $\sigma = 14.32$	49	22	71
Patient	46–55	336	45.17 $\sigma = 13.45$	43.5	20	76
	56–65	39	43.68 $\sigma = 15.09$	44	21.05	75.79
	> 66	37	47.63 $\sigma = 13.13$	47	22	70
	Total	142	45.47 $\sigma = 13.82$	44.33	20	76
	18–35	4	53.66 $\sigma = 9.3$	55.82	41	62
	36–45	3	50.67 $\sigma = 19.5$	42	37	73
Partner	46–55	11	47.64 $\sigma = 11.44$	46	32	63
	56–65	16	42.31 $\sigma = 12.48$	40.5	28	73
	> 66	20	45.18 $\sigma = 8.58$	46	25.56	57.89
	Total	54	45.76 = 11.18	44.5	25.56	73

High anxiety is defined as scores above 45

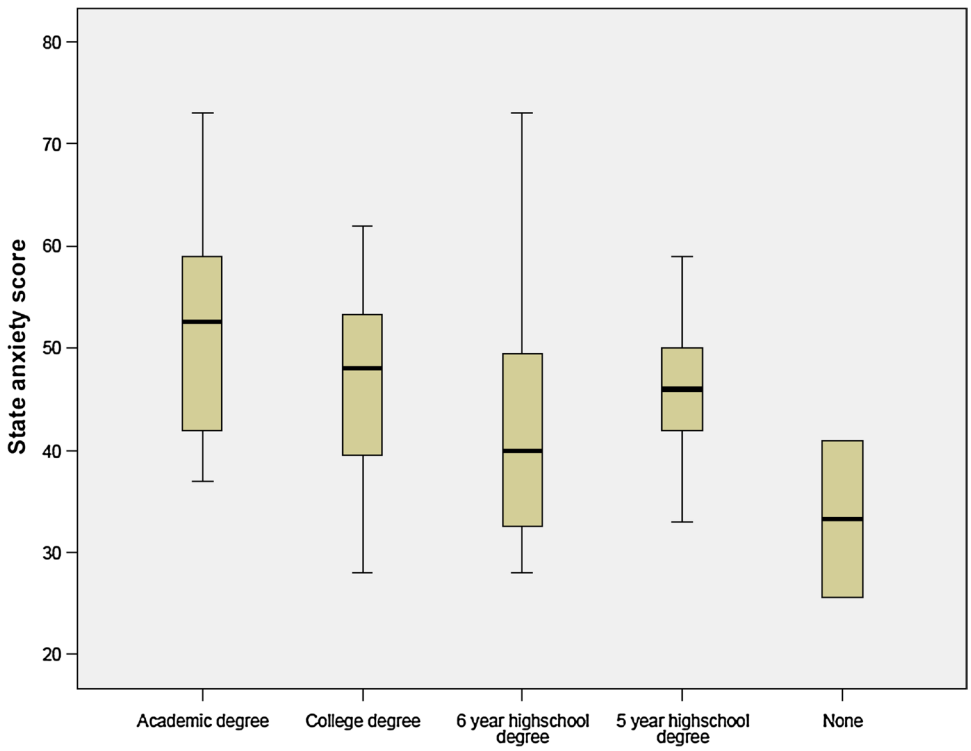

Fig. 1 State anxiety score of partners according to educational level. Educational levels are listed in declining order according to the German educational system from left to right

higher educational level ($p = 0.023$). On the other hand, when patients were evaluated for trait anxiety levels, patients representing 25% of the highest anxiety levels had a significantly lower educational level ($p = 0.009$) [3].

Stage in the course of breast cancer diagnosis and treatment

State anxiety levels of partners were highest in partners who accompanied their patients when presenting for examinations and operations and tumorboard decisions (Mean State-Scores 52, 45 and 46.5, see Table 3). Anxiety scores were lowest at the stage of ongoing chemotherapy or follow-up. In accordance with partners' anxiety levels, patients showed the highest levels of state anxiety when presenting for tumor board decisions (State-Score Mean 52.89 points); the second highest levels were reported by patients who presented for their operation. Patients already undergoing chemotherapy had lower state-anxiety levels than the group of all other patients ($p = 0.012$). Women undergoing chemotherapy showed lower anxiety levels relating to many procedures of breast cancer treatment. As mentioned above, partners showed a similar tendency; however, the decrease in anxiety levels was not significant ($p = 0.228$) (Figs. 2, 3, 4).

Specific breast cancer-focused questionnaire

One part of the questionnaire consisted in a breast cancer-specific questionnaire containing 25 items (see Table 4). When asked for levels of anxiety, anxiety levels concerning different items differed significantly between partners and patients themselves. We assessed significant differences between partners and patients in specific anxiety items (see Table 5).

Partners were most afraid of repeat surgery and pain following operation. Partners' anxiety levels concerning postoperative pain were significantly higher in partners compared to patients ($p < 0.001$). Furthermore, partners showed significantly higher levels of anxiety when asked for anesthetic complications (as the patient not waking up after general anesthetic) ($p < 0.001$). In our patient collective, patients were most afraid of chemotherapy. The second highest anxiety levels were reported for mastectomy.

Patients were significantly more afraid of surgery-associated scars than partners ($p = 0.027$) and significantly more afraid of port implantation ($p = 0.016$), hair loss during chemotherapy ($p < 0.001$), nausea during chemotherapy ($p = 0.012$) and weight gain during chemotherapy ($p < 0.001$) (Figs. 5, 6).

