SPMC JHCS

RESEARCH

Psychosocial factors related to postmastectomy pain syndrome among women with breast cancer: cross-sectional study

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Article editors
Joanna Victolero
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Received
1 August 2017

Accepted
31 October 2018

Published online
21 December 2018

Cite as
Lanaban ARD, Sorrosa RJ, Concha AS. Psychosocial factors related to postmastectomy pain syndrome among women with breast cancer: cross-sectional study. *SPMC J Health Care Serv.* 2019;5(1):1. http://n2t.net/ark:/76951/jhcs5gxf88

ABSTRACT

Background. An insight on the association of psychosocial factors with postmastectomy pain syndrome (PMPS) can help in the holistic management of patients with PMPS.

Objective. To determine the proportion of patients with PMPS among those who underwent mastectomy for breast cancer and identify factors associated with the syndrome.

Design. Cross-sectional study.

Setting. Outpatient Unit in Southern Philippines Medical Center.

Participants. 45 women who had mastectomy for breast cancer.

Main outcome measures. Proportion of patients with PMPS; prevalence odds ratios (POR) of having PMPS for selected factors.

Main results. The patients had a mean age of 53.18 ± 8.09 years, mean BMI of 23.57 ± 2.65, and—on average—were 27.09 ± 35.76 months postmastectomy upon entry into the study. Of the 45 patients, 22 (48.89%) had PMPS. Univariate POR of having PMPS were significantly high for patients who: had distant metastasis (POR=5.56; 95% CI 1.27 to 24.29; p=0.0227), experienced premastectomy breast pain (POR=35.70; 95% CI 6.14 to 207.52; p<0.0001), were in late-stage family life cycle (POR=9.18; 95% CI 1.02 to 82.22; p=0.0476), and were in late-stage family illness trajectory (POR=4.96; 95% CI 1.39 to 17.70; p=0.0137).

Conclusion. In this study, 48.89% of patients had PMPS. Factors associated with PMPS include: having distant metastases, having premastectomy breast pain, being in late-stage family life cycle, and being in late-stage family illness trajectory.

Keywords. premastectomy breast pain, family illness trajectory, family life cycle, family function

INTRODUCTION

Postmastectomy pain syndrome (PMPS) is the chronic neuropathic pain in the anterior aspect of the thorax, axilla, and/or upper half of the arm that persists beyond three months after mastectomy.[1] The subtypes of PMPS include phantom breast pain, intercostobrachial neuralgia, pain secondary to a neuroma, and pain due to other nerve damage.[2] Among patients who undergo mastectomy, 25% to 60% experience persistent pain after the surgery.[3 4] Around 30% to 80% of postmastectomy patients experience phantom breast syndrome, which is pain that is perceived in the absent breast after mastectomy.[5] Other known risk factors for postmastectomy pain syndrome are chemotherapy, radiotherapy and nerve damage related to surgical techniques used.[6]

The present management of PMPS includes topical application of lidocaine/prilocaine cream, oral mexiletine, oral opioids and ultrasound-guided intercostobrachial nerve (ICBN) perineural injections of triamcinolone and lidocaine.[7-9] Psychosocial factors have been known to affect the perception of pain. Patients in pain who have good general social support have been found to have better pain outcomes, with decreased pain intensity.[10 11] Negative emotional responses, such as anxiety, can also lead to the persistence of pain.[12 13]

The relationship of PMPS and the psycho-

IN ESSENCE

The physical pain felt by patients with chronic illness can be influenced by psychosocial factors.

In this cross-sectional study, 48.89% of patients who underwent mastectomy experienced postmastectomy pain (PMPS). Having premastectomy breast pain or distant metastases and coming from a family in late-stage family life cycle or late-stage family illness trajectory increased the odds of having PMPS.

Early identification of psychosocial factors related to PMPS can provide insight on the overall experience of patients and help in the holistic approach to pain management in PMPS.

social characteristics of the patient's family has not been explored. If psychosocial factors indeed play a role in pain perception in PMPS, psychosocial management can be added to the present pharmacologic interventions in order to improve the overall biopsychosocial care of patients with breast cancer.

This study aimed to determine the proportion of patients with PMPS and identify clinical and psychosocial factors associated with the syndrome among patients who underwent mastectomy for breast cancer.

