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Pros and Cons of Pre Mammography Examination Technique Description on Pain in Mammography and Re-attending Screening Program

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PAIN experienced during mammography has been reported frequently by females who underwent either diagnostic or screening breast mammography. This pain is a significant deterrent for women considering this examination and may prevent their participation in breast screaning. Many studies have tried to use strategies to decrease or even prevent pain during mammography. The purpose of this study is to detect the pros and cons of describing the technique of mammography examination to women attending the screening mammography programs on preventing pain and consequently decreasing the need to repeat the test, reduce the dose of radiation exposure, and also increase the rate of coming next year for follow up mammography. 306 females were divided into two equal groups; the 1st group attended a lecture describing the mammography technique the 2nd went to mammography directly.This study is highly suggestive that the description of the mammography technique for patients before starting the examination plays a vital role in decreasing the intensity of pain related to compression especially pain related to Medio-Lateral Oblique view compression (P= 0.010), also decreasing or even stopping the repetition of mammography and reducing the un-necessary radiation exposure (P= 0.000). It was also found that a highly significant relation between attending a lecture and showing up next year (P value = 0.000).

Keywords: Breast pain during mammography, Mammography description, Radiation protection, Screening mammography.

Introduction

Breast cancer is an important challenge for healthcare systems because it is both the most frequent cause of malignant tumors and the leading cause of mortality among women worldwide. In 2020, >2 million new breast cancer cases were diagnosed (23% of all cancers), and around 685,000 women died as a consequence of this disease. According to the World Health Organization, 1 in 12 women will experience breast cancer during their lifetime (WHO, 2023).

Breast cancer screening using mammography has been implemented in many countries, which has resulted in reduced breast cancer mortality rates (Wanders et al., 2022).

Digital mammography is the current standard modality for early breast cancer detection, but as with every screening tool, it has its limitations (Dembrower et al., 2020).

Despite continuous advances in medicine and technology, one aspect of mammography has not changed in over 50 years: the breast is flattened onto the detector because this improves diagnostic image quality and reduces dose (Davey, 2007).

Mammography studies include two projections: cranio-caudal (CC) and medial-lateral oblique (MLO). Both projections are made by pulling and separating the breast tissue from the chest wall (Dosis, 2016).

Mammographers incorporate a blade to

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compress the breast, immobilize the tissues, and reduce breast thickness. This system reduces the radiation dose and improves image quality (Montoro et al., 2023).

However, 75% of women describe mammography screening as a painful experience, and as a factor influencing the perceived quality of the service and the success of early detection programs. Some women even report feeling discomfort and pain in subsequent days (Moshina et al., 2018).

Many women consider the so-called 'breast compressions' painful, particularly women conservatively treated for breast cancer. Pain can prevent asymptomatic women from continued breast cancer screening attendance (Hauge et al., 2012).

Early studies mention risk factors for the pain: breast tenderness, anxiety level, pain expectation, and staff attitude. Some studies also found breast density, volume, and menstrual status to be risk factors, but other studies did not support these conclusions. Several pain-preventing strategies have been proposed, and many researchers found that most of these are not ready for implementation for various reasons (Montoro et al., 2023).

Further research is continuously called for. To the best of our knowledge, it is remarkable that all studies on mammography pain and pain-preventing strategies have only assessed pain levels reported directly after breast compression, not during the entire compression cycle or for some days afterward (De Groot et al., 2015).

In breast screening, overall participation rates are affected by a wide range of factors, including psychological and socio-economic ones. Repeated participation has been studied less often than initial uptake, but client experience is one of the factors affecting re-attendance (Soler-Michel et al., 2005).

Conflicting evidence exists concerning the effect of mammography pain on re-attendance for breast screening. For example, a New Zealand study found that the primary reason was pain in 46% of previous participants who declined subsequent invitations. At the same time, other authors have detected only a very small or no statistically significant relationship (Drossaert et al., 2001).

Rrepeated mammography exposure to ionizing radiation examinations may increase breast cancer risk (Preston et al., 2002). Mortality associated with radiation-induced breast cancer incidence associated with recommended screening strategies is suggested to be low relative to breast cancer deaths prevented (Hendrick, 2010).

Patients & Methods

Inclusion criteria

All women underwent breast cancer screening mammography, in the period from 25 February 2018 to 30 March 2019, age 40 years or more.

