



CASE CONTROL STUDY TO IDENTIFY RISK FACTORS FOR MAMMARY DUCT ECTASIA WITH SPECIAL EMPHASIS ON SERUM PROLACTIN LEVELS

General Surgery

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ABSTRACT

Mammary duct ectasia (MDE) is a benign, non-proliferative inflammatory condition affecting the major lactiferous ducts, primarily involving the nipple-areola complex. It is characterized by dilatation of ducts due to accumulation of secretions within the lumen and degenerative changes in the duct wall, particularly loss of elastic tissue. It appears to arise from a complex interplay of structural, hormonal, and possibly inflammatory factors rather than a single identifiable cause. The absence of a clearly defined etiological trigger underscores the need for continued research to elucidate the underlying mechanisms responsible for disease onset and progression. This hospital-based case-control study was conducted in the Department of General Surgery at M.G.M. Medical College and M.Y. Hospital, Indore, over 12 months after ethical approval. It included 60 female participants above 18 years, divided into 30 cases with radiologically confirmed MDE and 30 age-matched controls. Clinical, radiological, and laboratory parameters including serum prolactin were analyzed. MDE was most commonly observed in women aged 31–50 years. Significant associations were found with marital status, higher BMI, multiparity, lactation history, and serum prolactin levels. Among all factors, elevated serum prolactin showed a strong association, suggesting an important role in disease pathogenesis, while age, menstrual factors, and other risk factors were not significant. Mammary duct ectasia predominantly affects women in the reproductive age group, though age is not a significant factor. Associations with higher body mass index, multiparity, and history of lactation, suggests a role of metabolic and reproductive factors. Notably, serum prolactin levels were significantly higher in cases, indicating a possible role of hyperprolactinemia. Overall mammary duct ectasia appears to be multifactorial, with serum prolactin emerging as an important and potentially modifiable factor, supporting its inclusion in routine evaluation.

KEYWORDS

Mammary Duct Ectasia (mde), Lactiferous Ducts, Benign Breast Disease, Ductal Dilatation, serum Prolactin

INTRODUCTION

Mammary duct ectasia is characterized by abnormal dilatation of the major lactiferous ducts, typically associated with chronic periductal inflammation, intraluminal debris accumulation, and subsequent fibrosis. Although traditionally considered a disease of peri- and post-menopausal women, increasing evidence suggests that MDE can affect a broader age spectrum, including premenopausal women, thereby challenging conventional assumptions regarding its etiopathogenesis. Several risk factors have been implicated in the development of mammary duct ectasia, including increasing age, parity, history of lactation, obesity, smoking, and reproductive hormonal variations. Studies from different populations have reported associations with marital status, prior breastfeeding, and increased body mass index, suggesting that prolonged hormonal exposure and metabolic factors may play a contributory role. However, the strength and consistency of these associations vary across studies, highlighting the need for region-specific data to identify population-relevant risk factors. Emerging evidence suggests that elevated serum prolactin levels may also contribute to ductal dilatation and inflammatory changes characteristic of mammary duct ectasia. This study aims to clarify the role of hormonal, reproductive, and clinical factors in disease development. Understanding these associations may facilitate early diagnosis, targeted investigations, and more comprehensive management strategies, thereby reducing patient morbidity and healthcare burden.

CASE STUDY

The study was carried out in the Department of General Surgery, M.G.M. Medical College and M.Y. Hospital, Indore. The duration of the study was 12 months (one year), commencing after obtaining approval from the Institutional Ethics Committee. The study population comprised female patients aged more than 18 years attending the Surgery Outpatient Department (OPD) of M.Y. Hospital during the study period. Group A (Cases) comprised of radiologically confirmed cases of mammary duct

ectasia. Group B (Controls) comprised of Age-matched females without mammary duct ectasia, selected from the same hospital population. Sample size was calculated using the formula for comparison of proportions in a case-control study. Thus, a sample size of 30 cases and 30 controls was included in the study. After recruitment, all eligible participants were enrolled in the study after obtaining written informed consent. Detailed demographic information including age and relevant personal history was recorded for each participant. A thorough clinical history was obtained with emphasis on presenting complaints related to the breast, duration of symptoms, laterality, nature of nipple discharge (if present), associated pain, and any previous breast-related interventions or treatments. A comprehensive clinical examination of both breasts and axillae was performed in all participants. Findings related to nipple-areola complex, presence of nipple discharge, nipple inversion, palpable subareolar masses, skin changes, and axillary lymphadenopathy were carefully documented. All collected information was systematically entered into a pre-designed and pre-tested working proforma to ensure uniformity and completeness of data. The odds ratio was calculated to determine the strength of association between various risk factors and the occurrence of mammary duct ectasia. A 95% confidence level was considered for all statistical tests, and a p-value of less than 0.05 was considered statistically significant.