METHODS

Study design and setting

We conducted a cross-sectional study in the Surgery and Internal Medicine departments of the Outpatient and Preventive Care Services Unit in Southern Philippines Medical Center, Davao City from December 2012 to January 2013. Both departments dedicate one day per week to cater to patients with breast cancer in any stage of the illness.

Participants

Female patients aged 18 years or older who had radical mastectomy for breast cancer were eligible to participate in this study. We excluded patients who had chest surgery for conditions other than breast cancer, unstable comorbid conditions, chest trauma, or any chest pain prior to the mastectomy. Sample size computation for this study was computed based on the assumption that 46% of surgically-treated patients with breast cancer have chronic pain.[14] The study would require at least 44 patients for estimating the expected proportion with an absolute precision of 15% and confidence level of 95%. We were able to recruit 45 women into our study.

Data collection

We used a questionnaire to gather the demographic, clinical, and psychosocial data of each patient. For demographic characteristics, we collected the patient's age, civil status, level of education, and employment status. For clinical characteristics, we gathered data on the patient's body mass index (BMI), smoking history, alcohol drinking history, comorbidities, presence of any ipsilateral breast pain before mastectomy, and the number of months since mastectomy. We also asked the patient's attending physician about the stage of the breast cancer—including the presence of distant metastasis—at the time of the patient's participation in the study.

Different phases in the illness course elicit distinct psychosocial problems that patients and their families need to address.[15] Hence, determining the stage of the family illness trajectory—onset of illness, reaction to diagnosis, major therapeutic efforts, early adjustment to outcome, or adjustment to permanency of the outcome[15]—is usually part of the biopsychosocial assessment of patients with chronic illness. In this study, we asked each patient about her expectations regarding full return to her pre-cancer condition. From her answer, one of us (AL) determined the stage of family illness trajectory that the patient was in.

The roles and relationships among family members change through time as they go through the different stages in the family life cycle—unattached young adult, newly married couple, family with young children, family with adolescents, launching family, and family in later years.[16] We drew a 3-generation genogram for each patient in this study, identified the roles, responsibilities, and present living arrangements of the patient's family members, and asked the patient about her perceived family support. From these information, one of us (AL) established the family life cycle stage that the patient was in.

Family APGAR is a scoring system for family function. A family member rates five statements depending on his or her satisfaction of the family's social support on the domains of Adaptability, Partnership, Growth, Affection, and Resolve. Each domain is rated 0 (least satisfied), 1, or 2 (most satisfied). The total score is interpreted as: severely dysfunctional family (0-3); moderately dysfunctional family (4-7); and highly functional family (8-10).[17] For this study, we established family function by requesting the patient to answer the Filipino translation of the Family APGAR tool.[18]

The primary outcome measure in this study was the presence of PMPS. We considered PMPS if a patient reported any chronic, ipsilateral pain in the anterior chest, axillary area and/or upper half of the arm that persisted beyond three months after her mastectomy procedure. We also asked each patient with PMPS about the: pain character (tingling, pins and needles, electricity-like, stabbing, or mixed), radiation (radiating or non-radiating) of the pain, rating (using a 10-point numerical rating scale from 1= "least

