

## Research Article

# Evaluation of the Relationship between Breast Duct Diameter Measured by Ultrasonography and Mastalgia in Postmenopausal Patients

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### Abstract

**Objectives:** The aim of this study was to determine the relationship between mastalgia, which is an important health problem in women, and breast duct diameter using ultrasonography (US).

**Methods:** The study was planned prospectively. A total of 40 postmenopausal patients who were referred to our clinic due to unilateral breast pain were included in the study. Before the US examination, the patients were asked to score pain levels from 0 (no pain) to 100 (worst pain) according to the Visual Analog Scale (VAS).

**Results:** The mean age of the patients was 56 (range 40-77) years. The mean diameter of the duct was  $1.77 \pm 0.59$  mm for the side with pain and  $1.08 \pm 0.36$  mm for the other side. There was a statistically significant difference between the two groups ( $p < 0.001$ ). There were a statistically significant positive correlation between both the duct diameter and symptom duration ( $r = 0.514$ ,  $p = 0.007$ ) and between the duct diameter and VAS score ( $r = 0.684$ ,  $p < 0.001$ ).

**Conclusion:** In this study, the relationship between mastalgia and duct diameter was shown, but more comprehensive studies on this subject can shed further light on the etiopathogenesis of mastalgia.

**Keywords:** Duct diameter, mastalgia, ultrasonography

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Pain in the breast is one of the most common symptoms reported by women. Mastalgia is the terminological definition of pain arising from breast tissue, which can be unilateral or bilateral. The etiology and treatment of mastalgia have not yet been fully clarified, but it is known that approximately 70% of women present to the doctor due to breast pain at some point in their lives.<sup>[1]</sup> Mastalgia is a condition that hampers daily normal life activities and causes significant financial costs. Today, with the increased public awareness about breast cancer, more women consult a doctor due to pain complaints, worrying that mastalgia might be a symptom of cancer.<sup>[2]</sup>

Breast pain can be difficult to identify because it is very

diverse. Women sometimes complain that pain can be reduced and increased by certain activities. Mastalgia is a common condition with unknown etiology, and an optimal treatment is yet to be determined. Breast pain can be severe, interfere with daily activities, and can significantly affect quality of life. Assessment using pain-rating instruments, such as the Visual Analog Scale (VAS) can help in the initial assessment of breast pain, decision-making about treatment, and monitoring patients' response to therapy.<sup>[3]</sup>

The aim of this study was to determine the relationship between mastalgia and the breast duct diameter using ultrasonography (US).

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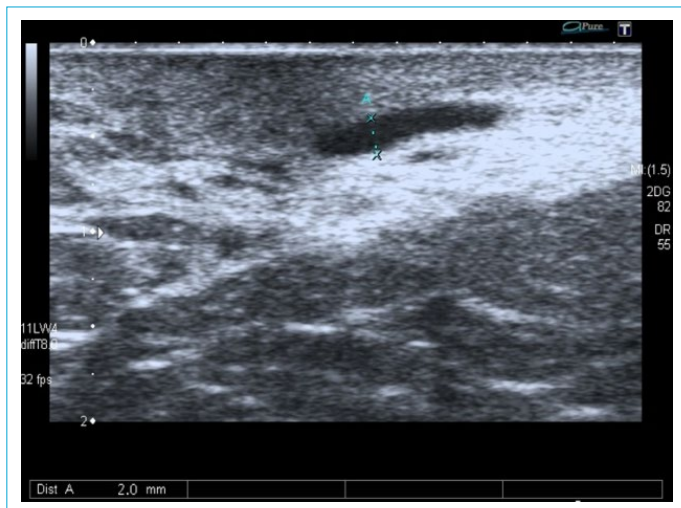
## Methods

The study was planned prospectively. The ethics committee approval was received for the study (15.05.2018-24/08). A total of 40 postmenopausal patients who were referred to our clinic due to unilateral breast pain between June 2018 and June 2019 were included in the study. Only patients evaluated as Breast Imaging-Reporting and Data System (BI-RADS) category 1 according to US and mammography classification were included in the study. Other BI-RADS categories, patients with any active drug use, those that had previously received hormone therapy, and current and past smokers were excluded. In addition, the patients with a palpable mass, nipple discharge, nipple retraction, history of previous breast surgery, mastitis, or breast abscess were also not included in the study.

Before the US examination, the patients were asked to score pain levels from 0 (no pain) to 100 (worst pain) using VAS. The US measurements were made using a Toshiba Aplio 500 device (Toshiba Medical Systems Corporation, Japan) and a 12 MHz probe on grayscale images. The US images were obtained in both sagittal and transverse planes. US was performed for the entire breast in all patients. The largest duct was identified, and its diameter was recorded for both right and left breasts on sagittal images (Fig. 1). All measurements were undertaken by a radiologist with five years of experience in breast radiology, who was blinded to the VAS scores of the patients.

