

Factors associated with nipple trauma in the maternity unit

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Abstract

Objective: To identify factors associated with nipple trauma in women breastfeeding exclusively in a maternity unit.

Methods: This was a case-control study that recruited 146 recently-delivered mothers in rooming-in wards: 73 cases, defined as women with nipple trauma, and 73 controls, defined as women free from this pathology. Women breastfeeding exclusively were tested daily for a diagnosis of nipple injury, identified using a magnifying glass. Sociodemographic, obstetric and neonatal variables were studied. A logistic regression model was used for statistical analysis.

Results: Cases and controls proved to be comparable in terms of their sociodemographic variables, although the women with nipple trauma were more likely not to be living with a partner. The following variables were found to be factors associated with nipple trauma: primiparity (OR 3.16; 95%CI 1.19-8.42), not living with a partner (OR 3.25; 95%CI 1.18-8.93), turgid and/or engorged breasts (OR 12.31; 95%CI 4.48-33.78), semi-protruding and/or malformed nipples (OR 4.69; 95%CI 1.50-14.62), and depigmentation of nipples (OR 13.98; 95%CI 4.43-44.06).

Conclusion: Primiparity, not living with a partner, turgid and/or engorged breasts, semi-protruding and/or malformed nipples, and depigmented nipples are associated with nipple trauma.

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Introduction

Nipple injury is a breast disorder with an incidence varying from 11 to 96% of women who breastfeed during the first week after delivery.¹⁻⁴ It has also been observed that 80 to 95% of these women exhibit some type of nipple pain and that 26% exhibit extreme pain,² which has a negative impact on breastfeeding duration.⁵ The observable

consequences of this include early breastfeeding cessation⁶ and an increased likelihood of bottlefeeding, which leads to weaning due to the use of artificial nipples.⁷

Nipple trauma has been identified as being a disorder resulting from incorrect positioning and latching-on during breastfeeding. Therefore, the most important intervention

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for reducing its occurrence is the education of women on correct breastfeeding techniques, starting during pregnancy.³

Nevertheless, it has been observed that other factors can also contribute to nipple trauma.^{2,8-12} Since both domestic and international publications dealing with this issue are rare, this study was designed in order to investigate which maternal and neonatal factors may contribute to the development of nipple trauma in women breastfeeding exclusively in a maternity unit.

Identification of associated factors can increase knowledge on the subject and contribute to the development of preventative actions which could minimize not only the appearance of the pathology but also its consequences.

Methods

This was an unpaired case-control study undertaken at the Hospital São Paulo belonging to the Universidade Federal de São Paulo (UNIFESP), in São Paulo, Brazil. The study enrolled recently-delivered mothers of singleton babies on exclusive breastfeeding and with weights greater than 2,500 g, selected from the rooming-in wards. The cases were women with nipple trauma, defined as any type of wound or pathological change to the nipple skin (fissures, scratches, erosion, ecchymosis, marks or blisters).¹³ The controls were recently-delivered mothers with healthy nipples who had given birth during the same period. The exclusion criterion was infants with palate or tongue malformations.

The study was approved by the Research Ethics Committee at UNIFESP and patients were enrolled after signing a Free and Informed Consent Form. Data collection was carried out between September 2004 and May 2005 by one of the investigators, who has more than 5 years' experience in this area. Women who met the eligibility criteria were interviewed daily and both breasts were examined with the aid of a magnifying glass in order to identify the presence or absence of nipple trauma. For each case identified, a control was sought with the same admission conditions, during the first 72 hours. The data collected were recorded on forms designed specifically for this study. It should be pointed out that all of the mothers at this institution were given general guidance on breastfeeding by health professionals according to a care protocol, although the hospital does not have the Baby-Friendly certification. The data recorded during the interview were as follows:

Maternal variables:

- age;
- educational level (in years of education);
- skin color (defined as white or brown/black, self-reported);

- marital status;
- primiparity;
- preparation of nipples during pregnancy [two variables: yes or no and correct (exposure to the sun) or incorrect (use of creams and abrasives such as sponges)^{1,14,15}];
- condition of breasts after delivery [responses: flaccid (soft), turgid (full and hard) or engorged (painful)^{10,16}];
- nipple type [responses: protruding (90° angle between nipple and areola), not protruding/ semi-protruding (angle of more than 180° between nipple and areola) or malformed¹⁷];
- nipple pigmentation [defined as normal (homogeneous color throughout entire nipple) or partial or total depigmentation (nipple color different from areola)¹³].

Neonatal variables:

- sex;
- birth weight;
- time of first breastfeeding.

The chi-square test and Student's t test were used to analyze the sample. Odds ratios (OR) with 95% confidence intervals (95%CI) were calculated from the univariate analysis in order to identify relationships between possible associated factors and nipple trauma. A non-conditional logistic regression model was used to evaluate the combined association of independent variables with the condition of the women (cases or controls). The initial multivariate analysis model comprised those variables selected by the raw analysis ($p \leq 0.10$). The sample size calculation specified enrollment of 140 women, taking into account need for 10 to 15 patients for each of the independent variables to be analyzed using the logistic regression model. The database was stored on Epi-Info[®] and Stata version 6.