Table 1 Sociodemographic and clinical characteristics of patients

Characteristics	Total n=45	With post mastectomy pain syndrome (n=22)	Without post mastectomy pain syndrome (n=23)	p-value
Mean age ± SD, *years*	53.18 ± 8.09	53.45 ± 7.67	52.91 ± 8.63	0.8253
Civil status, frequency (%)				0.3887
Single	4 (8.89)	2 (9.09)	2 (8.70)	
Married	36 (80.00)	19 (86.36)	17 (73.91)	
Widowed	5 (11.11)	1 (4.55)	4 (17.39)	
Highest level of education, *frequency (%)*				0.1806
Elementary	3 (6.67)	0 (0.00)	3 (13.04)	
High school	23 (51.11)	13 (59.09)	10 (43.48)	
College	19 (42.22)	9 (40.91)	10 (43.48)	
Employed, *frequency (%)*	15 (33.33)	9 (40.91)	6 (26.09)	0.2917
Mean BMI ± SD	23.57 ± 2.65	24.45 ± 2.88	22.73 ± 2.14	0.0279*
BMI category, *frequency (%)*				0.0074*
Normal	33 (73.33)	12 (54.55)	21 (91.30)	
Overweight	12 (26.67)	10 (45.45)	2 (8.70)	
Smoker, *frequency (%)*	4 (8.89)	3 (13.64)	1 (4.35)	0.3463†
Alcohol drinker, *frequency (%)*	3 (6.67)	1 (4.55)	2 (8.70)	1.0000†
Comorbidities, *frequency (%)*				
Hypertension	7 (15.56)	3 (13.64)	4 (17.39)	1.0000†
Diabetes mellitus	3 (6.67)	0 (0.00)	3 (13.04)	0.2333†
Premastectomy breast pain, *frequency (%)*	19 (42.22)	17 (77.27)	2 (8.70)	<0.0001*†
Mean number of months since mastectomy ± SD, *months*	27.09 ± 35.76	40.32 ± 46.36	14.43 ± 12.78	0.0134*
Stage of breast cancer, *frequency (%) (n=43)*				0.0585
I	3 (6.98)	0 (0.00)	3 (14.29)	
II	6 (13.95)	2 (9.09)	4 (19.05)	
III	21 (48.84)	10 (45.45)	11 (52.38)	
IV	13 (30.23)	10 (45.45)	3 (14.29)	
Family illness trajectory stage, *frequency (%)*				0.0359*
Onset of illness	0 (0.00)	0 (0.00)	0 (0.00)	
Reaction to diagnosis	0 (0.00)	0 (0.00)	0 (0.00)	
Major therapeutic efforts	8 (17.78)	2 (9.09)	6 (26.09)	
Early adjustment to outcomes	17 (37.78)	6 (27.27)	11 (47.83)	
Adjustment to the permanency of the outcome	20 (44.44)	14 (63.64)	6 (26.09)	
Family life cycle stage, *frequency (%)*				0.0238†
Unattached adult	2 (4.44)	0 (0.00)	2 (8.70)	
Newly married couple	0 (0.00)	0 (0.00)	0 (0.00)	
Family with young children	1 (2.22)	1 (4.55)	0 (0.00)	
Family with adolescents	5 (11.11)	0 (0.00)	5 (21.74)	
Launching family	26 (57.78)	17 (77.27)	9 (39.13)	
Family in later years	11 (24.44)	4 (18.18)	7 (30.43)	
Mean Family APGAR score ± SD	8.51 ± 1.66	7.95 ± 2.08	9.04 ± 0.88	0.0261*
Family APGAR category, *frequency (%)*				0.2576
Highly functional	40 (88.89)	18 (81.82)	22 (95.65)	
Modysfunctional	3 (6.67)	2 (9.09)	1 (4.35)	
Severely dysfunctional	2 (4.44)	2 (9.09)	0 (0.00)	

* Statistically significant.
† Using Fisher's exact test.

Table 2 Characteristics of postmastectomy pain syndrome

Characteristics	Values (n=22)
Pain character, *frequency (%)*	
Tingling	2 (9.1)
Pins and needles	5 (22.7)
Electricity-like	12 (54.6)
Stabbing	1 (4.5)
Mixed	2 (9.1)
Pain radiation, *frequency (%)*	9 (40.91)
Mean worst pain score ± SD*	7.82 ± 1.68
Taking pain medication, *frequency (%)*	4 (18.18)

* From 1 (least painful) to 10 (most painful).

painful" to 10= "most painful") of the worst pain she experienced, and use of medications for the pain.

Statistical analysis

We summarized continuous variables as means and standard deviations and compared means between groups using t-test. We summarized categorical variables as frequencies and percentages and compared proportions using chi-square test or Fisher's exact test. Associations of variables were expressed as prevalence odds ratios (POR) and their 95% confidence intervals. We predetermined the cut-off points of categorical variables with more than two classifications as follows: Stage IV breast cancer for 'distant metastasis'; Family APGAR score of <8/10 for 'dysfunctional family'; 'launching family' and 'family in later years' for 'late-stage family life cycle'; and 'adjustment to the permanency of the outcome' for 'late-stage family illness trajectory.' We performed univariate logistic regression to determine the unadjusted associations of the selected clinical, and psychosocial factors with the presence of PMPS. We also explored the associations of the variables after adjusting for age, BMI, and number of months since mastectomy. We used Epi Info version 7.2.1 for all our statistical analyses.