The VAS scores, age at menopause, largest duct diameter on the side with and without pain, breast volumes (small, medium, large), and parenchymal patterns observed on mammography were recorded for all patients.

The Statistical Package for Social Sciences (SPSS) version



**Figure 1.** A sagittal ultrasonography image showing the measurement of the duct diameter.

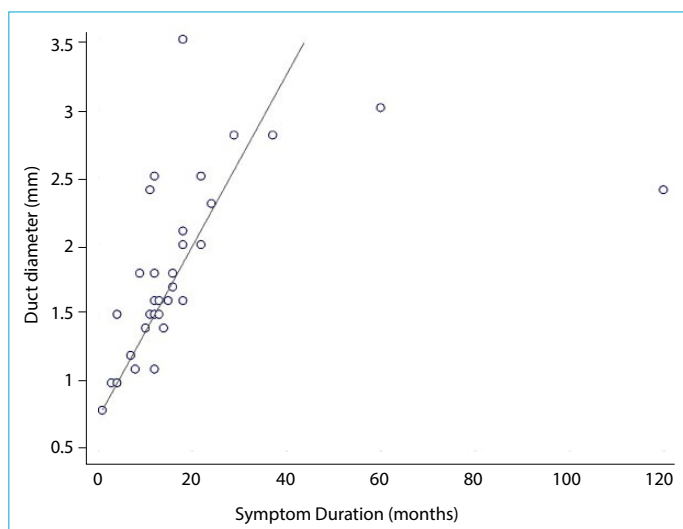
20.0 (Chicago, IL, USA) was used for statistical analysis. Descriptive statistics were given as median (minimum–maximum) and mean±standard deviation. Categorical variables were expressed as frequencies and percentages. According to the assessment of conformity to normal distribution by the Kolmogorov-Smirnov and Shapiro-Wilk tests, continuous variables were compared using non-parametric (Wilcoxon signed-rank test) or parametric (paired samples t-test) methods. One-way analysis of variance was used to compare more than two independent groups. The Spearman and Pearson correlation analyses were performed. A *p* value of <0.05 was accepted as statistically significant.

## Results

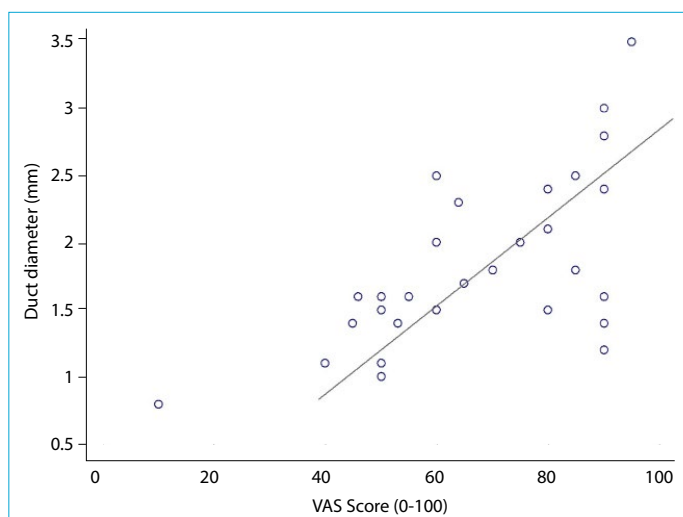
A total of 40 patients were included in the study. All patients were female. The mean age of the patients was 56 (range 40-77) years. The mean duration of symptoms was 17 months (range 1-120 months). The mean VAS value was 65±19.5. Pain was in the right breast in 13 patients (32.5%) and left breast in 27 patients (67.5%). The mean age at menopause was 48±6 years. The parenchymal pattern observed on mammography was type A in two patients (5%), type B in 18 patients (45%), type C in 18 patients (45%), and type D in two patients (5%). The breast volume was small in five patients (12.5%), moderate in 28 patients (70%), and large in seven patients (17.5%).

The mean diameter of the duct was 1.77±0.59 mm on the side with pain and 1.08±0.36 mm on the other side. There was a statistically significant difference between the two groups (*p*<0.001). However, no significant difference was observed between the right and left breasts in terms of the duct diameters (*p*=0.25). There was also no statistically significant difference between the breast volume and duct diameter (*p*=0.29). In patients with mammographic parenchymal density A and B, the mean duct diameter on the painful breast was 2.03±0.68 mm, whereas in patients with density C and D, the mean duct diameter was 1.53±0.41 mm on the side with pain. There was a statistically significant difference between the two groups (*p*=0.037). The mean VAS score was 70±17 for the patients with mammographic pattern a and b, and 60±21 for those with mammographic pattern c and d. However, there was no statistically significant difference between these two groups in terms of the VAS score (*p*=0.11).