Results

A total of 146 recently-delivered mothers were enrolled during the period studied, 73 of whom had nipple trauma (cases) and 73 who did not (controls). Some of the study variables were recorded with the objective of characterizing the study group. In terms of these variables, the cases and controls were comparable, with the exception of the number of women with a partner, which was greater in the group without traumas (Table 1).

The univariate analysis detected significant associations between nipple trauma and living with a partner, turgid and/or engorged breasts, semi-protruding and/or malformed nipples, nipple depigmentation and first breastfeed within 1 hour of birth (Table 2).

The initial logistic regression model included those explanatory variables with greater statistical significance

and those cited in the literature as factors that can trigger the development of nipple trauma. The multivariate logistic regression analysis identified the following factors as being associated with nipple trauma: primiparity, not living with a partner, turgid and/or engorged breasts, semi-protruding and/or malformed nipples, depigmentation of nipples and breastfeeding within the first hour after birth. (Table 3).

Discussion

This study demonstrated that primiparity, turgid and engorged breasts, semi-protruding/malformed nipples and depigmentation of the nipples are all factors that are associated with the development of nipple trauma in recently-delivered mothers whose children are on exclusive breastfeeding while in the maternity unit. Breastfeeding

Table 1 - Distribution of sociodemographic variables within the study population

Variables	Cases (n = 73)	Controls (n = 73)	p
Age of mother (years)	26.34±6.61	26.93±6.61	0.591*
Educational level of mother (years in education)	8.84±2.77	8.32±2.75	0.263*
Lives with partner (%)	55	65	0.031†
Gestational age ≥ 37 weeks (%)	69	66	0.347†
Female child (%)	37	33	0.508†
Birthweight of child (grams)	3,193.70±363.37	3,142.47±398.32	0.418*

Values shown as mean ± standard deviation.

* Student's *t* test.

† Chi-square.

Table 2 - Results of the univariate analysis with confidence intervals, by maternal variables and group (São Paulo, Brazil, 2008)

Characteristics	Cases (n = 73)		Controls (n = 73)		OR	95%CI	p
	n (%)	n (%)	n (%)	n (%)			
White skin	36 (49)	31 (42)	1.32	0.69-2.53	0.406		
Living with partner	55 (75)	65 (89)	0.38	0.15-0.93	0.031		
Primiparous	28 (38)	23 (31)	1.35	0.68-2.68	0.381		
Preparation of nipples during pregnancy	35(48)	14 (19)	3.88	1.85-8.15	0.001		
Incorrect preparation of nipples during pregnancy	33 (94)†	13 (93)†	1.27	0.11-15.23	0.851		
Turgid and/or engorged breasts	34 (47)	18 (25)	2.61	1.29-5.29	0.007		
Semi-protruding or and/or malformed nipples	14 (19)	04 (5)	4.04	1.26-12.93	0.013		
Nipple depigmentation	27 (37)	10 (14)	3.64	1.60-8.26	0.001		
First feed more than 1 hour after birth	23 (31)	39 (53)	0.40	0.19-0.83	0.007		

95%CI = 95% confidence interval; OR = odds ratio.

† For the variable incorrect preparation, the numbers included in the analysis were: n = 35 cases and n = 14 controls.

Table 3 - Final results from the adjusted logistic regression model for nipple trauma (São Paulo, Brazil, 2008)

Variable	Cases (n)	Controls (n)	Raw OR	Adjusted OR	95%CI
Not living with partner	18	08	1.32	3.24	1.18-8.93
Primiparous	28	23	1.35	3.16	1.19-8.42
Turgid and/or engorged breasts	34	18	2.61	12.31	4.48-33.78
Semi-protruding and/or malformed nipples	14	04	4.04	4.68	1.50-14.62
Nipple depigmentation	27	10	3.64	13.98	4.43-44.06
Breastfeeding within 1 hour of birth	50	34	0.40	11.62	3.93-34.32

95%CI = confidence interval; OR = odds ratio.

within the first hour after birth was associated with nipple trauma. Living with a partner was a protective factor against the development of nipple trauma.

A review of the literature did not identify Brazilian studies that had dealt with the factors associated with nipple traumas, with the exception of two studies which discussed breastfeeding technique (position and latching on) with relation to traumas.^{3,18}

A study carried out in the United States observed that parity is one factor related to nipple injury, in virtue of inexperience with breastfeeding technique, demonstrating a greater incidence of nipple injuries among primiparous women.¹⁹ Our study also identified that primiparous mothers were more likely to suffer nipple injuries than women with more than one child (95%CI 1.19-8.42).

