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Is bra discomfort a barrier to exercise for breast cancer patients?

Abstract

Goals of work Although exercise can provide a range of benefits for women living with a breast cancer diagnosis, many impediments to exercise exist. Several psychosocial and physical capacity impediments to exercise have been investigated, but no study has systematically investigated whether bras impede breast cancer patients from exercising. This study aimed to assess the extent to which exercise-induced breast pain and bra discomfort were reported by women living with breast cancer and whether this breast pain and bra discomfort impeded these women from participating in physical activity. **Patients and methods** Seventy-four women living with a breast cancer diagnosis completed a custom-designed questionnaire. Frequency data were analyzed to identify the most common barriers to exercise, and features in current bra designs causing discomfort during exercise were established. Main results When analyzed according to mean score, "bra discomfort" ranked as the fourth highest barrier to exercise behind a lack of self-discipline, procrastination, and fatigued by exercise. A significant 70.3% of the sample ($p < 0.001$) reported experiencing bra discomfort during exercise. Over half (57.7%) of these respondents reported the band as the most uncomfortable part of the bra. **Conclusions** This study has clearly established that bra discomfort, particularly bra band tightness, is a barrier to participating in physical activity for women living with a breast cancer diagnosis. To further encourage exercise in women living with a diagnosis of breast cancer, potential barriers to exercise, such as inadequate bra design, need to be modified to enable these women to enjoy the health benefits of exercising in comfort.

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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Is bra discomfort a barrier to exercise for breast cancer patients?

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Keywords: breast cancer, exercise, bras, breast motion, women's health

Introduction

Breast cancer has been identified as one of the leading types of cancer contributing to Australia's total burden of disease and the most common invasive cancer diagnosed among Australian females [1]. Despite the increase in breast cancer cases, improvements in treatment and population screening have led to a concurrent decline in mortality rates from the disease over recent years [2]. Consequently, more women than ever before are living with the permanent effects of breast cancer.

Although evidence-based research has examined the risk factors and presentation of breast cancer in women, relatively less information is available related to the maintenance and improvement in health for women living with breast cancer [3]. With increasing incidence rates and a growing number of survivors, greater efforts must be directed towards improving the physical functioning and quality of life of women with a breast cancer diagnosis. Previous research has shown that there are several quality of life interventions that may help an individual cope with the cancer experience, including cognitive-behavioral therapies, information and educational strategies, individual counseling, psychotherapy and social support [4]. However, one common limitation among these interventions is that they do not adequately address the physical and functional problems encountered by breast cancer patients, such as weight gain, fatigue, nausea and depression [5].

Exercise is being increasingly identified as an effective intervention that may address a broad range of quality of life issues, as well as enhance improvements in cardio-respiratory fitness, immune function during recovery, self-esteem and other psychological health parameters in breast cancer patients and survivors [6-9]. Studies have also shown promising effects of physical activity on fatigue, physical function, physical capacity and muscular fitness during, and after cancer treatment [5, 10-13]. In particular, breast cancer patients who exercise have reported decreased levels of anxiety and depression, coupled

with overall mood elevation [3]. Additionally, although the effect of physical activity on survival from cancer is largely unknown, it has been suggested that physical activity might improve prognosis through beneficial effects on cancer biomarkers and energy balance, as well as decreasing the risk of cardiovascular disease, an important cause of death for many cancer survivors [14]. Therefore, it is critical that any impediments to exercise are identified and minimized in order to encourage exercise, and its associated health benefits, among women living with breast cancer.

The long-term benefits of exercise can only be realized through regular participation and sustained physical activity is essential if the benefits are to be preserved over the course of cancer survivorship [15, 16]. Exercise adherence, however, is a difficult challenge for healthy adults and is likely to be even more difficult after a cancer diagnosis and during intensive medical treatment. Studies have reported adherence rates to supervised exercise interventions during treatment average 70% [7, 17] while adherence to supervised exercise programs after treatment increase to 87-98% [7]. However, it has been suggested that these adherence rates may even be over-estimated as they tend to provide a “snapshot” rather than detailed information about the duration, intensity and frequency of exercise achieved [18]. For example, a study by Irwin et al. found only 33% of post-treatment women within their program exercised for at least 150 minutes a week, while up to 94% exercise for at least 30 minutes a week [19]. No study was located which indicated the adherence rates of exercise among breast cancer patients outside of a research-generated exercise program. Some research exploring exercise adherence and motivation issues in breast cancer survivors has suggested that the strongest correlates of exercise adherence in cancer survivors are not demographic, socio-economic or medical variables but, rather, are social, cognitive variables such as attitudes, perceptions of control and subjective norms [18, 20-21]. Other research also indicates that over half of the barriers to supervised exercise can be directly attributed to the breast cancer disease and treatment