Discussion

As stated in a systematic review protocol in 2015, it is known that the diagnosis and treatment of breast cancer affect relationships including spousal relationships. Spouses and caregiving partners of women with breast cancer work to adjust roles and to balance added household responsibilities, particularly during times of treatment [15]. However data concerning psychological parameters of partners of breast cancer patients are scarce. Another important aspect in terms of anxiety is helplessness expressed by negativity and hostility. It is thus likely that anxiety might be associated with a tendency to be critical towards the partner [16, 17].

Table 3 State anxiety scores according to situation at presentation; SD = standard deviation. High anxiety is defined as scores above 45

Test person	Stage of breast cancer diagnosis and treatment	Number	Mean and SD	Median	Minimum	Maximum
Patients	Examination	19	40.21 $\sigma = 11.1$	38	22	59
	Surgery	28	50.24 $\sigma = 13.84$	49	20	76
	Tumorboard	11	52.89 $\sigma = 18.73$	55.79	22	74
	Chemotherapy	43	40.64 $\sigma = 10.94$	41	21.05	65
	Radiation	3	42 $\sigma = 10.44$	37	35	54
	Follow-up	27	47.99 $\sigma = 14.29$	47	26	75.79
	No statement	11	48.63 $\sigma = 1547$	50.53	23	68
	Total	142	45.47 $\sigma = 13.82$	44.33	20	76
Partners	Examination	11	52 $\sigma = 10.76$	50	37	73
	Surgery	4	45 $\sigma = 4.97$	45.5	39	50
	Tumorboard	6	46.52 $\sigma = 11.25$	46.1	32	63
	Chemotherapy	14	43.21 $\sigma = 13.1$	40.5	28	73
	Follow-up	19	43.12 $\sigma = 10.17$	42	25.56	59
	No statement	1	54 $\sigma = 0$	54	54	54
	Total	55	45.62 $\sigma = 11.12$	43	25.56	73

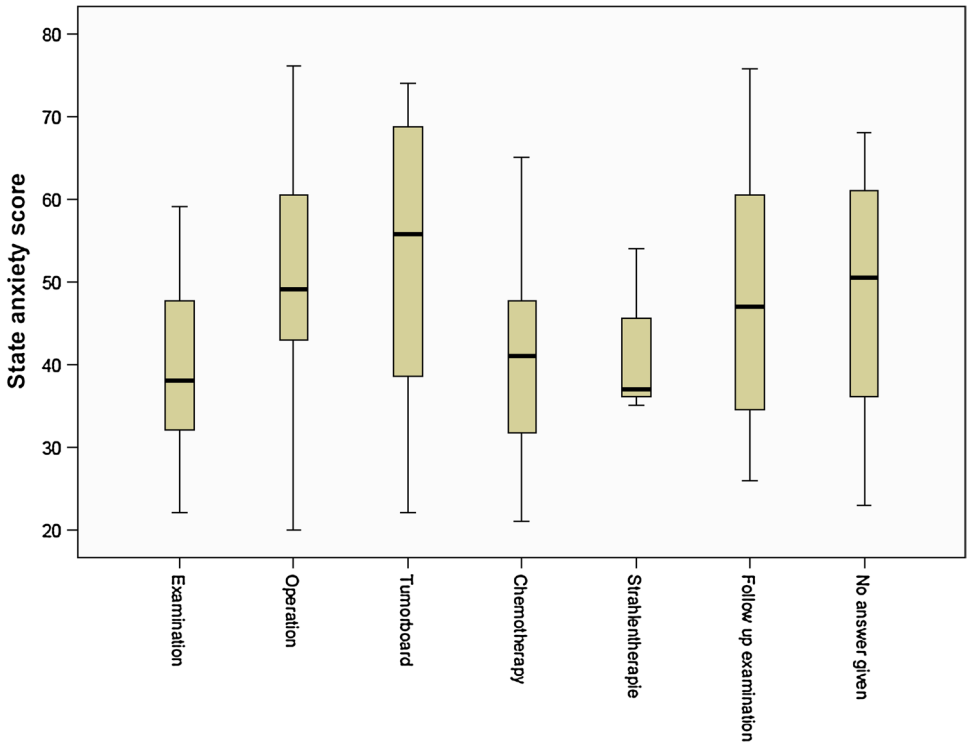

Fig. 2 State anxiety score in patients according to stage of breast cancer diagnosis and treatment