Exclusion criteria

Women aged less than 40 years, pregnant, lactating female, during menstruation, and previous history of breast cancer diagnosis or treatment,

Methods

We classify women who underwent breast cancer screening mammography into 2 groups; 1st group attended a lecture (before doing the mammography test) about the whole procedure, and how important this mammography is as it helps in the early diagnosis of cancer breast and this leads to a cure rate of about 98% to 100%, what they consider to do, what they believe in feeling during breast compression, the importance of breast compression and how the importance of perfect compression for better visualization of any suspected lesion. They were told that they have all the rights to stop the procedure whenever they feel intolerable pain.

The 2nd group will do a mammography test without a previous pre-mammographic lecture about the procedure.

Two mammography views were done Cranio-Caudal (CC) and Medio Lateral Oblique (MLO) to include the whole axilla.

A follow up for all groups next year coming to make their follow-up mammography were detected and included in the study.

Statistical methods

Statistical analysis was performed using SPSS version 29 statistical software (SPSS, Inc. Chicago, IL). Data was expressed using mean and standard deviation for quantitative variables, for

comparisons between the three groups one-way ANOVA test was applied. P-values less than 0.05 were considered statistically significant. Pearson's correlation was performed for correlation between different variables.

Results

551 females came to do the breast cancer screening mammography, 122 females aged less than 40 years, 38 were previously diagnosed with breast cancer, 85 were lactating, and the remaining 306 females were divided into two equal groups, as mentioned before. Table 1 shows the demographic information for the remaining 306 females.

Education and socio-economic level

Women were asked about education as sometimes the level of education could cause refusal to do the test; in our study, 41 (13.4%) were non-educated at all, 101 (33%) were educated to high school, most of the females had university degree about 139 (45.4%), and about 25 (8.2%) had a master degree or more. It wasfound that the level of education played an essential role in the behavior of the female participants, namely the highly educated females have highly understood the pre-test lecture (Table 2).

Pain

In the present study, the authors did not classify the type of pain as whether it is just the feeling of being non-comfortable or painful, but we asked explicitly if the pain is related more to the craniocaudal or Medio lateral oblique views. The study showed that the general level of pain, not significant between both groups and also pain with CC view, but considering the MLO view it was found that females of the first group showed a significant difference in tolerating pain than the 2nd group (Fig. 1 and Table 2).

Breast size

There is no significance of the breast size between both groups (Table 2).

Coming next year for follow-up sessions

This is one of the questions the patient asked to answer after the test, if she comes next year for follow-up, and the results showed a significant difference between both groups (Fig. 2 and Table 2).

Discussion

Freitas-Junior et al. (2018) explored the effect of different modes of health education on pain and anxiety experienced during mammography. The results showed no significant differences between the pain scores of the two groups, but the experimental group was lower than the control group by 0.44 points. This intervention could alleviate the anxiety of mammography screening, maybe due to the content of multimedia health education intervention, the screening process, relaxation techniques, and how to protect the privacy that has been provided in advance of the screening. However, the pain regarding breast compression still existed during the mammography.

TABLE 1. Demographic characters of all participants

		No.	%
Age	Mean±SD	50.28 ± 6.88	
	Range	40 – 75	
Education	Non-educated	41	(13.4%)
	high school	101	(33.0%)
	University Degree	139	(45.4%)
	Master or more	25	(8.2%)
Breast size	small	63	(20.6%)
	large	243	(79.4%)
Listen to description	Yes	153	50.0%
	No	153	50.0%

