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ORIGINAL RESEARCH

# Prevalence of persistent pain after breast cancer surgery and associated risk factors in Saudi women

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## ABSTRACT

**Background:** Persistent pain is a sensation of burning in the arm, anterior chest, and axilla. This pain can persist for several years. The prevalence of persistent pain differs greatly. Several factors are associated with persistent pain after breast cancer surgery including age, body mass index, adjuvant therapy, preoperative pain, and axillary lymph node dissection. The aim of the study was to investigate the prevalence of persistent pain and its risk factors for females after their breast cancer surgery.

**Methodology:** This is a cross-sectional study performed on 200 female patients who underwent a unilateral mastectomy. A questionnaire via the Internet was used in this study.

**Results:** In this study, the patients were divided into two groups, where each included 100 patients; the first group involved the patients with pain and the second group included the patients without pain. There was a significant difference (P value = 0.03) regarding radiotherapy as a risk factor.

**Conclusion:** Radiotherapy was the only significant risk factor for persistent pain after the breast cancer surgery.

**Keywords:** PPBCT, breast cancer, persistent pain, postoperative persistent pain.

## Introduction

Persistent pain after mastectomy was reported by Wood [1] in 1970 who defined persistent pain as a dull sensation of burning and aching in the arm, anterior chest, and axilla, which is increased by movement of the shoulder girdle. The pain persists for longer than 3 months [2], or it can persist for several years [3,4]. PPBCT is a side effect of breast cancer treatment [5].

The prevalence of persistent pain after surgery of breast cancer was reported to be in the range of 25% to 60% [6]. Persistent pain often causes considerable morbidity as a result of decline in emotional and physical well-being and debilitates the affected patients [5]. It was demonstrated that the patients who suffer persistent pain also suffer from high level of perceived stress, more anxiety, and depressive symptoms when compared with patients having no pain [7]. Presence of persistent pain is a significant predicting factor of reduced health-related quality of life after breast cancer surgery [8]. The mechanism of persistent pain occurrence is still uncertain and is likely multifactorial [2]. Adjuvant radiation damages the nerve fibers during the surgery, and chemotherapy may cause the persistent pain [9,10]. It was mentioned that pain was more common in young women and higher BMI was associated with more difficult surgical dissection that results in nerve damage. Age and BMI are risk factors for persistent pain that are related to the patient. The physiological risk factors for persistent pain include sleep disturbance, anxiety, depression, and catastrophizing [11]. So, this study aimed to assess the risk factors and their prevalence in female patients in Saudi Arabia who suffered persistent pain after breast cancer surgery.

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## Subjects and Methods

This study is a cross-sectional study of females who underwent unilateral mastectomy surgery, and was conducted using a questionnaire distributed via the Internet during the period January 2017 to March 2017. There were 353 females who participated in the survey, out of which, 53 were excluded as they underwent bilateral mastectomy and 100 were excluded as they did not meet the inclusion criteria. We excluded participants with breast cancer recurrence, those who showed breast reconstruction, and with migrated breast cancer. The final size of the study included 200 females. The questionnaire included questions about demographics and questions about the case such as the therapy used by the patients, tumor side, size, and location. When patient reported a persistent pain, the pain intensity was evaluated by using a numerical rating scale (NRS) of 0 to 10. The areas in which patients experienced pains were assessed and divided into three categories: mild, moderate, and severe.

Data were analyzed using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Chi-square tests were used for categorical variables and Student's *t*-test for normally distributed continuous variables. P value $< 0.05$ was considered statistically significant.

## Results

This study included 200 female participants who underwent unilateral mastectomy surgery: 100 participants reported pain and 100 did not experience pain; the mean age and the mean of BMI of the two groups of participants were close, whereas the mean age of patients with pain was 62.5 ± 12.2 years, while for patients without pain, it was 65.2 ± 10.8 years. The mean of BMI for patients with pain was 27.7 ± 5.3, whereas for the patients who did not experience pain, the mean of BMI was 25.4 ± 4.3. Right breast tumor was common in both groups (53% and 58% for patients with and without pain, respectively). Tumor size of more than 20 mm was more common in the group which did not experience pain (58%); the tumor in the upper lateral quadrate was more common in patients who experienced pain (26%). Patients with pain were more prone to have positive lymph nodes (67%) and required chemotherapy (42%) and radiotherapy (54%) than those who did not experience pain, whereas the group without pain was more prone to endocrine treatment (80%) than those with pain. The comparison between the two groups regarding demographics is shown in Table 1.