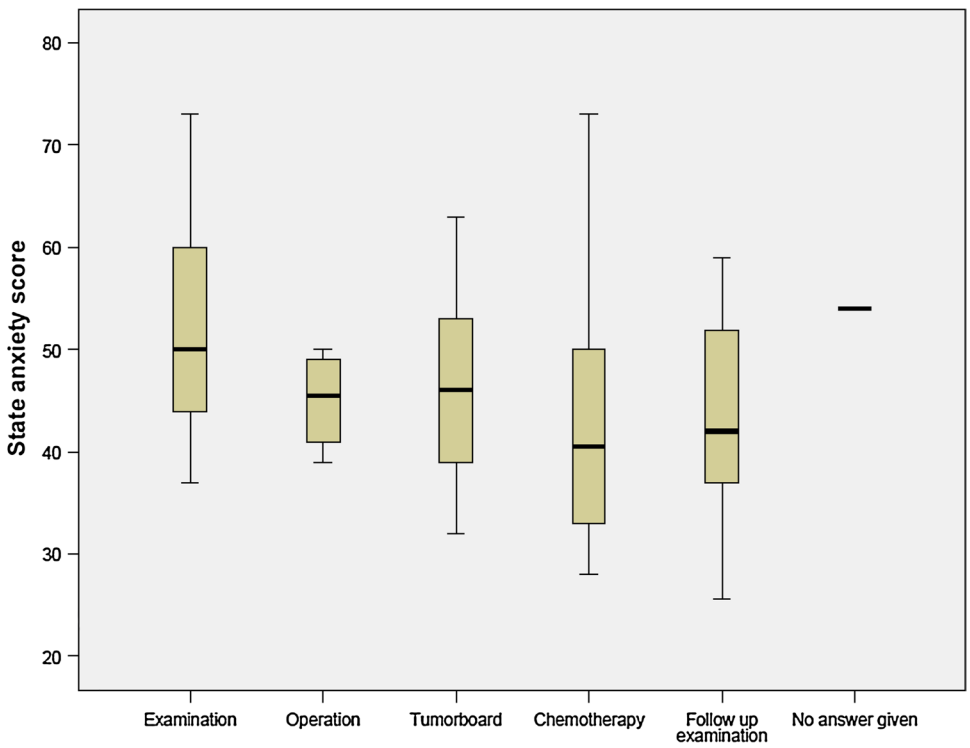

Fig. 3 State anxiety score in male partners of breast cancer patients according to stage of breast cancer diagnosis and treatment

Studies assessing the impact of attachment in breast cancer have shown that anxious patients have lower psychological adaptation indexes to the stress of the disease [18–20].

We conducted the present study on partners' anxiety levels under the hypothesis that patients' and partners' anxiety levels and issues of anxiety differ. As a test to quantify levels of anxiety both in partners of breast cancer patients and patients themselves, we chose the Spielberger STAI (state-trait-anxiety-inventory), which was developed by Spielberger et al. It is the most common test used to analyze

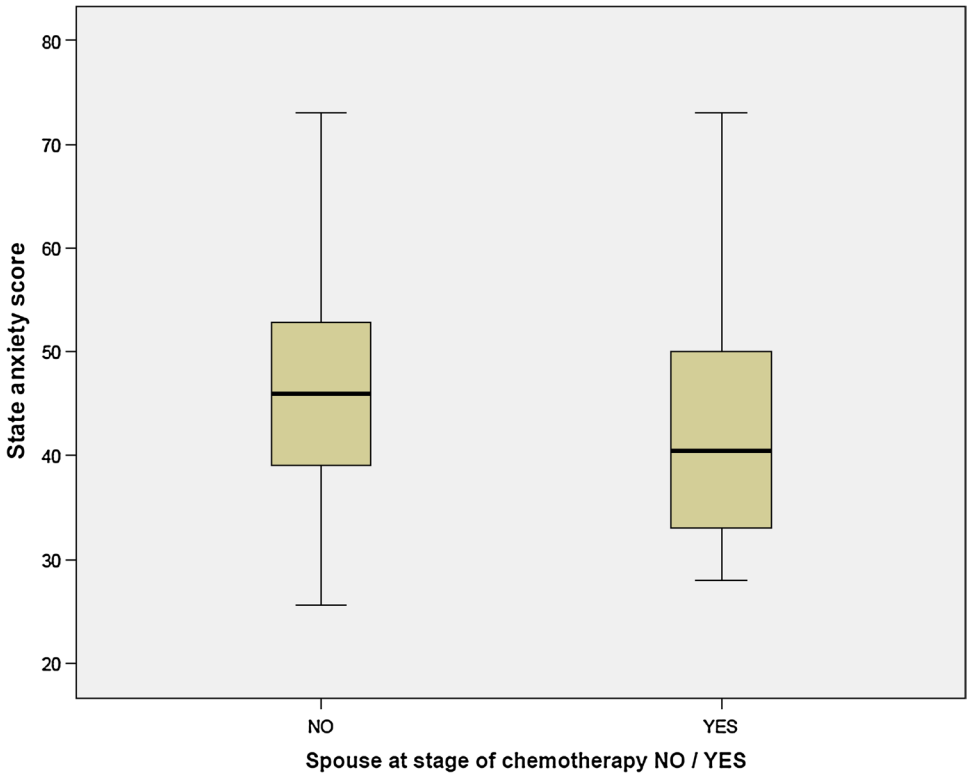

Fig. 4 Boxplot showing state anxiety levels of partners with ongoing chemotherapy versus partners of all other patients (not significant $p = 0.228$)

Table 4 Partners' and patients' anxiety according to different procedures of breast cancer diagnosis and treatment and side effects in descending order of frequency; *SD* standard deviation, *CTx* chemotherapy

