ORIGINAL ARTICLE

PAIN DURING X-RAY MAMMOGRAPHY: INTENSITY AND ASSOCIATED FACTORS

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ABSTRACT

OBJECTIVE: To determine the pain experienced during x-ray mammography and the associated factors. **METHODS:** Two hundred and seventy two women undergoing x-ray mammography were included in this study conducted at the Department of Radiology, Civil Hospital Karachi in 2011. Pain was scored using the Visual Analog Scale from 0-10. Other studied factors were age, menstrual phase, ethnicity, education level, previous mammography, size of breasts, presence of pathology, side of pathology and degree of compression in cm. Descriptive statistics were calculated, bivariate association between variables were analysed with Chi square test and Pearson correlation was used to determine the correlation between two continuous variables. **RESULTS:** The mean pain score was higher on left side (2.65 vs 2.48) higher score was significantly associated with the degree of compression ($p < 0.001$) and the side of compression ($p <0.001$). For every cm increase in compression, the pain score increased by 0.118 in left mediolateral oblique view ($p< 0.05$), 0.17 in left craniocaudal view ($p< 0.01$), 0.14 in right craniocaudal ($p< 0.01$) and 0.16 in rightmediolateral oblique view ($p = 0.01$). **CONCLUSION:** The mean pain score on mammography was higher on left side significantly associated with greater compression and with the presence of symptoms, Most patients reported a discomfort to bearable pain suggesting x-ray mammography as a tolerable procedure.

Key words: X-ray mammography, pain, compression, Visual Analog Scale, pain score.

Introduction

About a quarter of post pubertal women suffer from breast disease[1] which warrants either mammography or breast sonography or both.[2] Although x-ray mammography is highly accurate and sensitive in diagnosis of breast disease. The single major reported complaint during mammography is pain during the procedure which is caused by compression of breast, this compression is a crucial and unavailable requirement for a technically acceptable mammographic examination. The aim is to separate the overlapping structures, to improve resolution and to reduce the amount of radiation absorbed by the breast tissue.[3] The reported incidence of pain during mammography varies from 0.2 to 62%.[4] This pain or discomfort may even discourage future mammography, both by the women and by others.[5] Its Fear may lead to avoid mammography altogether being considered a barrier to screening.[6,7] Factors associated with pain during mammography includes age, educational level,[5,8] ethnicity, previous mammogram,[6,9] size of breasts, menstrual status,[4,7] preexisting cyclic breast pain, family history of breast cancer,[4] preexisting breast pathologies,[4,5] scars, skin thickening etc. Pain intensity during mammography has not been studied in Pakistan. Due to complete absence of Pakistani data on the pain felt during

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mammography and relevant factors, this study was planned to obtain information to determine the predictors of pain, association of these predictors to pain and to quantify pain intensity. This will help in improving health education regarding screening and adopting pain relieving measures so that pain management programs can be planned for women undergoing mammography.

The objective of this study was to determine the proportion of women who report marked pain during x-ray mammography procedure by using a Visual Analog Scale along a score of 1-10 and to determine factors associated with pain during mammography.

Methods

This studywas conducted inThe Department of Radiology, Dow University of Health Sciences and Civil Hospital Karachi from January to December 2011. It was cross - sectional study of all female patients undergoing diagnostic or screening mammography. Patients taking analgesics before mammography, patients with inflammatory carcinoma, galactocele, Paget's disease of nipple and skin infection, patients presenting with mastalgia and mentally retarded and disoriented patients were excluded. Sample size was calculated to be 272 depending upon 23% prevalence,[5] 95% confidence interval, 0.5% α level and 80% study power. Sampling technique was non-probability, purposive sampling.

Pain was defined as discomfort on compression severe enough for verbal complain or grimace and determined along Visual Analog Scale (VAS) of 0-10, 0=no pain, 1-2 = discomfort, 3-4 = bearable pain, 5-7 = moderate pain and 8-10 =severe pain. Visual Analog Scale is a simple assessment tool consisting of a 10 cm line with 0 (zero) on one end, representing no pain and 10 (ten) on the other, representing the worst pain ever experienced which a patient indicates so the clinician knows the severity of the pain.

The working hypothesis was that pain experienced on x-ray mammography was due to compression of breast tissue.

Studied variables were patient's age, educational level, ethnicity, previous breast mammogram, size of the breasts (small, medium, large), menstrual status, cyclic breast pain, family history, pre-existing breast pathologies and pain intensityscore using VAS. Data was taken on structured proforma. Mammography was performed on Planmed Sophie Classic RFH 40822. Factors associated were pain and pain intensity and were measured by visual analog scale and was recorded on proforma.