RESULT

A total of 60 female participants were included, comprising 30 radiologically confirmed cases of mammary duct ectasia and 30 controls without the disease. The majority of cases were observed in the 31–40 years age group (33.33%), followed by 41–50 years (30.00%), indicating that the disease predominantly affects women in the reproductive and early perimenopausal age groups. However, age distribution between cases and controls was not statistically significant ($p = 0.749$), suggesting that age alone may not be a determining factor. A significantly higher

proportion of cases were married (93.33%) compared to controls (70.00%) ($p = 0.042$), likely reflecting the influence of reproductive factors. Body mass index (BMI) showed a statistically significant association ($p = 0.041$), with a greater proportion of cases being overweight (36.67%) and obese (43.33%), indicating that increased adiposity may contribute to disease development. Reproductive factors were also found to be significant. Multiparity was present in 66.67% of cases compared to 36.67% of controls ($p = 0.046$), and history of lactation was observed in 73.33% of cases versus 43.33% of controls ($p = 0.035$). These findings suggest that repeated hormonal and structural changes in the breast associated with pregnancy and lactation may predispose to ductal alterations. In contrast, menstrual status, early menarche, and late menopause did not show statistically significant associations. Among other evaluated risk factors, including family history, smoking, pharmacological exposure, and prior radiation, none demonstrated statistically significant correlation, although higher frequencies were noted among cases. Clinically, the most common presenting symptom was mastalgia (70.00%), followed by nipple discharge (46.67%) and subareolar lump (26.67%). Nipple discharge, when present, was predominantly unilateral, spontaneous, and arising from a single duct, consistent with typical features of ductal pathology. On clinical examination, breast tenderness (53.33%) and palpable subareolar mass (26.67%) were the most frequent findings. Radiological evaluation revealed ductal dilatation on ultrasonography in 100% of cases, confirming it as the most consistent diagnostic feature. Additional findings included retroareolar lesions (40.00%),

mixed lesions (20.00%), and microcalcifications (16.67%), which occasionally mimicked malignancy. A key finding of this study was the significant association between serum prolactin levels and mammary duct ectasia. Elevated prolactin levels were observed in 23.33% of cases, whereas all controls had normal levels, with a statistically significant difference ($p = 0.048$). The mean serum prolactin level in cases (26.66 ± 37.05 ng/mL) was significantly higher than in controls (8.76 ± 2.14 ng/mL) ($p = 0.013$). The presence of elevated prolactin exclusively among cases suggests a strong association between hyperprolactinemia and duct ectasia. Among all variables studied, serum prolactin emerged as a key factor, supporting its potential role in the pathogenesis of the disease and emphasizing the importance of its evaluation in affected patients.

CONCLUSIONS

Mammary duct ectasia was predominantly observed in women of the reproductive and early perimenopausal age group, with the highest occurrence in the 31–40 years category; however, age was not found to be an independent risk factor. Body mass index showed a significant association, with a higher proportion of cases being overweight and obese, suggesting that increased adiposity may contribute to disease development. Reproductive factors, particularly multiparity and history of lactation, were also significantly associated, indicating that repeated hormonal and structural changes in the breast may predispose to ductal dilatation and inflammation. Marital status demonstrated a significant association, likely reflecting its correlation with reproductive exposure rather than a direct causal effect. In contrast, menstrual status, age at menarche, and menopause did not show significant associations, suggesting a limited role in disease pathogenesis. Clinically, the presentation was variable, with mastalgia being the most common symptom, followed by nipple discharge and subareolar lump, emphasizing the need to consider duct ectasia in differential diagnosis.

Ultrasonography emerged as the most reliable diagnostic modality, with ductal dilatation observed in all cases, although certain imaging findings occasionally mimicked malignancy, necessitating careful evaluation. Importantly, a significant association was found between elevated serum prolactin levels and mammary duct ectasia, with hyperprolactinemia present exclusively among cases. Additionally, mean serum prolactin levels were significantly higher in cases compared to controls, supporting the hypothesis that prolactin plays a contributory role in the pathogenesis of the disease.

REFERENCES:

1. Haagensen CD. Diseases of the Breast. 3rd ed. Philadelphia: W.B. Saunders; 1986. p. 241–256.
2. Dixon JM, Mansel RE. ABC of breast diseases. Congenital problems and aberrations of normal breast development and involution. *BMJ*. 1994;309(6957):797–800.
3. Going JJ, Moffat DF. Escaping from Flatland: clinical and biological aspects of human mammary duct anatomy in three dimensions. *J Pathol*. 2004;203(1):538–544.
4. Higginson J. Periductal mastitis and duct ectasia. *Br J Surg*. 1969;56(6):426–430.
5. Mansel RE, Webster DJT, Sweetland HM. Benign Disorders and Diseases of the Breast: Concepts and Clinical Management. 3rd ed. London: Elsevier Saunders; 2009. p. 123–140.
6. Mohammed AA. Mammary duct ectasia in adult females; risk factors for the disease: a case control study. *Ann Med Surg (Lond)*. 2021;62:140–144.
7. Vonderhaar BK. Prolactin: transport, function, and receptors in mammary gland development and differentiation. *Endocr Rev*. 1987;8(4):389–412.