Patients	Number	Mean and SD	Partners	Number	Mean and SD
Chemotherapy	140	2.9 $\sigma = 0.96$	Re-operation	55	2.87 $\sigma = 0.86$
Mastectomy	141	2.82 $\sigma = 1.1$	Postoperative pain	54	2.7 $\sigma = 0.82$
Nausea during CTx	142	2.76 $\sigma = 0.96$	Chemotherapy	54	2.67 $\sigma = 0.87$
Infections during CTx	142	2.73 $\sigma = 0.98$	Mastectomy	51	2.61 $\sigma = 1.04$
Re-operation	142	2.71 $\sigma = 0.9$	Surgery	56	2.59 $\sigma = 0.8$
hairloss	141	2.65 $\sigma = 1.03$	Surgery complications	55	2.56 $\sigma = 0.83$
Surgery complications	142	2.57 $\sigma = 0.97$	Infections during CTx	55	2.55 $\sigma = 0.92$
Biopsy	134	2.45 $\sigma = 0.83$	Biopsy	52	2.52 $\sigma = 0.92$
Surgery	145	2.4 $\sigma = 0.85$	Narcosis	55	2.49 $\sigma = 1$
Infection	141	2.38 $\sigma = 0.83$	Nausea during CTx	55	2.42 $\sigma = 0.79$
Radiation	142	2,36 $\sigma = 0.91$	Radiation	55	2.35 $\sigma = 0.87$
Weight gain	142	2.25 $\sigma = 0.95$	Infection	55	2.33 $\sigma = 0.79$
Aesthetic aspects	144	2.24 $\sigma = 0.88$	Mammography	53	2.26 $\sigma = 0.79$
Postoperative pain	142	2.23 $\sigma = 0.76$	Breast palpation	55	2.13 $\sigma = 0.86$
Port	141	2.21 $\sigma = 1$	Ultrasonography	54	2.11 $\sigma = 0.82$
Mammography	140	2.15 $\sigma = 0.85$	Aesthetic aspects	56	2 $\sigma = 0.79$
Ultrasonography	143	1.97 $\sigma = 0.86$	Hairloss	56	1.91 $\sigma = 0.92$
Venous punction	142	1.95 $\sigma = 0.96$	Port	53	1.81 $\sigma = 0.76$
scars	144	1.94 $\sigma = 0.8$	Loss of Libido	55	1.8 $\sigma = 0.83$
Breast palpation	144	1.92 $\sigma = 0,8$	Antihormonal Therapy	54	1.78 $\sigma = 0.66$
Narcosis	144	1.92 $\sigma = 0.99$	Venous punction	55	1.72 $\sigma = 0.69$
Antihormonal therapy	132	1.91 $\sigma = 0.88$	Scars	54	1.67 $\sigma = 0.7$
Loss of Libido	138	1.85 $\sigma = 0.86$	Surgical instruments	54	1.63 $\sigma = 0.68$
Surgical instruments	140	1.84 $\sigma = 0.88$	Weight gain	56	1.61 $\sigma = 0.65$
Blood sample	141	1.39 $\sigma = 0.59$	Blood sample	54	1.44 $\sigma = 0.66$

Table 5 Procedures and side effects of breast cancer treatment showing significant different levels of anxiety in partners and patients

Procedures	Test person	Number	Mean anxiety levels	*p* value
Narcosis	Patients	144	91.1	< 0.001
	Partners	55	123.29	
	Total	199		
Scars	Patients	144	104.52	0.027
	Partners	54	86.1	
	Total	198		
Postoperative pain	Patients	142	89.81	< 0.001
	Partners	54	121.35	
	Total	196		
Port catheter	Patients	141	103.16	0.016
	Partners	53	82.44	
	Total	194		
Hairloss	Patients	141	109.91	< 0.001
	partners	56	71.54	
	Total	197		
Nausea during CTx	Patients	142	105.04	0.012
	Partners	55	83.42	
	Total	197		
Weight gain	Patients	142	110.07	< 0.001
	Partners	56	72.69	
	Total	198		

anxiety in patients [21]. By applying the same test model to partners, we aimed at providing the necessary comparability between patients' and partners' levels of anxiety.

Age and anxiety

In our study, especially young male partners under the age of 35 showed higher state and trait anxiety levels in comparison to elderly men older than 56 years. Both trait and state anxiety showed very high levels in young men significantly above the cutoff of 45, which is defined as, high anxiety level' (state anxiety level mean 53.66 points, trait anxiety level mean 47.5 points) [11]. Apart from concerns and caring for the beloved partners, psychosocial factors of concern regarding the family microstructure, future perspectives, family planning, etc. might play a role in the high anxiety levels of young men.

Education and anxiety

In our collective, the state anxiety top quartile of partners showing the highest anxiety levels had a significantly better education in comparison to less anxious 75% of partners. These findings are in contrast to patients' data: our group found that the trait anxiety top quartile of patients showing the highest anxiety levels had a significantly lower education in comparison to the less anxious 75% of patients ($p = 0.009$). However, in partners these findings were only significant regarding state anxiety, while patients showed these significantly different levels of education associated with trait anxiety. Our data go in line with a study by Osborne et al., which found that in a collective of 731 female patients, younger patients and those with low education showed higher anxiety levels when compared to female patients with a college degree. However, in this study the HADS (Hospital Anxiety and Depression Scale) was applied and data were collected in a different cultural context (Australia) [22]. Van Esch et al. reported similar results: Female patients, who showed trait anxiety levels above 44 points, had lower education levels [23].

In summary, a possible hypothesis could be that better educated male partners present with specific concerns when their partners face a cancer diagnosis due to a more profound background knowledge of disease progression, complications and prognosis. On the other hand, less educated female patients might be more scared due to intellectual overload, confusion and the burden of decisions to take.

Stage of treatment and anxiety

Both partners and patients showed the highest levels of anxiety when presenting for tumor board decisions.

Galloway et al. reported on decreasing levels of state anxiety in female patients, as soon as a plan of treatment is established. Thus, uncertainty is a relevant factor for anxiety [24].

High anxiety levels were also found in patients who presented after completion of therapy for follow-up examinations (median 42), while in our collective of partners, trait anxiety levels at follow-up examinations was rather low (median 32). One might hypothesize that patients' fear of progression (FOP) is increased in comparison to partners, and that partners feel ‚save' after completion of therapy. However, our data must be interpreted with care, as partners might have stated that they presented for examinations during therapy rather than follow-up. Especially in chronic disease, partners' FOP has been assessed and was remarkable [25].