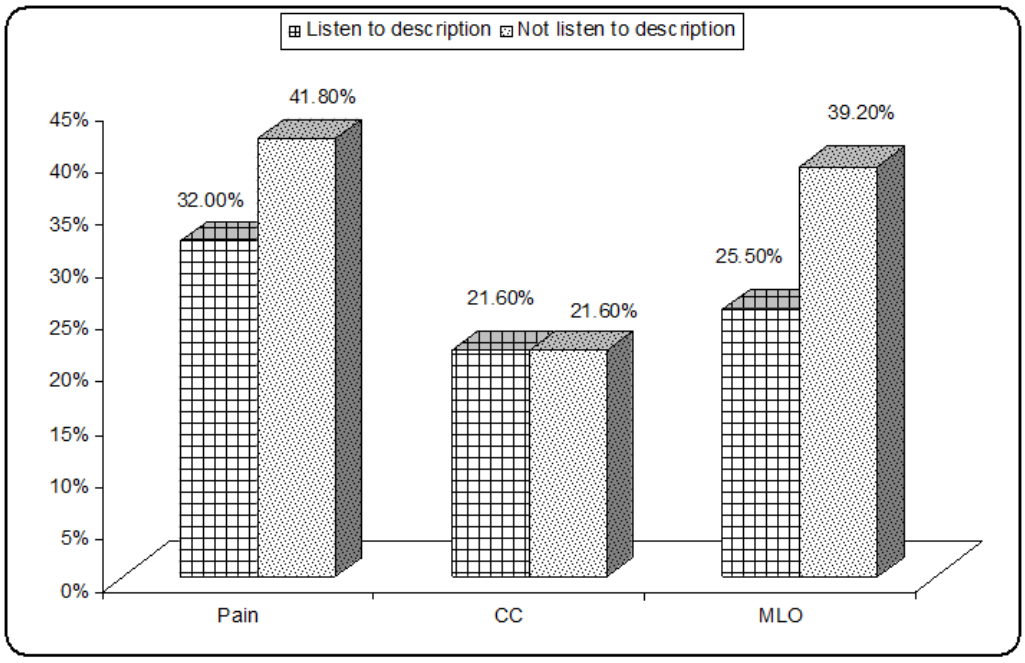

Fig. 1. Relation between general pain sensation, pain with CC view, and pain with MLO view with study groups

TABLE 2. Relationship between both groups considering age, education, pain, and next year's follow-up

		Listen to description				Test value	P- value	Sig.
		Yes		No				
		No.=153		No.=153				
Age	Mean±SD	50.32 ± 6.67		50.24 ± 7.10		0.100	0.921	NS
	Range	40 – 75		40 – 71				
Education	Non-educated	21 (13.7%)		20(13.1%)		9.108	0.028	S
	high school	39 (25.5%)		62(40.5%)				
	University Degree	81 (52.9%)		58(37.9%)				
	Master or more	12 (7.8%)		13(8.5%)				
Pain	No Pain	104 (68.0%)		89 (58.2%)		3.157	0.076	NS
	Pain	49 (32.0%)		64 (41.8%)				
Pain with CC view	No	120	78.4%	120	78.4%	0.000	1.000	NS
	Yes	33	21.6%	33	21.6%			
Pain with MLO view	No	114	74.5%	93	60.8%	6.585	0.010	HS
	Yes	39	25.5%	60	39.2%			
Breast size	small	38	24.8%	25	16.3%	3.378	0.066	NS
	large	115	75.2%	128	83.7%			
Repeating test	No	151	98.7%	131	85.6%	18.085	0.000	HS
	Yes	2	1.31%	22	14.4%			
Next Year Test	Yes	141	92.2%	53	34.6%	109.137	0.000	HS
	No	8	5.2%	60	39.2%			
	not known	4	2.6%	40	26.1%			

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant*: Chi-square test; •: Independent t-test

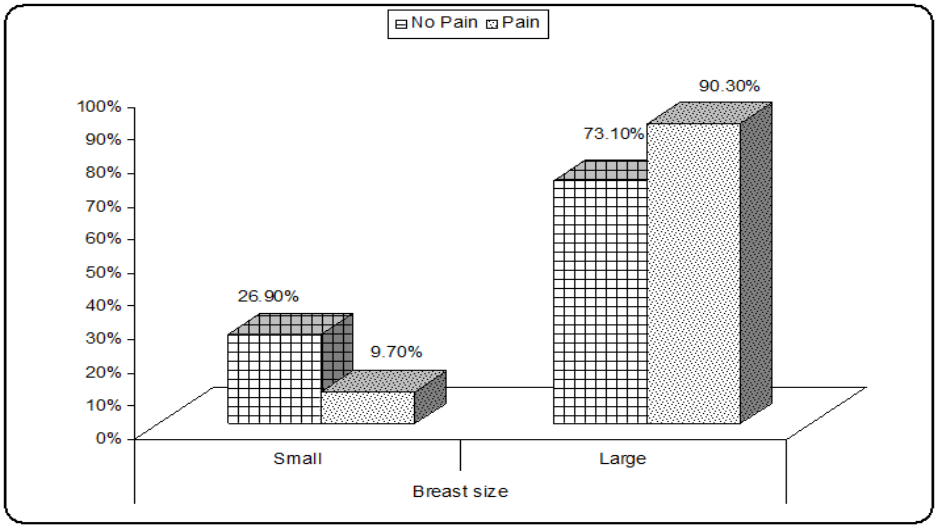

Fig. 2. Relation between general pain sensation and breast size

In the current study, we studied the effect of the detailed description of mammography examination technique on decreasing the intensity of pain felt by patients or even complete relief of it, and consequently re-attendance for breast cancer screening. It was found that describing the mammography technique before doing the examination affecting significantly pain sensation in the MLO view (P= 0.010), also decreasing significantly the number of repeating the test consequently decreasing the radiation dose exposure from the test, and finally increasing the coming next year rate for breast screening.

