Section: Surgery

Original Research Article

BREAST ABSCESS, AN EARLY INDICATOR FOR DIABETES MELLITUS IN NON-LACTATING WOMEN: A RETROSPECTIVE STUDY FROM NORTH-EAST INDIA

T.D.Varneikip Chiru[1], Laikangbam Subhalaxmi[2], Jonan Puni Kay[3], Sinam Neetu Devi[4], Rajkumari Kshemitra[5], Gaihemlung Pamei[6]

[1]Assistant Professor, Department of Surgery, Churachandpur medical College, Churachandpur, Manipur, India
[2]Assistant Professor, Department of Medicine, Churachandpur medical College, Churachandpur, Manipur, India
[3]Associate Professor, Department of Anaesthesiology, Churachandpur medical College, Churachandpur, Manipur, India
[4]Assistant Professor, Department of Anaesthesiology, Churachandpur medical College, Churachandpur, Manipur, India
[5]Assistant Professor, Department of Anatomy, Churachandpur Medical College, Churachandpur, Manipur, India
[6]Assistant Professor, Department of Community Medicine, Churachandpur medical College, Churachandpur, Manipur, India

Received *: 10/01/2026*
Received in revised form *: 04/02/2026*
Accepted *: 21/02/2026*

Corresponding Author:
Dr. Gaihemlung Pamei,
Assistant Professor,Department of Community Medicine,Churachandpur Medical, College, Churachandpur, Manipur, India.
Email: pameihem@yahoo.com

DOI: 10.70034/ijmedph.2026.1.529

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (1); 3081-3084

ABSTRACT

Background: The study tests the hypothesis that breast abscesses in Non-Lactational Breast Abscesses (NLBA) women can be an indicator of undiagnosed diabetes mellitus (DM) in a region experiencing nutritional transition.

Material and Methods: A retrospective cross-sectional study was carried out in Churachandpur Medical College, Manipur, on 80 non-lactating women presenting with breast abscesses from July 2022 to July 2024. The subjects were grouped based on Random Blood Sugar (RBS) and Glycated Hemoglobin (HbA1c) levels. The study outcomes included the recurrence of breast abscesses, duration of symptoms, and response to empiric antibiotic therapy. Odds Ratio (OR) with 95% Confidence Intervals (CI) was calculated.

Results: The study subjects had a mean age of 40.2 years ± 8.1 years. Out of the total subjects, 45.0% (n=36) had diabetes mellitus, which was significantly higher than the baseline. The diabetic subjects had significantly higher levels of Random Blood Sugar (RBS) (228 mg/dL ± 45 mg/dL vs. 138 mg/dL ± 22 mg/dL, $p < 0.001$) and HbA1c levels (7.15% ± 0.8% vs. 5.9% ± 0.4%, $p < 0.001$) compared to non-diabetic subjects. Diabetes mellitus was strongly associated with recurrence of breast abscesses (OR 9.0, 95% CI 3.2 to 25.1, $p < 0.001$), duration of symptoms more than 2 weeks (OR 13.3, 95% CI 4.5 to 39.2, $p < 0.001$)

Conclusion: NLBA is an extremely informative marker of metabolic dysregulation. The high correlation with treatment failure and relapse in hyperglycemic patients supports a paradigm shift: all non-lactating women with breast sepsis should undergo metabolic screening and culture-based antimicrobial stewardship.

Keywords: Non-lactational breast abscess, Diabetes Mellitus, Metabolic Syndrome, Surgical Site Infection, Antimicrobial Resistance.

INTRODUCTION

Traditionally, breast abscesses are considered in the obstetric/puerperal context. Traditionally, most breast abscesses have been reported in lactating women as a complication of mastitis caused by milk stasis and nipple trauma, which provides an entry site for skin flora like Staphylococcus aureus into the breast ductal system.[1,2] Consequently, most surgical algorithms have focused on breast sepsis in the puerperium. However, in modern surgical practice, there are considerable demographic changes in breast pathology, with an increase in breast abscesses in non-puerperal women in the outpatient departments. This includes perimenopausal, postmenopausal, and nulliparous women.[3,4]

The occurrence of NLBA is a new phenomenon, which is distinct from lactational breast abscesses in etiology, microbiology, and prognosis. The non-lactating breast is in a state of quiescence and is usually resistant to bacterial invasion. However, in the occurrence of breast abscesses in non-lactating women, there is considerable breach in local resistance mechanisms or systemic immune compromise. Recent evidence points towards the global rise in non-communicable diseases like Type 2 Diabetes Mellitus as a factor in immune compromise. The "diabetic breast" is an emerging concept, similar to the "diabetic foot" as a soft tissue organ.[5,6]