[22]. It is most likely that a combination of these barriers exist. As such, literature attempting to identify barriers to exercise in this patient population has covered a variety of psychosocial or physical capacity themes [23]. Interestingly, due to the changes which occur to the breast during the disease and treatment, there is scope for the notion of inadequate breast support as a reason female breast cancer patients do not adhere to exercise. However, no study was located which has systematically investigated whether bra design impedes female breast cancer patients from participating in exercise. This is surprising given that the fundamental purpose of a bra is to support the breasts and that during breast cancer treatment the breasts will be markedly affected.

Exercise-induced breast discomfort has been reported in female populations without breast cancer, so it is likely that breast discomfort might be experienced in a breast cancer cohort [24]. It is also likely that exercise-induced breast discomfort would be amplified in this patient population, possibly impeding women living with breast cancer from participating in physical activity. Therefore, the purpose of this study was to assess the extent to which exercise-induced breast pain and bra discomfort were reported by women living with breast cancer and whether this breast pain and bra discomfort impeded these women from participating in physical activity. It is hypothesised that: (1) bra discomfort will be a common barrier to exercise for female breast cancer patients and will present in over 50% of the sample population; and (2) breast cancer patients will display specific needs in an exercise bra, whereby breast cancer treatment side effects will be significantly related to bra discomfort.

Patients and Methods

Participants and Survey Implementation

Participants included 74 breast cancer patients aged 35-85 years (mean 63.4 ± 10.07 years), who resided in the Illawarra, New South Wales, Australia. The participants were

recruited via promotion of the survey at local community breast cancer events, at Illawarra Breast Cancer Support Group (IBCSG) meetings, and through the IBCSG newsletter. During promotion of the survey, breast cancer patients were invited to complete the survey on site, take the survey away, or contact the research team to indicate their willingness to have the survey mailed to their home address. Each participant was given a Participant Information Sheet and survey, within a pre-addressed reply-paid envelope. Tacit consent was applied, such that by filling in and returning the survey, subjects gave their informed consent to participate in the study. This was to ensure that every respondent provided consent, while having their confidentiality preserved.

The surveys were coded to allow for accurate response rate tracking and all data collection procedures were approved by the University of Wollongong Human Research Ethics Committee (HE059/07). Of the 111 surveys distributed, 74 were completed and returned (66.7% response rate).

Instrument

A researcher developed survey was designed, following a series of discussions with breast cancer patients, to delineate treatment phases, treatment type, side-effects and psychological issues associated with breast cancer, including social and motivational influences, which could act as barriers to exercise. These discussions also highlighted inadequacies in current bra designs for breast cancer patients. Following the development of the survey, content validity, as determined by expert review, was confirmed via focus groups. Participants in the focus groups were all breast cancer patients, moderately active, and expert review was further strengthened with the inclusion of an athletic runner and a professional bra fitter. The survey was structured into three parts as described below.

(1) *Diagnosis – “About You”*: This section consisted of 8 close-ended questions which assessed background information, including self-reported demographic variables

(age, postcode), and medical variables (e.g. disease timelines, treatment methods, types of surgery, and complications).

(2) Exercise – “About Your Exercise”: This section consisted of 42 close-end and 3 open-end questions which investigated levels of physical activity and perceived benefits and barriers to exercise. Levels of physical activity were assessed using the *Global Physical Activity Questionnaire: Recreational Activities* [25]. Perceived benefits and barriers to exercise were assessed using an adapted *Exercise Benefits and Barriers Scale* incorporating barriers identified in the literature to be specific to breast cancer patients [11, 20, 23, 26], and the inclusion of a question regarding exercise bra comfort. Participants were asked to rate, on a 4-point Likert scale, their level of agreement or disagreement with perceived benefits (n = 17 items) and barriers (n = 17 items; see Table 2) of exercise.

(3) Bra Design – “About Your Bra”: This section consisted of 11 closed-ended and 3 open-ended questions, which investigated the types of bras worn; whether the bra was professionally fitted; what respondents were prepared to pay for a bra; design features respondents looked for in a bra; whether bra discomfort was experienced; and the extent to which this discomfort was perceived as a barrier to exercise. These questions were based on previously validated bra design surveys [27, 28] that were modified through personal interviews and focus groups to be breast cancer specific. Questions in this section also identified the most common complications from which bra design modifications may be suggested.

