Prevalence and Risk Factors of Lactation Mastitis in Three Hospitals in Cameroon: A Cross-Sectional Study

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Authors’ contributions

This work was carried out in collaboration between all authors. Authors TOE, DTN and RT conceptualized the study. Author DTN conducted the data collection. Authors TOE and DTN conducted the data analysis. Author TOE wrote the manuscript. Author MNN supervised and proofread the manuscript. All the co-authors gave advice on presentation of the results and editing of the text, and approved the final manuscript.

ABSTRACT

Background: Lactation mastitis is a painful, debilitating condition that if not well managed, can mislead women into prematurely stopping breastfeeding and by so doing deprive the child of optimal feeding. The World Health Organization (WHO) estimates that about 10% of breastfeeding mothers worldwide develop mastitis, though incidence may vary between 2.6% and 33%.

Objective: The aim of this study is to determine the prevalence and risk factors of lactation mastitis among breastfeeding mothers in three hospitals in Cameroon.

Patients and Methods: This was an observational, cross-sectional prospective study of 245

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breastfeeding women in three hospitals in Douala and Limbe during the period January 1, 2012 to December 31, 2012. Participants who had opted for breastfeeding were recruited and invited to complete a baseline questionnaire before discharge from hospital. Cases of mastitis were either reported directly to the researchers or diagnosed clinically. Regular telephone follow-up interviews were done for women diagnosed with mastitis.

Results: A total of 37 (15%) women were diagnosed with mastitis. Seventy-one percent (174/245) of them were not aware of breastfeeding techniques and did not practice standard breastfeeding habits. 42% practiced poor breastfeeding hygiene.

Conclusion: Approximately one in seven women is likely to have mastitis during breastfeeding. Most of the women are not aware of breastfeeding techniques and practice substandard breastfeeding hygiene that predisposes them to mastitis and to possible premature cessation of breastfeeding. In such circumstances, the method's nutritional, immunological and economic benefits are lost.

Keywords: Prevalence; lactation mastitis; weaning; risk factors; breastfeeding practices.

1. INTRODUCTION

Mastitis is an inflammation of the breast tissue which may or may not be caused by infection [1,2]. It can occur at any age; but it is most common in breastfeeding mothers, in which case it is known as lactation mastitis [3]. The condition occurs in 9-33% of lactating mothers, mostly in the first few weeks. Nearly all cases occur within the first 3 months [4–6].

The condition is painful and debilitating, and can affect breastfeeding mothers adversely [7]. Mastitis is a relatively common complication of lactation. Surprisingly, though, few studies have been carried out on its incidence and risk factors [8].

Mastitis results from ineffective removal of milk from the breast [9,10], which in turn results in stasis in an area of breast tissue. Stasis generates a local inflammatory process with pain and redness in a wedge-shaped area of the breast. Infection is most likely to occur as bacteria may enter through cracks in the nipple, leading to pyrexia or malaise [11]. Milk stasis has several known risk factors, among which are plugged ducts and nipple pore engorgement, decreased or delayed feeding times, breast surgery, maternal lifestyle (for example too many activities), maternal illness, stress or fatigue, nipple sore, and ineffective breastfeeding [12–14]. If well discussed during antenatal consultations in which healthy breastfeeding practice guidelines are outlined, these risk factors will reduce significantly. Diagnosis is usually clinical and does not require milk culture. Only in cases of severe mastitis, mastitis refractory to optimal antibiotic treatment or hospital-acquired mastitis is milk culture advised [15]. The major infectious agents found during mastitis are Staphylococcus aureus, Escherichia coli and Hemophilus influenza [16–20]. These micro-organisms usually respond to Flucloxacillin (or Erythromycin in women with Penicillin hypersensitivity) for 10-14 days [21,22].