Similar to the present study, another study has reported pain alleviating methods including emotional support, verbal and written health education, and relaxation technique instructions. Those methods can alleviate pain caused by emotional support and give patients a sense of control. Therefore, pain relief can be achieved (Fernández-Feito et al., 2015).

Other research on music and abdominal breathing did not significantly reduce pain scores, but reported that anxiety was decreased effectively. Helping the patient to be psychologically prepared for the examination can achieve relaxation, consistent with the study findings of this multimedia health education intervention (Shang et al., 2020).

Some studies have demonstrated that individualizing compression, the radiologist's friendly attitude, and increasing verbal information can significantly improve pain alleviating. (Feder & Grunert, 2017).

Similar to the present study, Kornguth et al. (1996) found that by allowing women to control the degree of compression during mammography, they could significantly reduce the pain experienced and, at the same time, produce adequate images.

Again, these proposals have not been followed up in the published literature, so it is not clear how many studies have highlighted that pain in the previous mammography was the leading cause of not attending the test again. In the current research, the authors found that explaining the whole mammography technique by highlighting the need for breast compression on the accuracy of the test and early detection of cancer. It was found that the first group of patients who attended the lecture before the test decided to come next year for a follow-up examination with a higher significance rate of (P= 0.000) compared to the second group.

In accordance with the obtained results, in their study, Jacobsen & Von Euler-Chelpin (2012), claimed that the proportion of non-re-attendance accounted for by prior mammography pain ranged from 25% to 46%. This is an essential finding in the context of cumulative participation rates being increasingly recognized as an important performance indicator in screening.

This is in concordance with Edwards et al. (2011) who found that the most robust evidence derived from this study which indicates an association between prior mammography pain

and non-re-attendance purely, suggests that a higher proportion of women reporting pain at mammography will choose not to re-attend for a behavior depends of those not reporting pain (28%), although the difference is not statistically significant (P= 0.11)

On the other hand, we know that population characteristics, such as psychosocial and socio-demographic factors, could be expected behavior-attendance for mammography. We studied the effect of education level and socio-economic class on re-attending mammography screening, and pain sensation. We reached the results that educational level showed significant difference in results between both groups regarding academic level (P=0.028) (Table 2).

Shrestha & Poulos (2001), found that socioeconomic disadvantages are associated with reduced participation in screening programs.

A typical mammographic screening examination involving 2 views of each breast (total 4 mammograms) delivers a dose of between 3 and 5 mGy to the glandular tissue. Dose expresses the X-ray energy absorbed in a specific tissue. In the breast, it is the glandular tissue that is the most radiosensitive. The usual procedure is to estimate and express the dose as the average dose or the mean glandular dose (MGD) within each breast. Women with smaller-than-average breasts will receive a lower MGD. Doses are higher for women with larger breasts. Any additional images that might be required will add to the dose received (IAEA, 2023).

Cancer risk resulting from radiation exposure during breast mammography is high, and a guideline considering age and adequate breast compression is needed in mammography examination; repeating the exam results in doubling the radiation dose exposure. It is mainly studied in the current research that listening to detailed technique description resulting in high significance (P= 0.000) between patients who listened to the description which led to not repeating the examination and exposing to lower radiation dose as compared to patients repeated the examination.

Conclusions

In summary, most researchers believe that much of the pain and unnecessary anxiety experienced during mammography is because of the lack of information. The inexplicable fear and anxiety generated due to lack of correct information can affect the feeling of pain. Describing the breast mammography technique and the importance of breast compression could reduce anxiety effectively, and therefore significantly relieve mammography pain.

The present study showed that describing the mammography technique in a 10-minute lecture before the test has a great value in decreasing mammography, decreasing the rate of repetition of the test and hazardous exposure to an extra unnecessary dose of radiation, and also has a significant impact on coming next year for follow up examination.

Therefore, further research to minimize the pain is needed. Interventions that have shown promise in the past are patient-controlled compression and cushioning pads, but both run the risk of adverse effects on image quality. A key area of interest is the quality of the communication between mammography staff and clients, with several publications showing results on the reported pain.

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