Based on the prevalence of risk factors that are associated with pain, a comparison between the two groups was established. Age, BMI, same dominant hand as a side for surgery, endocrine treatment, and tumor location, side, and size were not considered as significant risk factors while comparing the two groups. Whereas radiotherapy, chemotherapy, and axillary procedure were considered as risk factors for developing pain as there were significant differences between the two groups regarding these risk factors (Table 2).

The average pain intensity for patients who reported experiencing pain was 4.9 ± 2.1 on the NRS. There were 32% who experienced mild pain, where 52% and 16% experienced moderate and severe pain, respectively. The presence of pain was investigated in five areas: the area of the missing breast, the axilla, side of the thorax, the mastectomy scar, and the arm. The frequencies of pain regarding the area and severity of pain are shown in Table 3.

***Table 1.*** *Comparison between the patient who experienced pain and those without pain.*

| Characteristics | With Pain N = 100 | Without Pain N = 100 |
|---|---|---|
| Age | 62.5 ± 12.2 | 65.2 ± 10.8 |
| BMI | 27.7 ± 5.3 | 25.4 ± 4.3 |
| **Tumor side** | | |
| Left breast | 47 (47%) | 42 (42%) |
| Right breast | 53 (53%) | 58 (58%) |
| Tumor size >20 mm | 58 (58%) | 62 (62%) |
| Tumor in upper lateral quadrate | 26 (26%) | 23 (23%) |
| Positive lymph nodes | 67 (67%) | 51 (51%) |
| **Chemotherapy** | | |
| Yes | 42 (42%) | 34 (34%) |
| No | 58 (58%) | 66 (66%) |
| **Radiation therapy** | | |
| Yes | 54 (54%) | 36 (36%) |
| No | 46 (46%) | 64 (64%) |
| **Endocrine treatment** | | |
| Yes | 70 (70%) | 80 (80%) |
| No | 30 (30%) | 20 (20%) |

## Discussion

This study was conducted on patients who underwent breast cancer surgery, specifically those who underwent unilateral mastectomy. The number of patients was 200, whereas 100 of them did not suffer persistent pain; the prevalence of persistent pain represented 50% of patients who participated in this study. It was reported that chronic pain after surgery for breast cancer could be present in 50% of the patients [12,13].

It was reported in one study that 38.3% of females in the study suffered surgical site pain [5]. The prevalence of pain presented in this study is higher than that reported by previous studies, whereas the prevalence rate reported in this study ranged from 24% to 47% [4,6,7,14]. A low prevalence rate of 8.2% was reported from one study [15]. The differences in prevalence between the different studies return to the difference in the definition of persistent pain and the duration as well as the frequency of pain reported by patients. The assessment of the prevalence of pain after breast surgery is difficult as there are limitations in the different methodology used and the treatments that the patients receive [16]. Several risk factors for persistent pain were mentioned in several studies and they were categorized into many groups—preoperative, intraoperative, and postoperative risk factors—and they included high BMI, young age, severe acute preoperative and postoperative pain, chemotherapy, radiotherapy, and axillary surgery [17].

Factors can be related to the patient and the treatment of the patient [11]. By studying age as a risk factor in this study, it was found that pain was more common in patients with age less than 60 years; however, no significant difference was found (P value = 0.1). Previous studies [6,14,18] stated that younger age was a risk factor for developing pain. The correlation between younger

***Table 2.*** *The risk factors for developing pain.*

| Risk Factors | With Pain N = 100 | Without Pain N = 100 | P value |
|---|---|---|---|
| **Age** | | | |
| <60 | 59 (59%) | 60 (60%) | 0.1 |
| ³60 | 41 (41%) | 40 (40%) | |
| **BMI** | | | |
| <18.5 | 6 (6%) | 8 (8%) | 0.6 |
| 18.5-24.9 | 37 (37%) | 42 (42%) | |
| 25-29.9 | 33 (33%) | 30 (30%) | |
| ³30 | 24 (24%) | 20 (20%) | |
| **Same dominant hand as a side for surgery** | | | |
| Yes | 47 (47%) | 60 (60%) | 0.2 |
| No | 53 (53%) | 40 (40%) | |
| **Radiotherapy** | | | |
| Yes | 54 (54%) | 36 (36%) | 0.03* |
| No | 46 (46%) | 64 (64%) | |
| **Chemotherapy** | | | |
| Yes | 42 (42%) | 34 (34%) | 0.04* |
| No | 58 (58%) | 66 (66%) | |
| **Endocrine treatment** | | | |
| Yes | 70 (70%) | 80 (80%) | 0.6 |
| No | 30 (30%) | 20 (20%) | |
| **Axillary procedure** | | | |
| ALND | 68 (68%) | 55 (55%) | 0.03* |
| SN | 32 (32%) | 45 (45%) | |
| **Location of tumor** | | | |
| Upper lateral quadrate | 26 (26%) | 23 (23%) | 0.6 |
| All other locations | 74 (74%) | 77 (77%) | |
| **Tumor side** | | | |
| Left | 47(47%) | 42 (42%) | 0.8 |
| Right | 53 (53%) | 58 (58%) | |
| **Tumor size** | | | |
| <20 mm | 58 (58%) | 62 (62%) | 0.6 |
| £20 mm | 42 (42%) | 38 (38%) | |