The Millennium Development Goals (MDGs) 4 and 5 are concerned with maternal and infant health [1,7]. To attain these goals, health professionals are expected to provide appropriate advice and support to women in the management of mastitis. They are equally expected to encourage breastfeeding since it is safe for the infant and beneficial to the mother in whom the risk of breast abscess increases with breast engorgement (except in HIV positive mothers) [23–28].

The aim of this study is to determine the prevalence and risk factors of lactation mastitis among breastfeeding mothers in three hospitals in Cameroon.

2. PATIENTS AND METHODS

2.1 Study Design

This was an observational, cross-sectional prospective study carried out during the period January 1 to December 31, 2012 in Douala and Limbe. The target hospitals were the Douala General Hospital (DGH), Douala Laquintinie Hospital (DLH), and the Limbe Regional Hospital (LRH). The Douala General Hospital is a tertiary care centre while the Douala Laquintinie Hospital is a secondary care centre. Both hospitals are known to have the greatest influx of patients in obstetrics/gynecology and in the infant welfare clinics (IWC) in Douala.
The Limbe General Hospital, for its part, is a secondary care center that serves as one of the referral hospital centers in the South West Region (SWR) of Cameroon. It also records a great influx of patients in the maternity and in the infant welfare clinic.

2.2 Study Population

The target population for the study was nursing mothers at the out-patient department (OPD) and those attending the IWC in the three hospitals. Participation was voluntary, and informed consent was obtained by having participants sign the consent form attached to the questionnaire. Names of participants were not part of the information requested.

To be included in the study, the women had to have had normal vaginal delivery of healthy singleton babies at term and to have been breastfeeding for about 6 months. The babies had to be normal (normal birth weights and devoid of congenital malformations). Women must have chosen to breastfeed (with or without food supplements). Participant enrolment into the study was non-discriminatory; Maternal age, gravidity or parity, and marital status were obtained; but social status, ethnic origin, occupation or level of education were not demanded. On the other hand, proficiency in English, Pidgin English and/or French was required.

Excluded from study were women with any long-standing debilitating illnesses, (diabetes, HIV) or those who had chosen not to breastfeed.

2.3 Sample Size Calculation

Participants were selected at random. The target sample size was obtained based on the WHO – steps for calculating sample size [29]:

\[ n = \frac{z^2p(1-p)}{d^2} \]

Where,

- \( n \) - minimum required sample size
- \( z \) - Confidence level at 95% hence standard value of 1.96
- \( p \) - Incidence of lactation mastitis in Australia, 20% [30]
- \( d \) - Margin of error at 0.7%

Therefore, \( n = \frac{1.96^2 \times 0.2(1-0.2)}{0.7^2} = 125.44 \)

Therefore, the minimum required sample size was 126, but a final sample size of 245 was used to improve the study significance.

2.4 Study Procedure

Data collected at recruitment by investigator-administered questionnaires included a wide range of demographic factors as well as the participant’s attitude to infant feeding. Participants were recruited at the IWC units, OPD and postnatal wards of the various target hospitals. Women were asked about their infant feeding intentions, number of feeds per day, duration of feeds, nature of bras, and other breastfeeding practices (example: Washing of hands, cleaning the nipples before breastfeeding and sitting position and how to hold the breast during breastfeeding).

As there is no standard definition of mastitis, participants were asked if they had any of the following symptoms: Breast tenderness/pain, redness of any part of the breast, breast lump, cracked nipples, high temperature or flu-like symptoms such as shivering, hot sweats or aches. If they confirmed any of the symptoms, they were asked further questions about timing and management of the episode. Also solicited were data concerning previous births, episodes of mastitis, breastfeeding experiences and counseling from health professionals.

Women with mastitis reported directly to the research team either in the post-natal wards or at the OPD. All participants were instructed to contact the research team by phone in case of any new symptom after leaving the hospital.

For the purposes of this study, mastitis was defined as the presence “at least of two of the three breast symptoms (pain, redness, lump) and of at least one of the fever and flu-like symptoms”.