The mechanism of Vulnerability: To appreciate the sentinel role of NLBA in diabetes mellitus, one needs to understand the effect of hyperglycemia on the host innate immunity. The primary defence mechanism against bacterial invasion in soft tissues is mediated by polymorphonuclear leukocytes (PMNs). During normoglycemia, neutrophils are recruited to the site of infection through chemotaxis and phagocytose bacteria to destroy them through reactive oxygen species (ROS) and antimicrobial peptides. Hyperglycemia causes immunoparesis that affects neutrophil function at multiple steps.[7] The chemotactic response is blunted, phagocytic ability is compromised, and the respiratory burst (NADPH oxidase-mediated superoxide production) is downregulated, allowing bacteria to survive intracellularly.[8]

Diabetes is a vascular disease that causes microangiopathy in small vessels through thickening of the basement membrane.[9] The microcirculation is compromised in diabetes. The breast is composed mainly of adipose and glandular tissues that become hypoxic in diabetes. The neutrophil function is compromised further in hypoxic conditions. The compromised microcirculation in diabetes also creates an environment that is favorable to anaerobic bacteria like Bacteroides, Peptostreptococcus, and Prevotella.[10,11] The availability of antibiotics is compromised in diabetes due to poor microcirculation.

The epidemiological context

The incidence of NLBA is rising in parallel with diabetes in low- and middle-income countries (LMICs). India is considered the diabetes capital of the world. The country is facing a double burden of infectious and metabolic diseases. The incidence of diabetes is rising in northeastern India, including Manipur. The nutritional transition in northeastern India is rapid due to urbanization and lifestyle changes.[12,13]

The incidence of metabolic syndrome and T2DM is rising in this region. A large percentage of diabetic patients in this region are undiagnosed due to asymptomatic hyperglycemia in the initial stages.[14] The rural population in this region does not have easy access to preventive health care. The incidence of NLBA in undiagnosed diabetic patients in this region could be an opportunity to screen for diabetes.

Objectives: Though the association of diabetes with NLBA is plausible, there is little data quantifying the association, especially in the context of North East India.

The objectives of the study were to

1. Ascertain the prevalence of undiagnosed diabetes in women with NLBA,
2. Evaluate whether diabetes status correlates with the clinical course of the disease, including recurrence and chronicity,
3. Assess the response of empirical antibiotics in the context of diabetes-related hyperglycemia, and
4. Provide data to support the mandatory screening of the surgical population for diabetes-related issues.

MATERIALS AND METHODS

Study design and setting: A retrospective cross-sectional audit was carried out in the Department of Surgery,Churachandpur Medical College (CMC), which serves the southern hill districts of Manipur and hence a varied population profile, including those with varied access to primary care. The study was carried out in accordance with the STROBE statement and included data collected from July 2022 to July 2024.

Participants: Female patients presenting to the surgical department with the complaint of breast abscess were included in the study. The inclusion criteria were women aged between 30 and 60 years, confirmed cases of breast abscess by clinical and ultra-sonographic assessment, and those not lactating for more than 12 months. The exclusion criteria included those who were lactating or had stopped lactation less than one year prior to presentation, to ensure that the abscess was not of puerperal origin. Patients were also excluded if they had immunosuppressive diseases like HIV or cancer including those patients with known cases of diabetes.

Variables: The study collected data using a proforma method. The exposure factor studied is glycemic status, with categories being “Newly diagnosed Diabetic” and “Non-Diabetic,” as identified by patient history or random blood sugar >200 mg/dL or HbA1c >6.5%.

The outcome factors studied were

1. Recurrence – recurrence of pus requiring incision and drainage
2. Antibiotic response - Classified as "Responsive" (resolution <7 days) or "Refractory" (worsening/persistent).
3. Chronicity - acute (<2 weeks) or protracted (>2 weeks).

The covariates studied were age, Body Mass Index (BMI), and Total Leucocyte Count (TLC).

Statistical Analysis: The analysis was conducted using SPSS version 26 software. The independent samples t-test was used for analysis of continuous variables, while Pearson Chi-square/Fisher Exact

tests were used for analysis of categorical variables. The Odds Ratio with 95% Confidence Interval was used to calculate the risk attributable to diabetes. The level of significance used for this study is $p<0.05$.

RESULTS

Demographic and Metabolic Findings: The study recruited 80 women for this study. The findings showed that 45.0% (n=36) were newly diagnosed as Diabetics (incidental findings).

