Original Research Article

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Analysis of the microbial flora in breast abscess: a retrospective cohort study conducted in the emergency department

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ABSTRACT

Background: Breast abscess develops as a complication of lactational mastitis. Recently, there is an increase in the incidence of non-lactational breast abscess. The aim of the study was to analyse the microbial flora in the lactational and non-lactational breast abscess in the ED and to elucidate the susceptibility of flora to different antibiotics.

Methods: This is a retrospective cohort study of breast abscess patients registered in the ED over two years. The case records of these patients were retrieved, and the details of their age, clinical presentation, investigation, and treatment were recorded. Specifically, the pus culture sensitivity and antibiotics used in the management of these patients were noted, and the pattern of microbiological flora analyzed.

Results: A total of 124 patients were included in the study, with 97 women were categorized into lactational breast abscess, and 27 women were classified as a non-lactational breast abscess. Mean age was 24 years of age (Range 18 to 56 years). The majority of the women were young between 18 and 34 years of age (83%). The culture was grown in 92% of the patient pus specimens. Staphylococcus aureus (83%) was common organisms cultured in lactational breast abscess. Mixed Flora including Staphylococcus aureus and Group B Streptococci were grown in non-lactational breast abscess.

Conclusions: Appropriate antibiotic choices are of immense importance in the management of breast abscess. Mixed flora is common in non - lactational breast abscess when compared with a lactational breast abscess. Staphylococcus Aureus is the most common isolate in both groups.

Keywords: Antibiotics, Breast abscess, Emergency department, Lactational breast abscess, Microbial flora, Non-lactational breast abscess, Pus cultures

INTRODUCTION

A breast abscess is one of the most common clinical conditions observed in females. They are more common in young women, women of poor socioeconomic status, obese patients, smokers, women with diabetes Mellitus and HIV-related disorders, than in the general population. The risk factors in the development

of breast abscess include delayed treatment of mastitis, delivery after 41 weeks, primiparity, increased stress, sleep deprivation, poor breastfeeding technique, low immune status, and smoking.³⁻⁷ The incidence is nearly 4.6 to 11% in both developed and developing countries.^{1,2,4,8} In Lactating mothers, 3 to 11% will develop breast abscess.⁷ Recently, there is an increase in the incidence of non-lactational breast abscess also. One

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should have increased clinical suspicion for breast abscess formation in patients with mastitis, if the fever does not subside within 48 hours of antibiotic treatment, or if the patient develops a palpable fluctuant mass.⁹

Staphylococcus aureus commonly causes breast abscess, followed by coagulase-negative *Staphylococcus epidermidis*, *Streptococcus viridians*, *Streptococcus pyogenes*, and anaerobes such as Pepto streptococcus and Bacteroides.¹⁻¹⁰ In India, abscesses can occur due to typhoid, tuberculosis, other mycobacteria, and parasites.¹⁻³ Lactational breast abscess may occur due to polymicrobial infections.⁸ These bacterial agents can arise any place from the nasopharynx of the baby to the skin of the mother. Fifty percent of Staphylococcus aureus causing breast abscess are penicillin-sensitive.^{3,11}

There is an increase in the incidence of methicillinresistant Staphylococcus aureus (MRSA) breast abscess which is susceptible to antimicrobials such as trimethoprim-sulfamethoxazole, fluoroquinolones, and clindamycin.⁹

The goals of this study are to analyse the microbial flora in both lactational and non-lactational breast abscess patients presenting to the emergency department and to elucidate the susceptibility of the microbial flora to different antibiotics.

METHODS

A retrospective cohort study of patients with breast abscess presenting to the department of emergency medicine at a tertiary care university teaching hospital in Chennai, India. The study was done for two years from January 1st 2013 to December 31st 2014. All patients presenting with breast abscess to the emergency department in the study period, more than 18 years of age and with breast abscess pus culture and sensitivity reports were included in the study. Patients records with incomplete or missing data were excluded.

The de-identified case records of ED patients with a presumptive diagnosis of breast abscess were retrieved from the medical records department. Based on the clinical features and signs of breast abscess, the diagnosis of breast abscess was made in the ED. Breast abscess pus culture and sensitivity were sent. Patients were treated as per the general surgeon's decision either to decompression by needle aspiration, continuous catheter drainage, or incision and drainage in the operating theater.