Janz et al. reported on the worry about recurrence in a population of 510 non-metastatic breast cancer patients and their partners. In contrast to our results, partners reported significantly more worry about recurrence than survivors. Partners of patients who received chemotherapy reported more anxiety. Among modifiable factors, patients and partners who received more emotional support from providers were less likely to report anxiety than those who did not receive such support [26]. Again, these findings underline

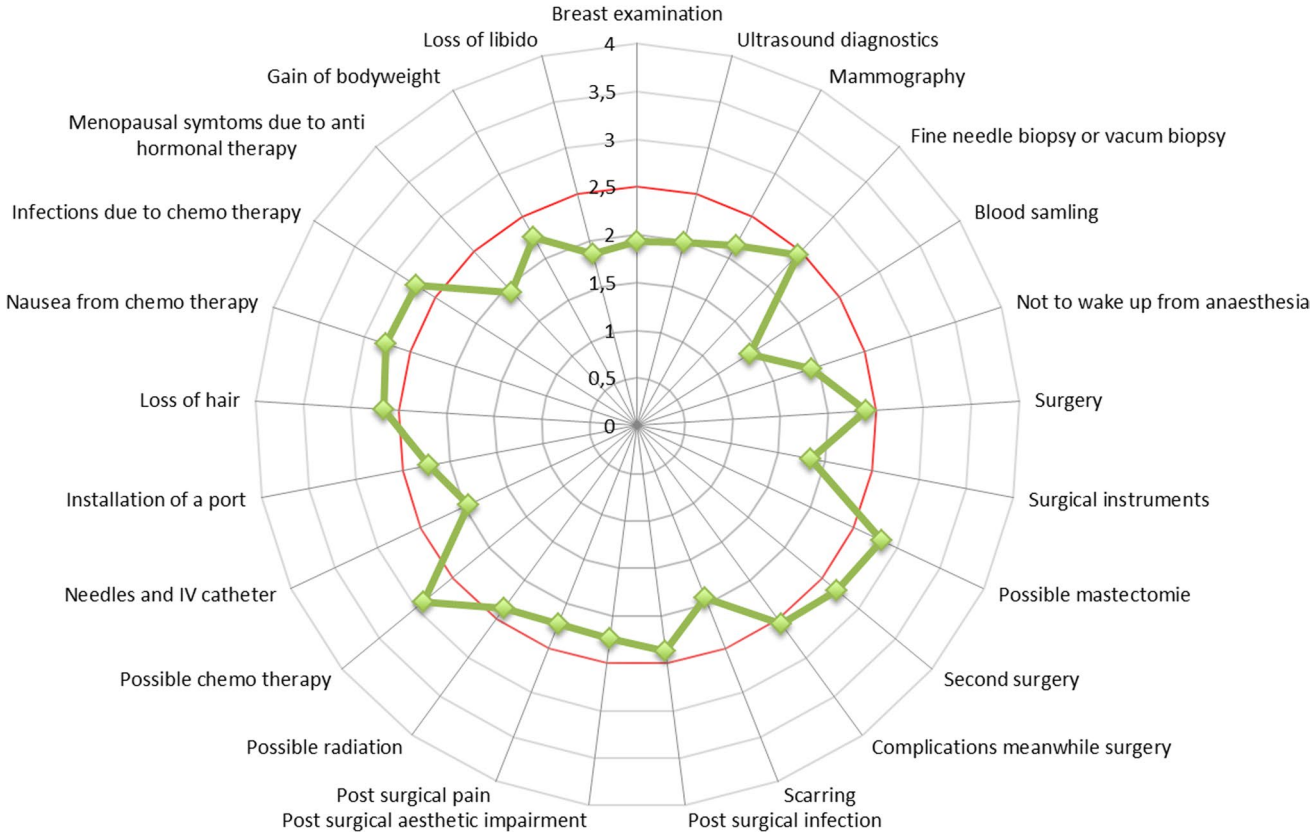

Fig. 5 Anxiety levels according to specific anxiety-triggering procedures and side effects in patients

the importance of extensive medical information prior to treatment.

Differences according to procedures

In the present study we found significant differences concerning the anxiety levels in partners and patients for several breast cancer-associated anxiety-triggering procedures and therapeutic effects. The focus of anxiety in partners of breast cancer patients and female patients themselves often diverges. Partners and patients are anxious facing different situations and at different extents. Female patients were more afraid of chemotherapy itself and side effects of chemotherapy than their male partners, e.g., hairloss, nausea during chemotherapy, weight gain during chemotherapy, postoperative scars and implantation of a port catheter. These findings go in line with the literature: Female patients are afraid of side effects of chemotherapy, e.g., fatigue, insomnia, nausea, menopausal symptoms and sexual dysfunction [27, 28]. These findings demonstrate that female patients are much more concerned about factors of body image than their male partners. As far as the aspect of nausea is concerned, one might assume that nausea might be associated with a negative body image by women rather than nausea being seen as a physical burden causing suffering and deterioration of the body. Female patients are much more afraid of physical changes and changes of their outer appearance due to the disease and due to the therapy, than their partners. It can be assumed that female patients' cancer-associated anxiety is partly due to the anxiety of not being physically attractive to their partners anymore. The importance of female body image facing a cancer diagnosis was described in the literature and the patients should be offered appropriate support [29]. As our data show, partners are much less concerned with these factors of body image. Consequently, medical consultation should also aim at speaking about these issues frankly to reduce anxiety levels.