*Significant P value.

***Table 3.*** *Distribution and frequency of pain.*

| Investigated Areas | Women With Pain (N = 100) | | |
|---|---|---|---|
| | Mild N = 32 (32%) | Moderate N = 52 (52%) | Severe N = 16 (16%) |
| **In the area of the missing breast** | | | |
| Every day or almost every day | 4 (12.5%) | 10 (19.2%) | 8 (50%) |
| 1-3 times weekly | 3 (9.4%) | 8 (15.4%) | 0 (0%) |
| Less than once a week | 10 (31.3%) | 4 (7.7%) | 0 (0%) |
| All frequencies | 15 (46.8%) | 30 (57.7%) | 8 (50%) |
| **In the axilla** | | | |
| Every day or almost every day | 5 (15.6%) | 18 (34.6%) | 5 (31.3%) |
| 1-3 times weekly | 9 (28.1%) | 5 (9.6%) | 2 (12.5%) |
| Less than once a week | 2 (6.3%) | 4 (7.7%) | 0 (0%) |
| All frequencies | 16 (50%) | 25 (48.1%) | 9 (56.2%) |
| **Side of the thorax** | | | |
| Every day or almost every day | 10 (31.3%) | 15 (28.8%) | 4 (25%) |
| 1-3 times weekly | 2 (6.3%) | 10 (19.2%) | 4 (25%) |
| Less than once a week | 6 (18.7%) | 3 (5.8%) | 4 (25%) |
| All frequencies | 14 (43.7%) | 24 (46.2%) | 4 (25%) |
| **In the mastectomy scar** | | | |
| Every day or almost every day | 4 (12.5%) | 14 (26.9%) | 8 (50%) |
| 1-3 times weekly | 3 (9.4%) | 7 (13.5%) | 0 (0%) |
| Less than once a week | 10 (31.2%) | 3 (5.8%) | 0 (0%) |
| All frequencies | 15 (46.9%) | 28 (53.8%) | 8 (50%) |
| **In the arm** | | | |
| Every day or almost every day | 8 (25%) | 15 (28.8%) | 5 (31.25%) |
| 1-3 times weekly | 6 (18.7%) | 6 (11.6%) | 2 (12.5%) |
| Less than once a week | 3 (9.4%) | 3 (5.8%) | 2 (12.5%) |
| All frequencies | 15 (46.9%) | 28 (53.8%) | 7 (43.75%) |

age and the persistent pain was not found in other two studies [5,19].

Regarding BMI, the current study showed that there was no significant difference between the presence of pain with regard to different BMI values (P value = 0.6). However, the pain was more prevalent in patients whose BMI was in the range of 18.5-24.9. In agreement with our findings, several studies [12,18,20] showed that there was no association between developing of persistent pain and increased BMI.

A study by Smith et al. [21] revealed a correlation between high BMI and persistent pain. In this study, we found that same dominant hand as the side for surgery was not a risk factor for persistent pain (P-value = 0.2). Radiotherapy was a risk factor for persistent pain in this study (P value = 0.03), and pain was more prevalent in those who were exposed to radiotherapy. Pain can result from radiation, as radiation damages brachial plexus lying in the field of radiation. Also, radiotherapy stimulates local fibrosis and persistent inflammation which cause nerve entrapment and adherence of scar to the deeper muscular layer [11].