Symptoms had to have been present for at least 24 hours. Milk culture or related para-clinical investigations were not requested for. Clinical findings were disclosed to the participants concerned.

Women experiencing mastitis provided further information regarding symptoms and management during follow-up telephone interviews that ensued after diagnosis and which held every 2 days for 1 week. The telephone interviews included questions on breastfeeding
practice, breast and breastfeeding-related problems, breast care, use of breast pumps, and maternal and infant health. Follow-up was continued for one year.

2.5 Data Management and Statistical Analysis

Two hundred and forty-five participants were recruited into the study from the three hospitals. As there were no differences in the background characteristics of the participants in the hospitals, and no differences in outcome variables (initiation and duration of lactation), the results of the women from the three hospitals were put together and treated as a cohort.

The responses in the questionnaires were logged into a computer that was password-protected, thus limiting access to the research information to the research team only.

Comparison between variables was conducted using the Chi-square test. Measures of central tendency and variation were used to illustrate the sample population characteristics. Results are represented in tabular form. Independent variables to be examined were derived from the literature and from clinical findings as well. These included demographic variables like maternal age, marital status, education, and address; maternal characteristics (place of birth, smoking status); and breastfeeding characteristics (cracked nipples, duration of nipple pain, over-supply of milk, duration of breastfeeding). Data analysis was with EPI INFO version 3.5 and Microsoft Excel 2007 software. The results were expressed as percentages. Statistical significance was set at P < 0.05.

2.6 Ethical Consideration

- Ethical clearance was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Buea, Cameroon (IRB/FHS-UB).
- Administrative clearance was obtained from the Regional Delegation of Public Health for Littoral and the South West Regions.
- The study also received approval from the Research Ethics Committee of the three hospitals.
- Written informed consent was obtained from the participants.

3. RESULTS

During the study period, 509 breastfeeding women were identified in three hospitals. Out of this number, 81 were discharged from hospital prior to completion of recruitment formalities. A further 159 women did not meet the inclusion criteria because of cesarean deliveries, multi-fetal births, congenital malformations or formula feeding, leaving us with 269 women. Among the remaining 269 women, 24 did not consent to study. We were finally left with 245/509 (48%) breastfeeding women for study.

Among the 245 women enrolled for study, 37 (15%) showed clinical signs and symptoms of mastitis that made them eligible for follow-up. Nine of the 37 (25%) women with mastitis were lost to follow-up and 28/37 (75%) completed the one-week telephone interview.

Table 1 shows the sampling of the 245 participants among the three study hospitals. The majority of study participants 103 (42%) were recruited from the DLH, followed by the LRH 84 (34.3%) and DGH 58 (23.7%) (P=0.05).

Table 1. Population sampling in the three selected hospitals

| Hospital       | Number of participants | P-Value |
|----------------|------------------------|---------|
| DLH            | 103 (42%)              | 0.05    |
| DGH            | 58 (23.7%)             |         |
| LRH            | 84 (34.3%)             |         |
| Total          | 245 (100%)             |         |

DLH: Douala Laquintinie Hospital, DGH: Douala General Hospital, LRH: Limbe Regional Hospital

Table 2 shows that most of the study participants 112 (45.7%) were in the age group 30-39 while 99 (40.4%) women were in the age bracket 20-29. (P=0.05). Teenage births accounted for 7.8% and advanced maternal age (> 40 years) was 6.1%. This reflects the age when women procreate in Douala and Limbe. Ninety-four percent of the participants were married (P=0.01).

Table 3 on the risk factors for lactation mastitis shows that 71% of the participants did not receive counseling from health professionals (P=0.04). The majority, 73 (43.5%) weaned their children after 10 months, 33.3% between 6-10 months, and 23.2% before 6 months (P=0.02). Eighty-two percent breastfed more than 6 times per day (P=0.04). Only 5 (2%) in the study group
smoked cigarettes. Two hundred and forty (98%) did not smoke (P=0.04). As regards wearing of tight-fitting bras, 14.7% did while 85.3% did not (P=0.03). Forty-two percent had poor breast hygiene while 142(58%) had good breast hygiene.