Collected data was analyzed through SPSS (version 19.0). Frequencies were calculated for categorical variables, like educational level, ethnicity, previous mammogram, size of breasts, menstrual status, cyclic breast pain, family history, presence of breast pathology. Mean and standard deviation were calculated for quantitative variables like the VAS score, compression and age. Chi square test was applied to assess any significance between the proportions among different group. Significance was assessed at $P<0.05$. Pearson correlation was used to determine the correlation between two continuous variables.

Results

Most of the women inthe studied sample were premenopausal (n= 190, 69.9%) with medium sized breasts (n= 157, 57.7%). Breast lump was the most frequent pathology found in 176 (64.7%) cases pathologies were more common on left side (n= 105, 38.6%). Theage ranged from 27 to 75 years. The mean age was 45.3 ± 10.1 years. Majority of women belonged to low socio-economic status a had relatively low educational level (primary school passed) and having mammography for the first time. Detailed sample characterstics are given in (Tab. 1).

Associated factors were different in the left breast in which minimum pain score was 2/10 (Discomfort) and maximum pain score was 7/10 (Moderate pain).Mean pain score was 2.65 ± 1 (Discomfort to bearable pain). Compression employed oncraniocaudal view varied from 1.2 cm to 8.9 cm mean compression was 4.2 ± 1.2cm. On mediolateral oblique view compression ranged from 1.8 cm to 9.0 cm and the mean compression was 4.9 ±1.2 cm. Significant

Factor	Number of Patient	Percent
AGE (years)		
27 – 50	217	79.8%
51 – 75	55	20.2%
MENSTRUAL PHASE		
Premenopausal	190	69.9%
Postmenopausal	82	30.1%
SIZE OF THE BREAST		
Small	31	11.4%
Medium	157	57.7%
Large	84	30.9%
SYMPTOMS		
Lump	176	64.7%
Nipple discharge	26	9.6%
Asymptomatic	69	25.4%
SIDE OF SYMPTOMS		
Bilateral	10	3.7%
Right	88	32.4%
Left	105	38.6%
LEFT BREAST PAIN		
Discomfort	163	59.9%
Bearable pain	82	30.1%
Moderate pain	27	9.9%
RIGHT BREAST PAIN		
Discomfort	181	66.5%
Bearable pain	70	25.7%
Moderate pain	21	7.7%
LATERALITY OF GREATER PAIN		
Right	78	28.7%
Left	92	62.9%

Table 1: Sample characteristics (n = 272)

correlation of pain scoring was seen with the degree of compression in craniocaudal view (r = 0.12 , p = 0.03) and mediolateral oblique view (r = 0.12, p = 0.04). No significant association of marked pain was seen with age(p = 0.72), menstrual phase (p = 0.55) and size of the breasts (p = 0.40) in the left breast, however significant association was seen with the presence of pathologies (p = 0.001) and side of the pathology (p = 0.001), (Tab. 2).

In the right breast minimum pain score was 2/10 (discomfort) and maximum pain score was 8/10 (severe). Mean pain score was 2.48 ± 0.9 (discomfort to bearable pain). The compression applied on craniocaudal projection ranged from 1.2 cm to 8.1 cm. Mean compression was 4.3 ± 1.2 cm. Range of compression applied on mediolateral oblique view varied from 1.8 cm to 8.9 cm. Mean compression

Factor	No. of patients with discomfort	No. of patients with bearable pain	No. of patients with moderate pain	Total No. of patients	P value
Age (years) mean age 45.3 ± 10.1					0.726
27 - 50	130	64	23		
51 - 75	33	18	04		
Menstural phase					0.557
Premenopausal	111	61	18	190	
Postmenopausal	52	21	09	82	
Size of the breasts					0.407
Small	17	09	05	31	
Medium	100	44	12	156	
Large	46	29	10	85	
Pathology					0.001
Lump	88	69	19	176	
Discharge	14	08	04	26	
Asymptomatic	61	05	04	70	
Side of pathology					0.001
Right	78	07	03	88	
Left	20	65	20	105	

Table 2: Left breast: Factors associated with level of pain (n = 272)

on mediolateral oblique view was 4.9 ± 1.2 cm. Significant correlation of right breast pain scoring was seen with compression on both craniocaudal view (r = 0.14, p = 0.01) and mediolateral oblique view (r = 0.16, p = 0.008). Significant association of right breast pain scoring was seen with age (p = 0.001), menstrual phase (p = 0.01), size of the breasts (p = 0.001) and presence of symptoms (p = 0.001), (Tab. 3).