Table 1: Baseline Demographic and Metabolic Characteristics

The first table depicts that the diabetic patients were significantly older and had a higher BMI, consistent with a metabolic syndrome phenotype. The mean RBS for the undiagnosed diabetic patients at admission was significantly high at 228 mg/dL, suggesting that these patients were presenting with severe hyperglycemia, which further compromises their immune response.

Table 2: Risk Analysis of Surgical Outcomes in NLBA

Clinical Outcomes and Risk

Diabetic women experienced a markedly more severe clinical course. Table 2 details the risk associations.

The aforementioned data also highlights a dichotomy wherein a diabetic woman suffering from a breast abscess is 9 times more likely to suffer from recurrence and 13 times more likely to suffer from a protracted illness than a non-diabetic woman.

Table 1: Baseline Demographic and Metabolic Characteristics

Variable	Newly diagnosed Diabetic Group (n=36)	Non-Diabetic Group (n=44)	p-value
Age (Years)	42.5 ± 8.2	38.4 ± 7.5	0.021*
BMI (kg/m²)	26.8 ± 3.1	23.2 ± 2.4	<0.001*
RBS (mg/dL)	228 ± 45	138 ± 22	<0.001*
HbA1c (%)	7.15 ± 0.8	5.9 ± 0.4	<0.001*
Elevated TLC (%)	61.1% (22/36)	31.8% (14/44)	0.009*

Table 2: Risk Analysis of Surgical Outcomes in NLBA

Outcome Measure	Newly diagnosed Diabetic (n=36)	Non-Diabetic (n=44)	Odds Ratio (95% CI)	p-value
Recurrent Abscess	24 (66.7%)	8 (18.2%)	**9.00** (3.22 – 25.13)	<0.001*
Antibiotic Failure	16 (44.4%)	6 (13.6%)	**5.07** (1.73 – 14.82)	0.002*
Symptoms > 2 Weeks	30 (83.3%)	12 (27.3%)	**13.33** (4.53 – 39.24)	<0.001*

DISCUSSION

The Breast as a Metabolic indicator: The findings showed that 45% of patients with breast abscess are Diabetics, which is a high percentage when compared with the general prevalence rate of Diabetes in Manipur, which is around 7-8%.[15,16] This shows that breast is an important organ for infection with Diabetes as a causative factor for breast abscess among non-lactating women. The fact that this study showed a six-fold increase in Diabetics among patients with breast abscess shows that breast abscess is not an opportunistic infection but is associated with Diabetes.

Opportunistic screening is an important tool for screening patients for Diabetes, and this study showed that screening for Diabetes among patients with breast abscess is a good tool for diagnosing Diabetes as well as breast abscess.

Mechanisms Underpinning Therapeutic Failure: Diabetic status was associated with a fivefold increase in empiric antibiotic failure (OR 5.07). Factors that contributed to this include:

(i) **Biofilm development**: Diabetic hyperglycemia drives bacterial overgrowth and virulence factor overexpression of Staphylococcus aureus, resulting in biofilm development that renders it resistant to first-line antibiotics.[17,18]

(ii) **Anaerobic shift**: Diabetic breast tissue hypoxia drives anaerobic pathogens, such as Bacteroides and *Peptostreptococcus*,[10] that are not covered by first-line antibiotics, which are aerobic skin flora pathogens; thus, anti-anaerobic antibiotics (Metronidazole, Clindamycin) should be considered as part of first-line therapy.

(iii) **Healing**: Diabetic pro-inflammatory state and AGEs impair wound remodelling, leading to recurrence of abscesses.[19]

The Diagnostic mimicry: Diabetic Mastopathy, or sclerosing lymphocytic lobulitis, can mimic NLBA; recurrent sterile abscesses may be due to diagnostic failure, thus highlighting the importance of biopsy and optimization of diabetes control.[20,21]

Implications for North-East India: These findings have important implications for North-East India, where 83% of diabetic women presented late, beyond 2 weeks, possibly due to difficult terrain and traditional healers being their first port of call; genetic predispositions to central obesity and insulin resistance may further increase predisposition to diabetes.[22,13] Breast abscess should be considered as a sentinel for NCDs, with integration of point-of-care HbA1c testing into existing surgical outpatient clinics being a cost-effective, impactful intervention.

Limitations of this study: The retrospective design of this study limited anaerobic microbiological testing, possibly leading to an underestimate of anaerobic prevalence; however, the sample size of this study was only 80 (n=80), thus limiting subgroup analysis.