All patients received antibiotics based on the sensitivity pattern and were discharged in 3 to 4 days. Patients presenting with the process of pus formation during lactation were categorized as group I, lactational breast abscess and other breast abscess patients were classified as group II, non-lactational breast abscess.

Data collection and statistical analysis

The data was collected in a preformatted questionnaire. The data gathered from the patient's records included their age, clinical presentation, investigation, and treatment. Specifically, the breast abscess pus culture, sensitivity, and antibiotics used in the management were recorded. The data collected in the preformatted questionnaire were entered in to a spreadsheet (Microsoft Office Excel 2013; Microsoft Corporation, Redmond, WA. USA). For categorical variables, descriptive analysis like frequency, and percentage were calculated. This study was approved by the institutional ethics committee.

RESULTS

A total of 148 patients presented with breast abscess to the ED from January 2013 to December 2014. As 24 patients had incomplete medical records or missing culture and sensitivity reports, only 124 patients were included in the study. Mean age was 24 years of age (Range 18 to 56 years). The majority of the women were young between 18 and 34 years of age (83%), 8% were between 35 to 49 years of age, and 9% were \geq 50 years of age.

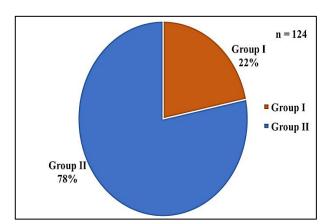


Figure 1: Types of breast abscess.

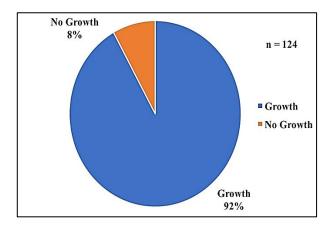


Figure 2: Cultural growth in breast abscess patients.

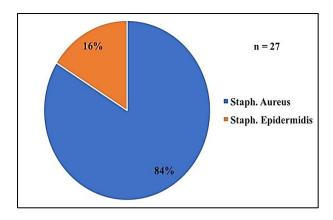


Figure 3: Type of organism in group I lactational breast abscess patients.

Based on their lactational status, 97 women (78%) were categorized into group I, lactational breast abscess and 27 women (22%) were classified as group II, non-lactational breast abscess (Figure 1). On analyzing culture and sensitivity reports of breast abscess pus samples, the culture was grown in 92% of the patient pus specimens (Figure 2). Eight percent were negative for any culture growth. Figure 3 shows, Staphylococcus aureus (83%) was the common organisms cultured in group I lactational breast abscess. Moreover, Figure 4 illustrates that Staphylococcus aureus was the common organism grown in group II non-lactational breast abscess, along with other aerobic organisms like Group B Streptococci, Proteus, and Acinetobacter SPP grown in the cultures. Table 1 lists all the antibiotics which are sensitive and resistant to the cultures in both the groups.

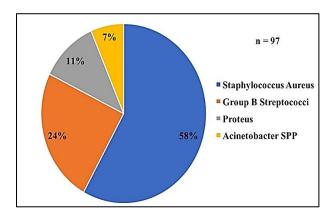


Figure 4: Type of organisms in group ii nonlactational breast abscess patients.

DISCUSSION

Breast abscesses is broadly classified into lactational and non-lactational breast abscess. In lactating women, acute puerperal mastitis is typically the first step indicating the beginning of breast abscess in 2.5% to 33% of cases.⁴ Lactational breast abscess develops within first 12 weeks of childbirth or while weaning and are associated with considerable morbidity.¹² The etiology of lactational

breast abscess is milk stasis due to blockage of engorged lactiferous ducts and the following infection.¹ Non-lactational breast abscess predominantly occurs in perimenopausal age group.^{1,13} Risk factors such as congenital abnormalities in the duct, duct ectasia, duct metaplasia, nipple inversion, and coexisting malignancy play a significant role in the etiopathogenesis of non-lactational breast abscess.^{14,15} Diabetes mellitus, smoking, obesity, black race, and piercing of the nipple are the most important risk factors for the development of non-lactational breast abscess.^{16,17} Usually, they manifest with an acute onset of severe pain and a well-defined fluctuant lump in the affected breast, redness, swelling, tenderness in affected area of the breast, fever, malaise, and enlarged axillary lymph nodes.³

Table 1: Antibiotics sensitivity and resistant to different cultured organisms in both the groups.