RESULTS

We analyzed the data of 45 patients who underwent mastectomy. PMPS was reported by 22/45 (48.89%) of the patients. Table 1 shows the sociodemographic, clinical, and psychosocial profiles of patients both as total sample and as divided according to the presence or absence of PMPS.

The mean age of the patients was 53.18 ± 8.09 years, while the mean BMI was 23.57 ± 2.65. Mean ages were comparable between patients with PMPS and those without, but the mean BMI of patients with PMPS (24.45 ± 2.88) was significantly higher than those who did not have the syndrome (22.73 ± 2.14; p=0.0279). The group with PMPS had significantly higher mean number of months since mastectomy (p=0.0134) and significantly lower mean Family APGAR score (p=.0261) than the group without PMPS. The groups also significantly differed in terms of distributions of BMI categories (p=0.0074), family illness trajectory stages (p=0.0359) and family life cycle stages (p=0.0238).

As summarized in Table 2 the mean worst pain score of patients who experienced PMPS was 7.82 ± 1.68. More than half of the patients described the pain as "electricity-like." Some patients characterized the pain as radiating, and some took medications for the pain.

Table 3 shows the associations between selected patient characteristics and presence of PMPS. The odds ratios of having PMPS were significantly high among patients who had premastectomy breast pain (POR=35.70; 95% CI 6.14 to 207.52; p<0.0001) and distant metastasis (POR=5.56; 95% CI 1.27 to 24.29; p=0.0227), and those who were in late-stage family life cycle (POR=9.18; 95% CI 1.02 to 82.22; p=0.0476) and late-stage family illness trajectory (POR=4.96; 95% CI 1.39 to 17.70; p=0.0137). After adjustment for age, BMI, and number of months since mastectomy, the odds ratios of having PMPS among patients who had premastectomy breast pain (adjusted POR=24.68; 95% CI 3.35 to 181.73; p=0.0016) and those who were in late-stage family life cycle (adjusted POR=22.30; 95% CI 1.29 to 384.74; p=0.0326) remained significantly high.

DISCUSSION

Key results

In this study, 48.89% of patients who had mastectomy had PMPS. Unadjusted prevalence odds ratio computation revealed that having premastectomy breast pain, having distant metastasis, being in late-stage family life cycle, and being in the late-stage family illness trajectory were significantly associated with having PMPS. After adjustment for age, BMI and number of months since mastectomy, both having premastectomy breast pain and being in late-stage family life cycle

were significantly associated with having PMPS.

Strengths and limitations

In this study, we were able to explore and link clinical (i.e., premastectomy breast pain, distant metastasis) and biopsychosocial (i.e., late-stage family illness trajectory, late-stage family life cycle) factors with a clinical condition (i.e., PMPS). Demonstrating some biopsychosocial bases of the syndrome establishes its multifactorial nature and opens the possibility of modifying the pain symptoms through psychosocial interventions. For this study, we used the Family APGAR to assess family function. The Family Assessment Device, which we did not use in this study, is another quantitative tool that assesses several dimensions of family function.[19] There are also other tools employed by practitioners in Family Medicine to assess a patient and his or her family's psychosocial status that we did not use in this study. SCREEM, family mapping,[20 21] and Ecomap[22 23] are some of the established Family Medicine tools that can potentially enable practitioners to gain deeper knowledge on the patient's psychosocial environment, but the use of these tools do not easily establish the associations of the psychosocial environment with pain.

Interpretation

Almost half of the patients (48.89%) in our study population reported symptoms consistent with PMPS. The figure is consistent with PMPS prevalence rates reported in previous literatures, which range from 20% to 64.1%.[24-28] We used a simple method to determine which patients had PMPS by asking direct questions on the presence, location and timing of any chronic pain, which lasted for more than three months postmastectomy. Other studies considered the characteristics, frequency and intensity of pain[27 28] or used different questionnaires[24-26] to establish the presence of PMPS.