4. DISCUSSION

Our study, set in three hospitals in Douala and Limbe undertook to determine the prevalence and risk factors of lactation mastitis among breastfeeding mothers.

Table 2. Socio-demographic characteristics of the study population

| Characteristics | DLH | DGH | LRH | Total | P values |
|-----------------|-----|-----|-----|-------|----------|
| Age distribution |     |     |     |       |          |
| 12-19 years     | 05  | 07  | 07  | 19 (7.8%) | 0.05    |
| 20-29 years     | 44  | 24  | 31  | 99 (40.4%) |        |
| 30-39 years     | 46  | 26  | 40  | 112 (45.7%) |        |
| > 40 yrs        | 08  | 01  | 06  | 15 (6.1%)  |         |
| TOTAL           | 103 | 58  | 84  | 245 (100%) |         |
| Marital status |     |     |     |       |          |
| Married         | 83  | 39  | 59  | 181 (74%) | 0.01    |
| Not married     | 20  | 19  | 25  | 64 (26%)  |         |
| TOTAL           | 103 | 58  | 84  | 245 (100%) |         |
| Parity          |     |     |     |       | 0.8      |
| Primipar        | 31  | 20  | 26  | 77 (31.4%) |        |
| Multipar        | 72  | 38  | 58  | 168 (68.6%) |        |
| TOTAL           | 103 | 58  | 84  | 245 (100%) |         |

Statistical Significance: P<0.05, DLH: Douala Laquintinie Hospital, DGH: Douala General Hospital, LRH: Limbe Regional Hospital

Table 3. Distribution of risk factors of breastfeeding mastitis

| Characteristics | DLH | DGH | LRH | Total (%) | P-Value |
|-----------------|-----|-----|-----|-----------|---------|
| Awareness BFT   |     |     |     |           |         |
| Yes             | 30  | 17  | 24  | 71 (29%)  | 0.04    |
| No              | 73  | 41  | 60  | 174 (71%) |         |
| Total           | 103 | 58  | 84  | 245 (100%)|         |
| Weaning (months) |     |     |     |           |         |
| <6              | 18  | 07  | 14  | 39 (23.2%) | 0.02    |
| 6-10            | 29  | 13  | 14  | 56 (33.3%) |         |
| >10             | 25  | 18  | 30  | 73 (43.5%) |         |
| Total           | 72  | 38  | 58  | 168 (100%)|         |
| Frequency BF/day |     |     |     |           |         |
| <6              | 24  | 10  | 11  | 45 (18%)  | 0.04    |
| >6              | 79  | 48  | 73  | 200 (82%) |         |
| Total           | 103 | 58  | 83  | 245 (100%)|         |
| Cigarette smoking |     |     |     |           |         |
| Yes             | 3   | 1   | 1   | 5 (2.0%)  | 0.04    |
| No              | 100 | 57  | 83  | 240 (98%) |         |
| Total           | 103 | 58  | 84  | 245 (100%)|         |
| Tight-fitting bras |     |     |     |           |         |
| Yes             | 17  | 11  | 08  | 36 (14.7%) | 0.03    |
| No              | 86  | 47  | 76  | 209 (85.3%)|         |
| Total           | 103 | 58  | 84  | 245 (100%)|         |
| Breast Hygiene  |     |     |     |           |         |
| Good            | 43  | 40  | 59  | 142 (58%) | 0.06    |
| Poor            | 60  | 18  | 25  | 103 (42%) |         |
| Total           | 103 | 58  | 84  | 245 (100%)|         |

Statistical Significance: P<0.05, BFT: Breastfeeding Techniques, BF: Breast Feeding, DLH: Douala Laquintinie Hospital, DGH: Douala General Hospital, LRH: Limbe Regional Hospital
The majority of the study participants were from the DLH and LRH. This actually reflects the trend of hospital attendance in the country. Among the 37 participants with lactation mastitis, only 28 completed the one-week telephone interview. This fact highlights the difficulty medical practitioners in Cameroon have following up patients after discharge from hospital.