There was no statistically significant correlation between the duct diameter on the side with pain and age (*p*=0.463) or age at menopause (*p*=0.702). However, there was a statistically significant positive correlation between the duct diameter and symptom duration (*r*=0.514, *p*=0.007) (Fig. 2). There was also a statistically significant positive correlation between the duct diameter and VAS score (*r*=0.684, *p*<0.001) (Fig. 3).



**Figure 2.** The relationship between the duct diameter and symptom duration.



**Figure 3.** The relationship between the duct diameter and VAS score.

## Discussion

The most important finding of our study is that the duct diameter on the painful breast was wider than the side without pain. On the painful side, the duct diameter was correlated with the VAS score and symptom duration. In a similar study by Peters et al.<sup>[4]</sup> including 335 patients, the duct diameter was reported to be wider in patients with non-cyclic mastalgia compared to both the non-mastalgia and cyclic mastalgia groups. In addition, similar to our study, a correlation between pain intensity which was evaluated by VAS score as our study and duct diameter was noted. However, in contrast to the current study, the authors of the previous study included premenopausal patients in the sample. In our study, only postmenopausal patients were evaluated. In addition, we evaluated the duration of symptoms, which

had not been undertaken by Peters et al.<sup>[4]</sup>

Although mastalgia is one of the leading complaints of women presenting to the physician with breast complaints, it is still not a well-known symptom. Mastalgia is more common in postmenopausal period. This is considered to be associated with decreased estrogen levels.<sup>[5]</sup> In a study by Arslan et al.,<sup>[6]</sup> the patients with mastalgia were analyzed retrospectively and ductal ectasia was found in 9.9% of the cases. However, a cut-off value was not specified for this condition. In another study, Eren et al.<sup>[7]</sup> found mastalgia to be more frequent in postmenopausal patients. In addition, the frequency of mastalgia was reported to be highest in patients with mammographic parenchymal pattern B. In our study, the duct diameter was wider in patients with mammography pattern A and B than those with pattern C and D. However, there was no difference between the two groups in terms of the VAS score.

US is an important imaging method used in the diagnosis of breast diseases. Breast US should be performed by experienced radiologists using devices with sufficient technical specifications for the accuracy of diagnosis. According to the American College of Radiology Appropriateness Criteria® Breast Pain<sup>[8]</sup> published in 2018, US can be used in all age groups to diagnose clinically significant mastalgia. According to this, mammography and tomosynthesis can also be utilized in mastalgia assessment in patients over 40 years of age. US has also been reported to have significant benefits in this age group. In a recent study by Holbrook et al.,<sup>[9]</sup> the frequency of cancer in patients with breast pain was similar to the results of healthy individuals undergoing routine screening mammography. Similar studies have reported that the relationship between mastalgia and cancer is unclear, and therefore screening mammography should be undertaken in these patients.<sup>[10, 11]</sup> In this context, the use of US, which is a reproducible and inexpensive examination that does not contain radiation, can be useful in the diagnosis of mastalgia.

There were some limitations to this study. Firstly, the number of patients included in the study was low. Secondly, since all the measurements were taken by a single radiologist, there was no examination of intra-observer agreement. Thirdly, the patients in the study were not followed up in the long-term. Finally, the blood hormone levels and other factors which could be effective in mastalgia were not evaluated. Future studies taking these limitations into consideration can provide further useful data on this subject.

## Conclusion

In conclusion, mastalgia is an important health problem frequently seen in women. Unfortunately, there are not

enough studies on the etiology and pathogenesis of mastalgia. In this study, the relationship between mastalgia and duct diameter was shown, but more comprehensive studies on this subject can shed further light on the etio-pathogenesis of mastalgia.

#### Disclosures

**Ethics Committee Approval:** The Ethics Committee of Erzincan Binali Yildirim University provided the ethics committee approval for this study (15.05.2018-24/08).

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Authorship Contributions:** Concept – O.T., U.K.; Design – O.T., U.K.; Supervision – O.T., U.K.; Materials – O.T., U.K.; Data collection &/or processing – O.T., U.K.; Analysis and/or interpretation – O.T., U.K.; Literature search – O.T., U.K.; Writing – O.T., U.K.; Critical review – O.T., U.K.

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