Clinical factors

In this study the odds of having PMPS were 35.7 times as high among patients with premastectomy breast pain than among those who did not report any breast pain prior to mastectomy. This association may be related to individual differences in somatic focus (e.g., pain-related fear, pain amplification). Individuals who often experience somatic symptoms are prone to report more pain and other related symptoms.[29] Thus, patients who report pain symptoms before a surgical procedure are also the ones more likely to report similar symptoms after the surgery.

Our study findings also revealed that distant metastasis of the breast cancer was significantly associated with PMPS. In another study, 67% of patients with PMPS had advanced stage breast cancer.[30] One explanation for this association would be the frequent co-occurrence of local tumor spread, distant metastasis, and locoregional recurrence of breast cancer.[31 32]

Increased inflammatory tissue responses—such as swelling, numbness, hardness, and strange sensation in the breast prior to surgery—may also be caused by changes in the tumor microenvironment. The presence

Table 3 Logistic regression analysis showing the association of selected clinical and psychosocial factors with postmastectomy pain syndrome

	Unadjusted		Adjusted*	
Clinical factors	Prevalence odds ratio (95% CI) n=45	p-value	Prevalence odds ratio (95% CI) n=45	p-value
Premastectomy breast pain	35.70 (6.14 to 207.52)	<0.0001*	24.68 (3.35 to 181.73)	0.0016*
Distant metastasis†	5.56 (1.27 to 24.29)	0.0227*	1.55 (0.21 to 11.36)	0.6674
Dysfunctional family (APGAR score <8)‡	4.89 (0.50 to 47.71)	0.1722	1.01 (0.05 to 21.29)	0.9953
Late-stage family life cycle§	9.18 (1.02 to 82.22)	0.0476*	22.30 (1.29 to 384.74)	0.0326*
Late-stage family illness trajectory‖	4.96 (1.39 to 17.70)	0.0137*	4.57 (0.79 to 26.55)	0.0905

* For age, body mass index, and number of months since mastectomy.
† Stage IV breast cancer.
‡ Moderate or severe family dysfunction.
§ Being in the *launching family or family in later years* stage of the family life cycle.
‖ Being in the *adjustment to the permanency of the outcome* stage of family illness trajectory.

of immune cells like tumor-associated macrophages contribute to the inflammation, which then lead to sensory disturbances.[33] These responses elicit increased somatic awareness, which is associated with the occurrence of persistent pain conditions.[34]

Psychological factors

The patients in our study who were in late-stage family illness trajectory had significantly higher odds of having PMPS than those in the earlier stages of the trajectory. The stages of family illness trajectory depict the usual course of an illness and the psychosocial reaction of the patient and family to the illness. Knowledge of the stage at which a patient and his or her family is in the trajectory allows the physician to anticipate and deal with the family members' response toward the illness. The stages of the trajectory are: 'onset of illness,' 'reaction to diagnosis,' 'major therapeutic efforts,' 'early adjustment to outcomes,' and 'adjustment to the permanency of the outcomes.'[35] The last stage in the trajectory—and what is referred to in our study as 'late-stage family illness trajectory'—involves a psychosocial crisis that the patient and her family must overcome. This crisis requires the acceptance of the reality that full return of the patient's health can no longer be obtained, and that debilities that were deemed temporary must now be seen as permanent.[15]

Also in our study, patients in late-stage family life cycle had significantly higher odds of having PMPS than those in early-stage family life cycle. The stages of the family life cycle show the structural and psychosocial changes of the family as a social unit over time.[36] Each stage has a unique set of events, which family members deal with and which serves as an impetus for change within the family. The stages of the family life cycle are: 'unattached young adult,' 'newly married couple,' 'family with young children,' 'family with adolescents,' 'launching family,' and 'family in later life'.[37] As family members go through the life cycle, they experience various first- and second-order changes within the family. First-order changes involve tasks that family members need to do, such as re-examining the family's living arrangements and maintaining contact with younger generations during the shift from the 'launching family stage' to the 'family in later life stage.' First-order changes do not involve alteration in the family's structure. Second-order changes involve changes in the roles and identities of each family member and the entire family structure, which need to happen in order for the family to proceed developmentally. In the 'family in later life' stage, the second-order changes include providing support for the middle generation to take a more central role in the family, and dealing with loss of spouse or other family members.[18] As referred in our study, 'late-stage family life cycle' includes the 'launching family' stage and the 'family in later life' stage. The 'launching family' stage begins with the departure of the first child and lasts until the departure of the last child, which then marks the beginning of the 'family in later life stage.' Such egresses of children often lead to the 'empty nest syndrome,' which is characterized by depression and loneliness among parents in response to being left behind.[38] Psychosomatic problems may also arise secondary to the departure of children from their homes.[18]