Several studies reported radiotherapy as a risk factor [1,22,23], while others did not find any association [7,14]. Regarding chemotherapy, less percent of patients who suffered pain were exposed to chemotherapy; although there was a significant difference between patients with and without pain (P value = 0.04), chemotherapy was not a risk factor for persistent pain. In a study by Gärtner et al. [6], it was showed that chemotherapy was not independently related to the risk of pain development, and also there were no significant results. This study showed that a significant difference was found between patients with and without pain regarding axillary procedure (P value = 0.03) and ALND was more common than SN in patients with pain. A study by Juhl et al. [5] was in agreement with this study, and found no association between ALND and persistent pain. Several previous studies have demonstrated that ALND was a risk factor for developing persistent pain after breast cancer surgery [6,14,24,25].

The risk of ALND resulted from the extensive damage of tissue in the axilla including nerves which was caused

by ALND, whereas SLNB targeted fewer nodes than the ALND [11]. In this study, tumor side, size, and location were not considered as significant risk factors for development of persistent pain. Regarding the severity of pain, this study revealed that moderate pain was the most common among participants (52%). The pain was investigated in five areas; in the area of the missing breast, mild and moderate pains were more common in all frequencies (46.8% and 57.7%) and severe pain was present every day in all frequencies. In the axilla area, three degrees of pain was more prevalent in all frequencies. Regarding side of the thorax, mild and moderate pains were more common in all frequencies, while severe pain was equally present every day, 1 to 3 times weekly, and less than once a week in all frequencies.

Mild and moderate pains were also more common in all frequencies in the mastectomy scar and the arm, whereas severe pain occurred in all frequencies and every day in the mastectomy scar and it was more common in all frequencies in the arm. It was demonstrated that the most common locations of pain were arm and axilla representing 20% to 60% and scar area representing 23% to 49% [9].

In a study by Vilholm et al. [14], it was found that pain occurred in the scar area in 55.8% patients, arm/axilla in 80.8% patients, and multiple sites in 75% patients in a specific population. This is the first study to analyze persistent pain after breast cancer surgery in Saudi women.

## Limitations of the Study

There are some limitations in this study. This study was conducted as a survey on the Internet, not based on medical records of patients from hospitals. Also, the study assessed the pain in general and did not define it in a specific duration.

## Conclusion

This study showed that age, BMI, same dominant hand as the side for surgery, chemotherapy, endocrine treatment, ALND, and tumor location, size, and side were not considered as significant risk factors for persistent pain. However, some factors were more common in patients with pain than those without pain. Radiotherapy was the only significant risk factor for persistent pain.

### List of Abbreviations

| | |
|---|---|
| BMI | Body Mass Index |
| ALND | Axillary Lymph Node Dissection |
| SLNB | Sentinel lymph node biopsy |
| PPBCT | Persistent pain after breast cancer treatment |
| SN | Sentinel Node |

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### References

1. Wood KM. Intercostobrachial nerve entrapment syndrome. Southern medical journal. 1978;71(6):662-663. https://doi.org/10.1097/00007611-197806000-00016
2. Langford DJ, Paul SM, West C, Levine JD, Hamolsky D, Elboim C. et al. Persistent breast pain following breast cancer surgery is associated with persistent sensory changes, pain interference, and functional impairments. The Journal of Pain. 2014;31;15(12):1227-1237.
3. Carpenter JS, Andrykowski MA, Sloan P, Cunningham L, Cordova MJ, Studts JL, et al. Postmastectomy/ postlumpectomy pain in breast cancer survivors. Journal of clinical epidemiology. 1998;31;51(12):1285-1292.
4. Mejdahl MK, Andersen KG, Gärtner R, Kroman N, Kehlet H. Persistent pain and sensory disturbances after treatment for breast cancer: six year nationwide follow-up study. BMJ. 2013;11;346:f1865.
5. Juhl AA, Christiansen P, Damsgaard TE. Persistent Pain after Breast Cancer Treatment: A Questionnaire-Based Study on the Prevalence, Associated Treatment Variables, and Pain Type. Journal of breast cancer. 2016;1;19(4):447-454.
6. Gärtner R, Jensen MB, Nielsen J, Ewertz M, Kroman N, Kehlet H. Prevalence of and factors associated with persistent pain following breast cancer surgery. JAMA. 2009;11;302(18):1985-1992.
7. Belfer I, Schreiber KL, Shaffer JR, Shnol H, Blaney K, Morando A, et al. Persistent postmastectomy pain in breast cancer survivors: analysis of clinical, demographic, and psychosocial factors. The Journal of Pain. 2013;31;14(10):1185-1195.
8. Rietman JS, Dijkstra PU, Debreczeni R, Geertzen JH, Robinson DP, de Vries J. Impairments, disabilities and health related quality of life after treatment for breast cancer: a follow-up study 2.7 years after surgery. Disability and rehabilitation. 2004;21;26(2):78-84.
9. Jung BF, Ahrendt GM, Oaklander AL, Dworkin RH. Neuropathic pain following breast cancer surgery: proposed classification and research update. Pain. 2003;1;104(2):1-3.