Interestingly, anxiety levels for loss of libido were low both in patients and their partners and the issue of loss of libido ranked at the end of the list of anxiety levels in both groups. However, loss of libido in patients undergoing breast cancer therapy is a common side effect and might also affect partners. Gilbert et al. reported on partners of breast cancer patients, who repositioned their partners with cancer as childlike or as an asexual 'sick patient' [30]. Sexual problems may affect couple relationship and as a result can cause anxiety and depression; thus, the issue of loss of libido should be openly communicated with patients

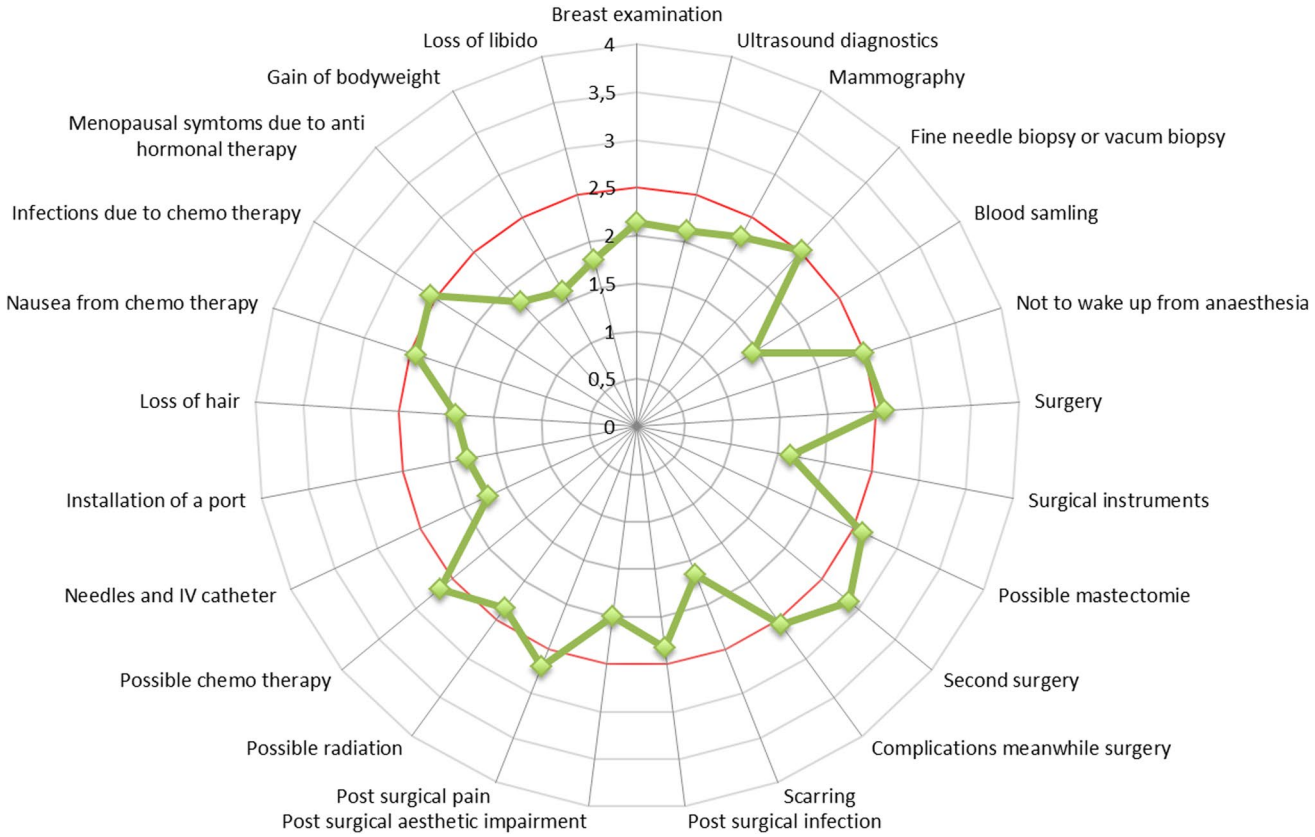

Fig. 6 Anxiety levels according to specific anxiety-triggering procedures and side effects in male partners of breast cancer patients

and partners. Further studies are needed to estimate to what extent breast cancer influences sexual health and relationship with the partner. The Brief Index of Sexual Functioning for Women or the Female Sexual Function Index (FSFI) could be adequate means to analyze on this topic. The presence of psychiatric comorbidities and psychological diseases, such as anxiety and depression, should be assessed through the use of validate psychodiagnostic tests with regard to an association with loss of libido both in patients and partners [31].

In the present study, our patient collective included both pre- and postmenopausal patients. Thus, we did not investigate on the impact of anxiety concerning loss of fertility. However, in premenopausal women who still want to have children, fertility after chemotherapy is crucial. Healthcare professionals should always provide information and support concerning fertility preservation to premenopausal patients during the communication of diagnosis and throughout the therapeutic process [32].

On the other hand, with regard to anxiety and chemotherapy, patients and partners obviously report much higher levels of anxiety waiting for chemotherapy in comparison to levels of anxiety during ongoing chemotherapy treatment ($p=0.012$). Thus, fear prior to chemotherapy might be exaggerated and retrospectively may be unfounded.

Partners reported significantly higher levels of anxiety when asked for surgery- and anesthetic-associated complications, e.g., their partner not waking up from general anesthetic and postoperative pain. Studies concerning patients' considerable fear of not waking up from general anesthetic have been published; however, patients' relatives were not included in these studies [33]. Our findings emphasize the importance of partners being involved in preoperative medical information, especially concerning anesthetic procedures. The feeling of loss of control during their partners' surgery might be one considerable aspect of the partners' significantly higher levels of anxiety with regard to surgery in comparison to the patients undergoing surgery themselves. Passively waiting for their partners triggers this feeling of loss of control in patients' partners. On the other hand, partners' levels of anxiety are lower when waiting for chemotherapy: here, the process of waiting is passed together; in this situation, the male partners play an active part. There is no loss of control; partners have better insight into ongoing processes.