Family caregivers have a significant role in a patient's pharmacologic and nonpharmacologic pain management, especially at home. Their responsibilities include the administration, reporting, and monitoring of medications, and the provision of emotional support and assistance to the patient.[39] In 'late-stage family life cycle,' less family members are involved to do these functions since they will have physically left the nuclear structure by this time. Moreover, in 'late-stage family life cycle,' the older family members adjust and adapt to a number of physical and health-related changes, e.g., physiologic changes, disabilities, episodic medical problems, or death of family members.[18] The relapsing or episodic course of chronic illnesses, such as cancer, requires frequent role changes among family members, adding tremendous stress to the family unit.[40]

On the other hand, social support may also intensify the overall pain experience and disability of patients. Some patients may experience more pain if their overly supportive partners hinder them from performing any task that may exacerbate their condition. Such solicitous behavior of partners are reported to increase the pain experience of patients, and lengthen their periods of disability.[41]

The physical pain that patients in our study reported as part of PMPS possibly had psychosocial bases. It is possible that the

pain was a consequence of the psychosocial stressors that they were experiencing at this particular stage in the illness. Emotional stress is a strong antecedent of PMPS.[42] The association of psychosocial crises and somatic symptoms has been reported in the past.[43] Pain-specific psychosocial constructs and past experiences have also been known to modify the experience of chronic pain.[44-46] Although not demonstrated in our study findings, poor family functioning in the roles and affective involvement dimensions have been significantly associated with chronic widespread pain.[19] The social and emotional demands of late-stage family illness trajectory and late-stage family life cycle not only present as enormous developmental challenges to family members but also provide additional psychosocial stress to patients. It is possible that the stressors experienced by some of our patients in these particular biopsychosocial contexts all contribute to the chronic pain that they experience as PMPS.

Generalizability

Our findings may be applied to patients who share similar characteristics with the patients in our study. We had a good representation of women participants in our study in terms of: civil status, highest level of education, employment status, BMI, smoking history, alcohol drinking history, comorbidities, and stages of breast cancer. The range of psychosocial characteristics—i.e., stages in the family illness trajectory and family life cycle—of patients in our study was also broad. The insight on how psychosocial factors affect pain experience in PMPS is important in improving current standards of cancer pain management. A diagnostic evaluation of a patient's psychosocial characteristics ensures the early recognition and holistic management of PMPS.[47] Skill-based and education-based psychosocial interventions have been suggested to become part of an integrative approach to cancer pain management.[48 49] Based on our findings in this study, patients who have undergone mastectomy for breast cancer and who experience PMPS may also benefit from family-based psychosocial interventions. Counseling or other interventions that are aimed towards the family's healthy acceptance of the permanency of a patient's condition can potentially alleviate the pain perceived by the patient. Likewise, a patient's experience of pain may also be possibly modified for the better with family-based interventions that promote the successful implementation of first- and second-order changes within the patient's immediate family as they all go through the shift to another stage in the family life cycle.

CONCLUSION

Among patients with breast cancer who were included in this study, 48.89% had PMPS. Patients with premastectomy breast pain, distant metastasis, and those who were in late-stage family life cycle and late-stage family illness trajectory had significantly higher odds of having PMPS.

Ethics approval
This study was reviewed and approved by the Department of Health XI Cluster Ethics Review Committee (DOH XI CERC reference P12103106).

Reporting guideline used
STROBE Checklist (http://www.strobe statement.org/fileadmin/Strobe/uploads/checklists/STROBE_checklist_v4_combined.pdf)

Article source
Submitted

Peer review
External

Funding
Supported by personal funds of the authors

Competing interests
None declared

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