CONCLUSION

NLBA can be considered an indicator of metabolic syndrome, with approximately 50% of non-lactating women with NLBA being diabetic, indicating that diabetes leads to immune compromise through hyperglycemia.

Clinical Recommendations: Universal screening with random blood sugar and HbA1c should be done for all non-lactating women with a breast abscess; culture-guided therapy should be done because of high empiric failure rates; for diabetic women with abscesses, anaerobic coverage should be included in the empiric regimen until cultures are available; glycemic control should be corrected with insulin therapy in conjunction with drainage of the abscess; recurrent sterile abscesses should be evaluated for diabetic mastopathy before making another incision.

REFERENCES

1. Rizzo M, Peng L, Frisch A, Jurado M, Umpierrez G. Breast abscesses in nonlactating women with diabetes: clinical features and outcome. Am J Med Sci. 2009;338(2):123-6.
2. Dixon JM. Breast infection. BMJ. 2013;347:f3291.
3. Bharat A, Gao F, Aft RL, Gillanders WE, Eberlein TJ, Margenthaler JA. Predictors of primary breast abscesses and recurrence. World J Surg. 2009;33(12):2582-6.
4. Gollapalli V, Liao J, Dudakovic A, Sempowski GD, Agarwal A, et al. Risk factors for development and recurrence of primary breast abscesses. J Am Coll Surg. 2010;211(1):41-8.
5. Lipsky BA, Berendt AR, Cornia PB, et al. 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. Clin Infect Dis. 2012;54(12):e132-73.
6. Verghese BG, Ravikanth R. Breast abscess, an early indicator for diabetes mellitus in non-lactating women: a retrospective study from rural India. World J Surg. 2012;36(5):1195-8.
7. Delamaire M, Maugendre D, Moreno M, Le Goff MC, Allannic H, Genetet B. Impaired leucocyte functions in diabetic patients. Diabet Med. 1997;14(1):29-34.
8. Jafar N, Edriss H, Nugent K. The Effect of Short-Term Hyperglycemia on the Innate Immune System. Am J Med Sci. 2016;351(2):201-11.
9. Tooke JE. Microvascular function in human diabetes. A physiological perspective. Diabetes. 1995;44(7):721-6.
10. Bartolomé-Álvarez J, Solves-Ferriz V. Microbiology of breast abscesses. Enferm Infecc Microbiol Clin (Engl Ed). 2022;40(9):479-82.
11. Peleg AY, Weerarathna T, McCarthy JS, Davis TM. Common infections in diabetes: pathogenesis, management and relationship to glycaemic control. Diabetes Metab Res Rev. 2007;23(1):3-13.
12. Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, et al. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: phase I results of the ICMR-INDIAB study. Diabetologia. 2011;54(12):3022-7.
13. Hills AP, Arena R, Khunti K, Yajnik CS, Jayawardena R, Henry CJ, et al. Epidemiology and determinants of type 2 diabetes in south Asia. Lancet Diabetes Endocrinol. 2018;6(12):966-78.
14. Unnikrishnan R, Anjana RM, Mohan V. Diabetes in South Asians: is the phenotype different? Diabetes. 2014;63(1):53-5.
15. ICMR-INDIAB Collaborative Study Group. India Diabetes (INDIAB) Study: Phase I Results. Indian J Med Res. 2011.
16. Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, et al. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR-INDIAB population-based cross-sectional study. Lancet Diabetes Endocrinol. 2017;5(8):585-96.
17. Mottola C, Mendes JJ, Cristino JM, Cavaco-Silva P, Tavares L, Oliveira M. Polymicrobial biofilms by diabetic foot clinical isolates. Folia Microbiol (Praha). 2016;61(1):35-43.
18. Percival SL, Suleman L. Slough and biofilm: removal of barriers to wound healing by desloughing. J Wound Care. 2015;24(11):498, 500-3, 506-10
19. Hu SC, Lan CE. High-glucose environment disturbs the physiologic functions of keratinocytes: Focusing on diabetic wound healing. J Dermatol Sci. 2016 Nov;84(2):121-127.
20. Camuto PM, Zetrenne E, Ponn T. Diabetic mastopathy: a report of 5 cases and a review of the literature. Arch Surg. 2000;135(10):1190-3.
21. Tomaszewski JE, Brooks JS, Hicks D, Livolsi VA. Diabetic mastopathy: a distinctive clinicopathologic entity. Hum Pathol. 1992;23(7):780-6.
22. Ngangbam S, Roy AK. Determinants of health-seeking behaviour in Northeast India. J Healthc Manag. 2019;21(2):234–57.