Consequently, a comprehensive medical briefing in detail and a preoperative informative interview concerning both surgery and anesthesia should be performed carefully not only for informed consent, but also to reduce anxiety levels

both in patients and partners. Belleau et al. reported on a significant reduction of preoperative anxiety in patients awaiting mastectomy, when a preoperative-individualized psychocognitive educational intervention on preoperative anxiety was performed in comparison to standard informed consent [34]. Under the assumption that these findings can be applied to partners, breast cancer patients should be motivated to bring their partners for preoperative medical assessment.

Favez et al. introduced the concept of expressed emotion (EE) in breast cancer patients [18]. Expressed emotion (EE) is related to negative individual and relational psychological outcomes in psychiatric and somatic diseases. Expressed emotion (EE) is a construct that originally had been established to describe the emotional behavior of close relatives of patients [18] and refers in particular to negative statements, such as criticism or hostility, and to overprotective emotional involvement. High EE, i.e., the assumption of both overprotective and negative statements, has been shown to impair coping strategies in patients [18]. The authors found that EE was most likely to appear in early cancer stages; thus even in cases with good prognosis, relational and emotional disturbances may occur. Cancer stage, attachment tendencies, and couple satisfaction were predictors of EE. Anxiety might trigger EE to a considerable extent; thus, reducing anxiety levels in partners might reduce EE. Consequently, patients' coping strategies and resilience might be improved by reducing partners' anxiety levels [18].

In general, anxiety facing a breast cancer diagnosis refers to the patients' tendency of feeling uncertainty and helplessness associated with unpredictability in the responses of the caregiver and vice versa. By overemphasizing their inability to cope with threatening situations, overanxious people seak for protection in their social environment. One hypothesis might be that when the overanxious partner of a patient faces a cancer disease, the partner's high anxiety levels will trouble the patient's coping strategies. As both patient and partner are affected by pathological anxiety, the respective partner is no longer capable of reducing their partners' fears. In these situations, psychological support is required. In terms of breast cancer, an a priori indicator for these situations might be stages of breast cancer diagnosis and therapy and specific issues, when both patients and partners report high levels of anxiety.

Limitations and BIAS

As the questionnaire was filled out on a voluntary basis, there might be a bias in the direction of patients and partners who are rather open minded and willing to participate in a questionnaire.

For every test person taking part in the present study, levels of anxiety were evaluated only once during the course of diagnosis and therapy. Thus, individual levels were interpreted regarding inter-individual differences, but not chronologically. Patients and their respective partners were not matched and data were evaluated individually. Future studies are needed to investigate on the association of partners' anxiety and patients' anxiety, focusing on patients' psychological state during the course of the disease. Further interesting aspects for further investigations are associations between partners' anxiety and patients' compliance, response to therapy, side effects, recovery and relapse. Furthermore, in our study, all stages of breast cancer were included. Further studies are needed to differentiate between curative and palliative settings.

In the present study, when evaluating data on partners, we did not differentiate between spouses and domestic partners and we did not take into consideration the duration of the relationship. Goldzweig et al. reported on non-married colorectal cancer patients, who showed higher levels of distress [35]. Furthermore, as reported in a former study, only 50% of the patients considered their spouses or domestic partners their principal advisor in the course of breast cancer diagnosis and treatment [36].

Conclusion

The present study underlines that spouses and domestic partners of breast cancer patients are affected by considerable anxiety. We found even higher anxiety levels in male partners of breast cancer patients than in the female patients themselves according to the stage in the course of diagnosis and treatment of breast cancer, e.g., before surgery and tumor board decisions, and depending on specific anxiety-triggering items, e.g., surgery complications. Especially young partners of breast cancer patients show high levels of anxiety, this finding which might be associated with their particular living situation, e.g., responsibility for a young family.

As a major consequence of this survey we are optimizing the conditions for patients and partners at high anxiety risk. First, involving the partners in medical briefings is indispensable. We aim at extended clarification due to the schedule of the tumor therapy, extra careful and sensitive communication of any tumor board decision and looking after partners and patients which are at high risk from a demographic point of view (young age). Furthermore, involving a psycho-oncologist and psychologic support of the partner is mandatory. The study showed that patients probably benefit more from medical briefings and psycho-oncological support, if their partners are involved at an early point of the diagnosis and therapy. Resilience and coping strategies in patients result from a stressless environment with a stable partner relationship and family support. Detailed as well as sensitive

clarification of all procedures and the steps of therapy both for patient and partner are mandatory.