The final survey instrument was composed of 68 closed-ended and 11 open-ended items. Closed-ended question were either a checklist of mutually exclusive categorical response options; Likert scales; ranking of items of a checklist; or ticking all checklist items that applied. The open-ended questions sought a written answer composed by the respondent to provide additional information where appropriate.

Reliability of the survey was confirmed through a 7-day test-retest method [29, 30]. The survey was deemed reliable with 85% of responses eliciting intraclass correlation coefficients of $R > 0.8$.

Statistical Treatment

Answers to the closed-ended items were coded and counted to determine the frequency response for each item. Where applicable, mean and standard deviation data were also calculated and tabulated for the closed-ended questions. Descriptive comments from open-ended item responses were reviewed and systematically represented using codes.

To assess the most common barriers to exercise, responses between perceived barrier questions were compared. The mean (and standard deviation) of responses for each question were calculated to show where most participants responded on the continuum of strong agreement (high score) to strong disagreement (low score).

A binomial test (based on z -test statistic approximation) was conducted to determine whether bra discomfort during exercise was experienced by a significant proportion of the sample. Pearson's Chi-Square test of independence ($\alpha = 0.05$, C.I 95%) was used to identify whether bra discomfort during exercise was dependent on surgery type, post-surgery aesthetic choices, treatment type or weekly level of exercise. To determine the feature of the bra causing the greatest discomfort for breast cancer patients, frequency data were expressed as a percentage of the total cases and analyzed using One-way Chi-Square statistical tests ($\alpha = 0.05$, C.I 95%). All statistical analyses, conducted using SPSS for Windows software (version 13.0, SPSS Inc, Chicago, USA), were completed by the Chief Investigator (SG).

Results

Sample Characteristics

Table 1 provides a summary of the sample's surgery, aesthetic choice (prosthesis or reconstruction), treatments and weekly exercise hours. Approximately half the sample had undergone a mastectomy (53·4%), with the remainder having undergone a lumpectomy (46·6%). All were relatively active with only nine respondents (12·2%) reporting that they had participated in no physical exercise over the last seven days. This finding differs substantially from previous studies, with sedentary behaviors being reported in up to 72% of a breast cancer population [15].

<Insert Table 1 about here>

Barriers to Exercise

The most commonly perceived barrier to exercise identified by the current sample of breast cancer patients was a “lack of self-discipline” (see Table 2). This question also had the highest standard deviation (0·93) indicating that, although most respondents agreed it was a barrier, the responses to the question varied greatly. Interestingly, based on mean scores, “bra discomfort” was the fourth highest perceived barrier to exercise ($\mu = 2\cdot16$), with most participants agreeing it was an issue when responding to general exercise barrier questions.

<Insert Table 2 about here>

Responses to the Bra Discomfort Section

When presented with the direct closed-question “Do parts of the bra you wear during exercise cause you discomfort?” a significant proportion ($p < 0\cdot001$) of the sample ($n = 52$; 70·3%) reported experiencing bra discomfort during exercise, compared to 22 respondents (29·7%) who reported no bra discomfort. Despite this discomfort, a significant proportion of the respondents ($n = 64$; 86·5%) reported that bra discomfort was not an impediment to them exercising, although 10 respondents (13·5%) reported that it was. Of these 10 respondents, 6 reported bra discomfort prevented a “few exercise

activities” (8·1%), while 4 reported being prevented from “some exercise activities” (5·4%). Interestingly, although most respondents indicated bra discomfort did not impede their exercise activities, a significant proportion of these respondents ($n = 42$; 56·8%) concurrently reported experiencing bra discomfort during exercise (see Table 3).

<Insert Table 3 about here>

No significant relationship between the type of surgery (mastectomy or lumpectomy) and the discomfort experienced during exercise was evident in the present study. Similarly, patient aesthetic choice (prosthesis, reconstruction or neither), treatment (chemotherapy or radiotherapy) and weekly exercise levels were independent of bra discomfort for breast cancer patients in this sample (see Table 4). Rather, results of the present study clearly confirmed that a significant proportion of breast cancer patients experienced bra discomfort during exercise, irrespective of treatment, although this discomfort had no significant effect on their weekly exercise levels.

<Insert Table 4 about here>

Impact of Treatment Side Effects on Bra Discomfort

Overall, a significant proportion of the sample reported experiencing bra discomfort during exercise ($n = 52$; 70·3%). An analysis of the impact of reported treatment side effects on bra discomfort revealed significant relationships between bra discomfort and lymphoedema, shoulder limitations, pain and muscular chest pain (see Table 5). It is postulated that these results are due to the effects of breast surgery on lymph node disruption, scar tissue formation and intercostalbrachial or brachial plexus nerve injury; effects which can be exacerbated by wearing an inappropriate bra during exercise.