Breastfeeding is a major component of a baby’s nutrition. It is cheap, readily available and safe. It also encourages bonding between mother and child and provides the baby with antibodies against bacterial infections [26,31–33]. The WHO recommends exclusive breast milk for a minimum period of 6 months because of the advantages of breast milk already mentioned [34–36].

However, if proper hygiene is not respected during breastfeeding, infection can occur on the breast leading to lactation mastitis. The normal milk of mastitis patients is significantly deficient in IgA, C3 and lactoferrin, in opposition to that of other lactating women, suggesting that the former were predisposed to mastitis [37].

4.1 Prevalence of Lactation Mastitis

The prevalence of lactation mastitis in this study is 15%, very closely similar to the 17.3% and 20% reported in Australian studies [19,30,38]. Other studies conducted on Scottish women in 2008 failed to identify non-suppurative forms of mastitis (thus underestimating the real incidence of mastitis at 18% [39]. In this study, both supplicative and non-suppurative forms of mastitis were identified. Another US study [13] reported a 9.5% incidence of health care provider-diagnosed lactation mastitis. In our study only nine women (3.7%) were reported to be visiting a hospital OPD for signs and symptoms suggestive of mastitis. The rest of the cases were diagnosed incidentally in the postnatal wards and IWC. Some of the women in our study had lactation mastitis after a previous delivery, but most of them did not seek medical care. This situation contrasts with an Australian study where majority of the women (73%) sought treatment and advice from their General Practitioner [30], and with another study in the United States of America [13] where all the women were diagnosed during a medical consultation. In general, incidence rates for mastitis are below 10% when medical records and women seeking medical advice are used as data sources, whereas incidence rates of about 20% are reported in studies where diagnosis is based on self-reported symptoms [38].

4.2 Risk Factors of Lactation Mastitis

Mastitis has been seen to be resulting from stasis of breast milk and subsequent infection, and from premature cessation of breastfeeding [28,38]. The key to avoiding the condition is counseling women about breastfeeding techniques. Most participants in this study were not aware of breastfeeding techniques. Approximately 1 in 5 women has had counseling on Breastfeeding either from a nurse, a midwife, a General Practitioner or an obstetrician, but none from a lactation consultant. The other 80% have relied on sub-standard past experiences as reflected in breast hygiene and manual expression of breast milk. A few cases responded, “The baby’s mouth is clean, and so is the nipple.” “No, I don’t need to wash my hands before breastfeeding.” “It is against our culture to discard breast milk.” These views are not surprising because there are pretty few breastfeeding specialists and lactation consultants in the ANC and IWC centres under study.

The US Healthy People 2010 goals for breastfeeding were that 75% of mothers initiate breastfeeding, with 50% and 25% continuing to 6 and 12 months respectively [40]. The WHO recommends breastfeeding for at least 6 months [36]. In this study, only 23.2% participants breastfed for less than 6 months. The majority, 76.8%, breastfed for longer than 6 months. Nursing mothers are advised to breastfeed for 24-26 weeks in order to reduce the incidence of breast pathologies like mastitis. This has been shown to be a common practice among women in the study hospitals, in contrast to the Australian study that found no association between mastitis and breastfeeding duration [41,42]. Vogel et al. [43] conclude that mastitis is more likely to occur in mothers with ample milk supply. Such mothers are more at risk of milk stasis if they delay or miss a feed [2].