Antibiotics sensitivity	and resistant	
Group I- Lactational breast abscess		
Type of organisms	Antibiotic sensitivity	Antibiotic resistance
Staphylococcus aureus	Ciprofloxacin	Ampicillin
	Cephalexin	Gentamycin
	Cloxacillin	
	Cefotaxime	
Staphylococcus epidermis	Ciprofloxacin	Ampicillin
	Cefoxitin	Gentamycin
	Cephalexin	
	Cloxacillin	
	Cefotaxime	
	Erythromycin	
Group II- Non- lactati	onal breast abso	ess
Type of organisms	Antibiotic sensitivity	Antibiotic resistance
Staphylococcus aureus	Erythromycin	Ampicillin
	Cefoxitin	Gentamycin
	Methicillin	Gentantyen
	Ciprofloxacin	
	Cloxacillin	
Group B Streptococci	Penicillin	Gentamycin
	Ampicillin	Cloxacillin
	Erythromycin	Сюжасиии
Proteus	Amikacin	Ampicillin
	Tobramycin	Ampiemm
	Cefepime	
	Netilmycin	
Acinetobacter SPP	Amikacin	Ampicillin
	Tobramycin	Ciprofloxacii
	Polymyxin	Ofloxacin
	Meropenem	Cephalexin
	Meropeneni	Cefotaxime
		Ceftazidime
		Piperacillin

Knowledge and information of current trends in the bacteriology are valuable in choosing the correct antibiotics, in the management of breast abscess. In our study, the maximum number of patients were younger (83%) between 18 to 34 years of age. Similarly, Pachani et al, in his study, observed 70% of the breast abscess patients were in 20 to 39 years of age. ¹⁸ In contrast, Sandhu et al, and Ekland et al, had highest patients in 36 to 45 years of age. ^{1,19} This increase in incidence of breast abscess in young women can be attributed to the increased incidence of breast abscess in lactating mothers.

In this study, Lactational breast abscess was predominant (78%), and only 22% had non-lactational breast abscess. Efem et al, in his study of 299 breast abscess patients observed that the majority of patients had lactational breast abscess, similar to present study.²⁰ In contrast, Sandhu et al, and Bundred et al, in their research observed a maximum number of non-lactational breast abscess (70%, 68% respectively).^{1,21} The reason for this high incidence in lactational breast abscesses among young mothers can be ascribed to high rates of breastfeeding, lack of awareness, education, poor hygiene, poor socioeconomic status, poor breastfeeding techniques and decreased accessibility to health care facilities, especially during first 12 weeks after birth.

In lactational breast abscess, *Staphylococcus aureus* (84%) was the most common organism in study, which was very similar to other studies. 1,20-22 Surprisingly, in present study, none of the patients grew MRSA (Methicillin-resistant *Staphylococcus aureus*) in the culture. In contrast, studies by Berens et al, and Al Benwan et al, found MRSA in (63% and 23% respectively) breast abscess patients. 9,10 *Staphylococcus aureus* was the most common agent isolated (58%) followed by Group B *Streptococci* (24%), *Proteus* (11%) and Acinetobacter SPP (7%). This group had both gram negative and gram-positive organisms in the isolates. No anaerobes were grown in both the lactational and non-lactational groups.

A lactational breast abscess is usually bacterial in etiology and can be effectively managed with oral antibiotics. All patients in this study received antibiotics based on their sensitivity pattern and were discharged in 3 to 4 days. In addition to antibiotics, management of breast abscess includes drainage, symptomatic treatment with analgesia and antipyretics, reassurance, assessment of the infant's breastfeeding technique, education, emotional support, and support for continuous breastfeeding.

CONCLUSION

Appropriate antibiotic choices are of utmost importance in the management of breast abscess. Non-lactating breast infections are an uncommon clinical entity. Mixed flora is common in non-lactational breast abscess when compared with a lactational breast abscess. *Staphylococcus aureus* is the most common agent in both the groups.

Breast abscess should be treated with antibiotics started in the emergency department, as well as, prompt onsite consultation for decompression by needle aspiration under ultrasound guidance, or continuous catheter drainage in the ED or taken to surgery for incision and drainage. We recommend continuous use of Flucloxacillin with or without Metronidazole or Amoxycillin + Clavulanic Acid combination as initial empirical therapy.

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Ethical approval: The study was approved by the

institutional ethics committee

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