<Insert Table 5 about here>

Bra Feature Causing the Greatest Discomfort

Of the patients who reported bra discomfort during exercise, a significant percentage (57·7 %) ranked the band as the part of the bra causing the most discomfort ($p < 0·001$). Of this 57·7%, half were lumpectomy patients ($n = 15$), with the other half having

undergone a mastectomy ($n = 15$; see Figure 1). Further investigations into the *causes* of bra band discomfort revealed that, of all respondents who reported the band as being the most uncomfortable part of the bra ($n = 30$), 30% were lumpectomy patients, who reported the band being “too tight” as the primary cause of this discomfort ($n = 9$; see Figure 2). This group of respondents was significantly different from any other group reporting causes of bra band discomfort ($p = 0.046$).

<Insert Figure 1 and 2 about here>

Discussion

To further encourage breast cancer survivors to exercise, potential barriers to exercise need to be minimized. The most common barriers to exercise for breast cancer patients in the present study included procrastination, a lack of self-discipline, fatigued by exercise, bra discomfort and exercise not being a priority. Apart from the inclusion of bra discomfort, the barriers to exercise for breast cancer patients in the present study were highly comparable to those previously reported in the literature [23]. It is notable that bra discomfort was the first barrier listed in the present study that can be externally influenced, such as via bra design modifications, making it an ideal option for intervention.

The proportion of women in a non-breast cancer population reported to experience exercise-induced breast discomfort is 56% [24]. However, in response to direct questioning, 70·3% of breast cancer patients in the present study reported experiencing bra discomfort during exercise. Interestingly, despite the substantial number of breast cancer patients reporting bra discomfort during exercise, only 13·5% of these women reported that this discomfort impeded their exercise participation. This suggests that a large and unacceptable proportion of women living with breast cancer, experience bra discomfort while they exercise. Therefore, bra design features causing discomfort need to be identified and improved so all women, irrespective of their breast cancer status, can exercise in comfort.

The band was identified as the bra component which caused the most discomfort to the breast cancer patients in the present study, irrespective of surgery type. Furthermore, band tightness was an acute cause of this discomfort, particularly for lumpectomy patients. Women living with a breast cancer diagnosis are particularly susceptible to fluctuating tissue oedema during both treatment and exercise and, in the present study, 92·3% of women who reported lymphoedema also reported bra discomfort. It is therefore

postulated that a potential link may exist between bra “band tightness” discomfort and increased tissue oedema, particularly for lumpectomy patients. In addition, a woman undergoing a lumpectomy experiences the partial removal of a breast, which can lead to asymmetrical breast mass. As bras are fitted to the larger breast, the smaller, treated breast frequently does not adequately fill the bra cup and may experience greater motion and consequently greater exercise-induced breast pain [31]. Therefore, it is speculated that lumpectomy patients, in an effort to limit vertical movement of the treated breast, tighten the bra band in order to “tighten” the cups. Inevitably, such a strategy will lead to “band tightness” discomfort.

Regardless of the reason for the tightness, there exists a need to modify the bra band for breast cancer patients, to reduce their exercise-induced breast discomfort. Although the theoretical solution for experiencing a tight bra band may be to simply loosen the bra, in practice this is not a viable answer. In fact, such a strategy would impede the functional design of an exercise bra to provide support, as well as cause the bra to ride up during exercise. Further studies must employ creative and innovative designs to relieve bra band pressure without impeding the functional support of an exercise bra.

This study, the first to systematically investigate the extent to which exercise-induced breast pain and bra discomfort are reported by women living with breast cancer, has clearly established that bra discomfort is a barrier to these women from participating in physical activity. It is acknowledged that the small sample size is a limitation of this study, and the results must be confirmed in larger sample groups. More expansive research needs to clearly identify specific exercise bra requirements according to treatment and side effects, with sufficient statistical power for each treatment subgroup, thereby permitting conclusive evidence to support the development of a range of exercise bras specifically designed to meet the needs of women living with breast cancer. This research should also draw clear conclusions and provide substantial data pertaining to bra

design modifications required to permit both adequate exercise support, as well as post-treatment comfort, for women living with a breast cancer diagnosis. The ultimate goal of such research is to reduce the potential barrier to exercise that uncomfortable bras pose, thereby enabling all women living with a breast cancer diagnosis to enjoy the benefits of exercise in comfort.

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Table 1: Summary of the sample population's surgery, aesthetic choice, treatments and weekly exercise (n = 74).