10. Haroutiunian S, Nikolajsen L, Finnerup NB, Jensen TS. The neuropathic component in persistent postsurgical pain: a systematic literature review. PAIN®. 2013;31;154(1):95-102.
11. Kaur N, Kumar A, Saxena AK, Gupta A, Grover RK. Postmastectomy Chronic Pain in Breast Cancer Survivors: an Exploratory Study on Prevalence, Characteristics, Risk Factors, and Impact on Quality of Life. Indian Journal of Surgery. 2017;2:1-7. https://doi.org/10.1007/s12262-017-1663-6
12. Steegers MA, Wolters B, Evers AW, Strobbe L, Wilder-Smith OH. Effect of axillary lymph node dissection on prevalence and intensity of chronic and phantom pain after breast cancer surgery. The Journal of Pain. 2008;30;9(9):813-822.
13. Kehlet H, Jensen TS, Woolf CJ. Persistent postsurgical pain: risk factors and prevention. The Lancet. 2006;19;367(9522):1618-1625.
14. Vilholm OJ, Cold S, Rasmussen LA, Sindrup SH. The postmastectomy pain syndrome: an epidemiological study on the prevalence of chronic pain after surgery for breast cancer. British Journal of Cancer. 2008;19;99(4):604-610.
15. Fecho K, Miller NR, Merritt SA, Klauber-DeMore N, Hultman CS, Blau WS. Acute and persistent postoperative pain after breast surgery. Pain Medicine. 2009;1;10(4):708-715.
16. Brummett CM. Chronic pain following breast surgery. Techniques in Regional Anesthesia and Pain Management. 2011;31;15(3):124-132.
17. Sipilä R, Estlander AM, Tasmuth T, Kataja M, Kalso E. Development of a screening instrument for risk factors of persistent pain after breast cancer surgery. British journal of cancer. 2012;23;107(9):1459-1466.
18. Miaskowski C, Cooper B, Paul SM, West C, Langford D, Levine JD, et al. Identification of patient subgroups and risk factors for persistent breast pain following breast cancer surgery. The Journal of Pain. 2012;31;13(12):1172-1187.
19. Tasmuth T, Blomqvist C, Kalso E. Chronic post-treatment symptoms in patients with breast cancer operated in different surgical units. European Journal of Surgical Oncology (EJSO). 1999;1;25(1):38-43.
20. Carpenter JS, Sloan P, Andrykowski MA, McGrath P, Sloan D, Rexford T. et al. Risk factors for pain after mastectomy/lumpectomy. Cancer practice. 1999;1;7(2):66-70.
21. Smith WC, Bourne D, Squair J, Phillips DO, Chambers WA. A retrospective cohort study of post mastectomy pain syndrome. Pain. 1999;1;83(1):91-95.
22. Poleshuck EL, Katz J, Andrus CH, Hogan LA, Jung BF, Kulick DI, Dworkin RH. Risk factors for chronic pain following breast cancer surgery: a prospective study. The Journal of Pain. 2006;30;7(9):626-634.
23. Meijuan Y, Zhiyou P, Yuwen T, Ying F, Xinzhong C. A retrospective study of postmastectomy pain syndrome: incidence, characteristics, risk factors, and influence on quality of life. The Scientific World Journal. 2013. doi: 10.1155/2013/159732. https://doi.org/10.1155/2013/159732
24. Wang L, Guyatt GH, Kennedy SA, Romerosa B, Kwon HY, Kaushal A, Chang Y, Craigie S, de Almeida CP, Couban RJ, Parascandalo SR. Predictors of persistent pain after breast cancer surgery: a systematic review and meta-analysis of observational studies. Canadian Medical Association Journal. 2016;4;188(14):E352-361.
25. Bruce J, Thornton AJ, Powell R, Johnston M, Wells M, Heys SD. et al. Recovery Study Group. Psychological, surgical, and sociodemographic predictors of pain outcomes after breast cancer surgery: a population-based cohort study. PAIN®. 2014;28;155(2):232-243.