Author contributions Constanze Banz-Jansen: Protocol/project development, Data collection or management, Data analysis. Julian Frederik Wagner: Protocol/project development, Data collection or management, Data analysis, Manuscript writing/editing. Friederike Hoellen: Manuscript writing/editing, Data analysis. Achim Rody: Protocol/project development, Manuscript writing/editing. Dörte Lüdders: Protocol/project development, Manuscript writing/editing.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. RKI (2015) Krebs in Deutschland 2011–2012. Robert Koch Institute 10
2. Segrin C et al (2007) Interdependent anxiety and psychological distress in women with breast cancer and their partners. Psychooncology 16(7):634–643
3. Wagner JF, Lüdders D, Hoellen F, Rody A, Banz-Jansen C (2019) Treatment anxiety in breast cancer patients. Arch Gynecol Obstet 299(5):1365–1371
4. Borstelmann NA et al (2015) Partner support and anxiety in young women with breast cancer. Psychooncology 24(12):1679–1685
5. Northouse LL (1995) The impact of cancer in women on the family. Cancer Pract 3(3):134–142
6. Northouse LL, Dorris G, Charron-Moore C (1995) Factors affecting couples' adjustment to recurrent breast cancer. Soc Sci Med 41(1):69–76
7. Moreira H, Canavarro MC (2013) Psychosocial adjustment and marital intimacy among partners of patients with breast cancer: a comparison study with partners of healthy women. J Psychosoc Oncol 31(3):282–304
8. Jaafar NRN, Dim SHS, Saini S, Ahmad SN, Midin M, Sidi H, Silim UA, Baharudin A (2014) Clinical depression while caring for loved ones with breast cancer. Compr Psychiatry 55(Suppl 1):52–59
9. Arora NK et al (2001) Impact of surgery and chemotherapy on the quality of life of younger women with breast carcinoma: a prospective study. Cancer 92(5):1288–1298
10. Baucom DH et al (2005) Psychosocial issues confronting young women with breast cancer. Breast Dis 23:103–113
11. Spielberger CD, Gorsuch RL, Lushene RE (1970) STAI manual for the state-trait anxiety inventory. Consulting Psychologists Press, Palo Alto
12. Laux L, Schaffner GP, Spielberger CD (1981) Das State-Trait-Angstinventar Theoretische Grundlagen und Handanweisung. Beltz Test GmbH, Weinheim
13. Julian LJ (2011) Measures of anxiety: State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), and Hospital Anxiety and Depression Scale-Anxiety (HADS-A). Arthritis Care Res Hoboken 63(Suppl 11):S467–S472
14. Cd S (1983) Manual for the State-Trait Anxiety Scale. Consulting Psychologists, Palo Alto
15. Campbell-Enns H, Woodgate R (2015) The psychosocial experiences of women with breast cancer across the lifespan: a systematic review protocol. JBI Database System Rev Implement Rep 13(1):112–121
16. Maunder RG et al (2006) The relationship of attachment insecurity to subjective stress and autonomic function during standardized acute stress in healthy adults. J Psychosom Res 60(3):283–290
17. Mikulincer M, Shaver PR (2007) Attachment, group-related processes, and psychotherapy. Int J Group Psychother 57(2):233–245
18. Favez N et al (2017) Attachment and couple satisfaction as predictors of expressed emotion in women facing breast cancer and their partners in the immediate post-surgery period. Br J Health Psychol 22(1):169–185
19. Tacon AM (2003) Attachment experiences in women with breast cancer. Fam Community Health 26(2):147–156
20. Neel C et al (2015) Determinants of death anxiety in patients with advanced cancer. BMJ Support Palliat Care 5(4):373–380
21. Hüppe M, Uhlig T, Heinze J, Vogelsang H, Schmucker P (2000) Management and methodological approaches for the assessment of emotional states in anesthesiology. Anasthesiol Intensivmed Notfallmed Schmerzther 35(1):3–11
22. Osborne RH, Elsworth GR, Hopper JL (2003) Age-specific norms and determinants of anxiety and depression in 731 women with breast cancer recruited through a population-based cancer registry. Eur J Cancer 39(6):755–762
23. Van Esch L et al (2011) Trait anxiety predicts disease-specific health status in early-stage breast cancer patients. Qual Life Res 20(6):865–873
24. Galloway SK et al (2012) Depression and anxiety symptoms relate to distinct components of pain experience among patients with breast cancer. Pain Res Treat 2012:851276
25. Zimmermann T et al (2011) Fear of progression in partners of chronically ill patients. Behav Med 37(3):95–104
26. Janz NK et al (2016) Worry about recurrence in a multi-ethnic population of breast cancer survivors and their partners. Support Care Cancer 24(11):4669–4678
27. Fiorentino L et al (2011) The symptom cluster of sleep, fatigue and depressive symptoms in breast cancer patients: severity of the problem and treatment options. Drug Discov Today Dis Models 8(4):167–173
28. Shelke AR et al (2008) Effect of a nausea expectancy manipulation on chemotherapy-induced nausea: a university of Rochester cancer center community clinical oncology program study. J Pain Symptom Manage 35(4):381–387
29. Pierrisnard C et al (2018) Body image and psychological distress in women with breast cancer: a French online survey on patients' perceptions and expectations. Breast Cancer 25(3):303–308
30. Gilbert E, Ussher JM, Hawkins Y (2009) Accounts of disruptions to sexuality following cancer: the perspective of informal carers who are partners of a person with cancer. Health Lond 13(5):523–541
31. Vitale SG et al (2016) Comment on: "The consequences of gynaecological cancer in patients and their partners from the sexual and psychological perspective". Prz Menopauzalny 15(3):186–187
32. Carneiro MM et al (2018) Motherhood after breast cancer: can we balance fertility preservation and cancer treatment? A narrative review of the literature. JBRA Assist Reprod 22(3):244–252

33. Klafta JM, Roizen MF (1996) Current understanding of patients' attitudes toward and preparation for anesthesia: a review. Anesth Analg 83(6):1314–1321
34. Belleau FP, Hagan L, Masse B (2001) Effects of an educational intervention on the anxiety of women awaiting mastectomies. Can Oncol Nurs J 11(4):172–180
35. Goldzweig G et al (2009) Gender and psychological distress among middle- and older-aged colorectal cancer patients and their spouses: an unexpected outcome. Crit Rev Oncol Hematol 70(1):71–82
36. Grunfeld E et al (2004) Family caregiver burden: results of a longitudinal study of breast cancer patients and their principal caregivers. CMAJ 170(12):1795–1801