Frequent breastfeeding is paramount in achieving milk drainage and combating lactostasis. Only 18% (45/245) of the breastfeeding women in this study feed their babies less than 6 times a day, which greatly reduces the incidence of mastitis. Other studies in Spain report that mother-infant separation greater than 24 hours results in lactation mastitis (P=0.0027) [44].
Smoking has been shown to damage the milk ducts and hence restrict milk flow and promote stasis. Five of the 245 participants smoked at least 2 sticks of cigarettes per day. Cameroonian women are really not into smoking. The absence of non-lactation mastitis corresponds to the low incidence of cigarette smoking and mammary duct ectasia in Cameroonian women, while the high incidence of lactation mastitis corresponds to the high rate of breastfeeding and low level of personal hygiene in the low-income group where the disease is most common. Economic recession has also reduced consumption of formula milk, thus intensifying breastfeeding and reducing the likelihood of lactation mastitis. Nonetheless, this study did not specifically associate smoking with lactation mastitis. Studies have shown that women who smoke are less likely to breastfeed, less likely to initiate breastfeeding, and more likely to breastfeed for a shorter duration than nonsmokers. However, in some population groups, a high proportion of smokers breastfeed successfully. Therefore, it is likely that psychosocial factors are largely responsible for the lower rates of breastfeeding in women who smoke, compared to those who do not [45,46].

The habitual use of tight bras was a rare finding that involved 14.7% participants in the study. Other studies have found factors like restriction from a tight bra, attachment (to baby) difficulties, and nipple pain during feeds to be significant predictors of lactation mastitis in first-time breastfeeding mothers [12,41].

Mastitis is a continuum from a mild inflammatory condition to a severe bacterial infection. We used a strict definition of mastitis in this study in order to estimate the proportion of breastfeeding women who experienced a clinically significant illness. We avoided asking about mastitis directly; rather, in order to reduce bias, we collected information about signs and symptoms diagnostic of mastitis, just like the study conducted by Amir et al. [4].

4.3 Study Limitations

This study was hospital-based and only women who made use of the selected hospitals during the period of study were recruited. Mothers who did not visit either of the target hospitals may have missed mastitis or related cases and were thus likely to cause a bias in the data. There was a considerably high attrition rate as participants were lost to follow-up interviews either for personal reasons or because of communication problems.

The use of highly objective, closed-ended questions and a single interviewer throughout the study may have created the impression that the period of study appeared to match the target population size. However, the target population of a given hospital may have been different from the actual attendance during the periods when the interviewer was not there.

The participants who reported symptoms suggestive of lactation mastitis in previous births had no supportive medical report to affirm the diagnosis. The evolution of symptoms in the cases that completed the follow-up telephone interviews was only assessed verbally, with no clinical examination component to back up the findings as in ideal situations. This and other Scottish studies [39] probably underestimated the true incidence due to limitations in case ascertainment bias and the short period during which women were followed postpartum. It would have been more preferable to collect information about mastitis on several time points. More information could have been collected on breastfeeding patterns, such as data on the correct positioning of the breasts and the length of intervals between feeds overnight.

5. CONCLUSIONS

The findings of this study suggest that one in seven women may develop lactation mastitis. Only few women are aware of the breastfeeding techniques taught by health professionals. Majority of the study participants breastfed for more than 6 months, and more than 6 times a day (on baby’s demand). Forty-two percent of them have poor breastfeeding hygiene.

6. RECOMMENDATIONS

Women should be taught good breastfeeding techniques and practices during pregnancy. This should include breast hygiene, adequate breastfeeding positioning, bras to be worn, importance of frequent breastfeeding, symptoms of mastitis, and breast self-examination (BSE) techniques.

There is need to train breastfeeding consultants. A trained nurse should be assigned to give
lessons on BF and breast hygiene at least once a month during ANC and IWC.

Seminars on BF and maternal health should be organized periodically, and should involve all health personnel in the maternity, pediatrics and IWC clinics.

Every nursing mother from the postpartum wards should be referred to a lactation consultant before discharge from the hospital.

CONSENT

Written informed consent was obtained from all the participants of the study.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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