Factor	No. of patients with discomfort	No. of patients with bearable pain	No. of patients with moderate pain	Total No. of patients	P value
Age in years					0.001
27 – 50	151	56	10	217	
51 - 75	30	14	11	55	
Menstrual phase					0.011
Premenopausal	136	44	10	190	
Postmenopausal	45	26	11	82	
Size of the breasts					0.001
Small	17	06	08	31	
Medium	112	37	07	156	
Large	52	27	06	85	
Symptoms					0.001
Lump	100	62	11	176	
Nipple discharge	18	01	07	26	
Asymptomatic	60	07	03	70	
Side of the symptoms					0.001
Right	16	56	16	88	
Left	99	05	01	105	

Table 3: Right breast: Factors associated with level of pain (n = 272)

There was no significant association with ethnicity, educational level, marital status, family history and having experience of previous mammogram.

The mean pain score was higher on left side (2.65 vs 2.48) with particularly increasing compression and in the presence of symptoms. For every cm increase in compression, the pain score increased by 0.11 in left mediolateral oblique view ($p< 0.05$), 0.17 in left craniocaudal view ($p< 0.01$), 0.14 in right craniocaudal ($p< 0.01$) and 0.16 in right mediolateral oblique view ($p = 0.01$). It was significantly associated with the degree of compression.

Discussion

Pain on X-ray mammography, it's associations and coping strategies are a subject of interest due to the importance of mammography as a highly valued breast cancer screening test. The procedure related pain may preclude women from attending screening or even follow up studies after they have received therapy for cancer.[12,13]

There has been only two studies reported from our region on this subject,[4,14] was conducted on a group of Iranian women who belonged to a rather more affluent class with higher level of education than general population admittedly not representative of the whole,[14] that by Gupta was on Kuwaiti women and sample characteristics were not stressed.[4]

The present study was conducted on Pakistani women with lower socioeconomic and educational status that could be safely be projected to represent the majority of Pakistani females. It was a predominantly premenopausal sample, coming up for a diagnostic mammography for the first time. A small proportion was of asymptomatic presenting for screening mammography

Pain severity was determined for either breast separately, again this effect of laterality has not been studied before. Degree of compression was hypothesized to be causing the stated pain. Majority of women here had medium sized breast requiring 2-4 cm compression. It was found that pain score did increase with increasing compression on both sides being slightly higher on the left side compared to the right side which was in turn correlated with the laterality of the symptoms.

The greater pain being caused by compression has also been reported by other researchers.[3,12,14] The mean pain score was 2.6 on the left side 2.4 on the right side which represented discomfort to bearable pain. Asghariet al. also reported some pain in 92% women undergoing mammography, being moderate in 44% and severe in only 11% with mean pain score of 3.6. Sharp reported a mean pain score of 2.9,[7] which was closer to the present results.

However, compression alone may not be responsible for all the pain. The significantly greater frequency of pathology on the side of greater pain was also noticed. While Sapir found pre-existing breast tenderness to be a significant association,[7] this along with inflammation in fact one of our exclusion criteria to remove bias. Gupta found that women with pre-existing breast lumps, pain, inflammatory conditions and fibrocystic disease report greater pain on mammography.[4] Myklebustet al. found in Norwagian women that the level of compression was vital to patient experiencing pain but it did not influence their level of satisfaction with the procedure.[12] Sharp et al. found that highest level of pain reported resulted from the compression of breasts, but the most stressful part of procedure was waiting for the results of mammography.[7] Since compression seems to be such an important correlate, reduced compression,[15] and patient controlled compression techniques,[9,16] have been introduced in practice, particularly for women with sensitive breasts. The mammography staff and radiologists can also identify the subset of the of the women at risk of pain and deal accordingly.[17]

Age was not an association for pain in the left breast but it was so in the right breast. Pain was not associated with menstrual phase and size of the breasts in the left but was associated with these factors in right breast. Similar association of pain with breast size was seen in earlier study.[7] Significant association of pain with pathologies like lump and nipple discharge was seen in both breasts. Lumps were more common in left breast.

Limitations of the study was that the majority had low educational level with difficulty in comprehension which may have influenced the final pain score. However Asghari et al. found higher education status to be a limitation from their point of views.[14]
Another limitation of study was exclusion of the staff-related and the psychological / anxiety / pain anticipation aspect of the pain printed out by many other researchers,[3,5,8,10] however we were concentrating on the physical correlates and found, indeed that compression and preexisting pathologies, lumps in left breast to be precise, in the studied group of women, was associated with a higher pain score.
This is the first ever study of pain and it's correlates in Pakistani women undergoing x-ray mammography. Pakistan has the highest rate of breast cancer in the region and as yet the screening campaigns are limited to small, non-governmental groups trying to create ripples of awareness among at least the educated class.[18] Studies addressing such psycho-social and physical aspects of this very advantageous screening procedure that may bring down the rates of breast cancer related morbidity in Pakistan, are the need of the day.

Conclusion

The mean pain score was higher on left side with compression and with the presence of symptoms, however most patients reported a discomfort to bearable pain.

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