Percentage of Sample Population (n)	
Surgery	
Lumpectomy	45.9% (34)
Mastectomy	52.7% (39)
Neither	1.4% (1)
Aesthetic Choice	
Prosthesis Only	37.8% (28)
Reconstruction Only	13.5% (10)
Neither	48.7% (36)
Treatment	
Radiotherapy Only	35.1% (26)
Chemotherapy Only	13.5% (10)
Both	23.0% (17)
Neither	28.4% (21)
Weekly Exercise	
Sedentary	12.2% (9)
< 3 hours	29.7% (22)
3-4 hours	28.4% (21)
> 4 hours	29.7% (22)

Table 2: The most common barriers to exercise (ranked according to mean score) identified by the breast cancer patients (n = 74).

Barrier	Mean Score	SD
Lack of self-discipline	2.40	0.93
Procrastination	2.32	0.84
Fatigued by exercise	2.22	0.74
Bra discomfort	2.16	0.71
Not a priority	2.12	0.80
Inconvenient exercise schedule	2.06	0.71
Lack of equipment	2.04	0.64
Need to consult a fitness expert	2.02	0.77
Boring	1.98	0.71
Fatigue	1.94	0.65
Uncomfortable in exercise clothing	1.72	0.54
Lack of enjoyment	1.88	0.69
Family responsibilities	1.82	0.60
Can't use the changing facilities	1.82	0.63
Lack of interest	1.82	0.72
Don't know how to exercise	1.74	0.56
Too weak to exercise	1.72	0.54
Lack of time	1.72	0.57
Nausea	1.66	0.48

Table 3: The proportion of breast cancer patients who reported exercise bra discomfort as an impediment to exercise.

		Impediment to Exercise?		Total Reporting Discomfort	
		Yes	No		
Experience Bra Discomfort?	Yes	10 (13.5%)	42 (56.8%)	52 (70.3%)	
	No	0	22 (29.7%)	22 (29.7%)	
Total Reporting Impediment		10 (13.5%)	64 (86.5%)	74	

Table 4: Overview of relationships between surgery, aesthetic choice, treatment or weekly exercise and bra discomfort in the sample population (n = 74).

	Percentage of Respondents (n)		Pearsons Chi-Square Significance
	Discomfort	No Discomfort	
Surgery			
Lumpectomy	32.4% (24)	13.5% (10)	p = 0.552
Mastectomy	36.5% (27)	16.2% (12)	
Aesthetic Choice			
Prosthesis Only	28.4% (21)	9.5% (7)	p = 0.525
Reconstruction Only	6.8% (5)	5.4% (4)	
Neither	35.1% (26)	13.5% (10)	
Treatment			
Radiotherapy Only	27.0% (20)	8.1% (6)	p = 0.756
Chemotherapy Only	8.1% (6)	5.4% (4)	
Both	16.2% (12)	6.8% (5)	
Neither	18.9% (14)	9.5% (7)	
Weekly Exercise			
Sedentary	6.8% (5)	5.4% (4)	p = 0.707
< 3 hours	20.3% (15)	9.5% (7)	
3-4 hours	21.6% (16)	6.8% (5)	
> 4 hours	21.6% (16)	8.1% (6)	

Table 5: Pearsons Chi-Square significance between reported breast cancer treatment side effect and reported bra discomfort.

Side Effect	% of Sample Population Experiencing Side Effect	% of Group Experiencing Bra Discomfort	Pearson Chi-Square Significance (<i>p</i> -value)
Lymphoedema	35.1% (n=26)	92.3% (n=24)	0.002*
Broken/painful ribs	12.2% (n=9)	88.9% (n=8)	0.192
Weight gain	58.1% (n=43)	67.4% (n=29)	0.531
Nausea	16.2% (n=12)	58.3% (n=7)	0.323
Fatigue	60.8% (n=45)	71.1% (n=32)	0.844
Shoulder limitations	44.6% (n=33)	87.9% (n=29)	0.003*
Depression	28.4% (n=21)	80.9% (n=17)	0.206
Aching muscles	48.7% (n=36)	80.6% (n=29)	0.060
Breathlessness	33.8% (n=25)	72.0% (n=18)	0.816
Flushes	59.5% (n=44)	70.5% (n=31)	0.966
Burning/sensitive skin/chafing	31.1% (n=23)	69.6% (n=16)	0.929
Sleep disorders	51.4% (n=38)	76.3% (n=29)	0.242
Pain	29.7% (n=22)	86.4% (n=19)	0.049*
Muscular chest wall pain	29.7% (n=22)	90.9% (n=20)	0.012*

* Denotes significance ($p < 0.05$)