Authors report that breast engorgement makes it more difficult for newborn infants to latch on correctly, due to distension and edema of the nipple and areolar region.^{18,20} The results of our study confirm that nursing mothers with turgid and/or engorged breasts are more likely to develop nipple injury (95%CI 4.48-33.78). It is worth pointing out that the trauma itself can cause or aggravate engorgement, since mothers extend the time between feeds or don't feed due to the pain involved.¹⁶

With reference to the type of nipple, it was observed that both semi-protruding and malformed nipples caused difficulties with latching on while suckling and were more easily traumatized.⁹ One study found that 15.4% of women had malformed nipples, demonstrating a positive association between weaning and nipple anomalies (relative risk = 5.6).²¹ The women in our study who had malformed nipples exhibited a greater likelihood of trauma, when compared with women with protruding nipples (95%CI 1.50-14.62).

Another cause has been suggested for the development of lesions is depigmentation of the nipple and areolar region, resulting from the use of creams during pregnancy.⁹ Little research has been done to investigate whether this depigmentation has a direct effect on the occurrence of nipple injury. Our study identified a greater chance of nipple trauma among women with depigmented nipples (95%CI 4.43-44.06).

Another finding of our study was an association between nipple trauma and breastfeeding during the first hour after birth (95%CI 3.93-34.32). This practice is the fourth step in the Baby Friendly Hospital Initiative, based on benefits described in the literature.²² It is believed that the result found here is related to incorrect positioning and latching-on when the child is offered the breast, and not to the step itself.

Our study also confirmed that not living with a partner was a factor associated with nipple trauma (95%CI 1.18-8.93). There are no studies that have directly related this

variable to nipple traumas, but partners have been described as important sources of breastfeeding support.^{23,24} It is believed that not living with a partner may make mothers more insecure, making the breastfeeding process more difficult. Further studies should be conducted to explain this association.

Other causes of nipple trauma that have been suggested in the literature include lack or incorrect guidance during the prenatal¹⁸⁻⁹ and postnatal periods,²⁵ in addition to pale skin^{13,16,19} and male infants.¹²

With reference to preparing nipples during pregnancy, studies contraindicated the use of creams, oils and ointments and the use of sponges towels,^{15,26} since they can provoke peeling of the skin in the nipple and areolar region, make the nipples more sensitive and predispose to the occurrence of nipple trauma.²⁰ In our study, incorrect nipple preparation was not associated with the occurrence of trauma. However, more women in the case group than in the control group exhibited this practice.

Skin color was not a determinant of the occurrence of injuries, which is in agreement with the literature, which states that there is no evidence for such a correlation, although some applications have reported a higher proportion of traumas among women with pale skin.^{12,19}

With relation to infants of male sex, in our study no differences were observed between the groups in terms of sex, in common with another study carried out with women in rooming-in wards at a University Hospital in Brazil.¹²

Our study was able to measure an association between certain factors and nipple trauma. Nevertheless, the use of a larger patient sample may make it possible to identify other risk factors and to reduce the large confidence intervals.

Based on what has been discussed above, we emphasize the importance of postnatal care, which should be directed at the correct positioning and latching-on techniques standardized by the World Health Organization,²⁷ particularly for primiparous women and those with semi-protruding and/or malformed nipples. The initial feeding phase should be supervised by the healthcare team in order to emphasize testing areolar flexibility and removing excess milk from the areolar area before starting to feed.

The identification of women with factors associated with nipple traumas makes it possible to intervene earlier in order to avoid the occurrence of trauma or to provide guidance and act upon its effects. It also makes it possible to establish health promotion actions, which are easily forgotten in primary healthcare, such as Women's Healthcare Programs.

References

1. Centuori S, Burmaz T, Ronfani L, Fragiaco M, Quintero S, Pavan C, et al. [Nipple care, sore nipples, and breastfeeding: a randomized trial.](#) *J Hum Lact.* 1999;15:125-30.

2. Ziemer MM, Pigeon JG. [Skin changes and pain in the nipple during the 1st week of lactation](#). J Obstet Gynecol Neonatal Nurs. 1993;22:247-56.
3. Weigert EM, Giugliani ER, França MC, de Oliveira LD, Bonilha A, do Espírito Santo LC, et al. [Influência da técnica de amamentação nas frequências de aleitamento materno exclusivo e lesões mamilares no primeiro mês de lactação](#). J Pediatr (Rio J). 2005;81:310-6.
4. Tait P. [Nipple pain in breastfeeding women: causes, treatment, and prevention strategies](#). J Midwifery Womens Health. 2000;45:212-5.
5. Locke RO, Paul D, DiMatteo D. [Breastfeeding continuation factors in a cohort of Delaware mothers](#). Del Med J. 2006;78:295-300.
6. Escuder MM, Venâncio SI, Pereira JC. [Estimativa de impacto da amamentação sobre a mortalidade infantil](#). Rev Saude Publica. 2003;37:319-25.
7. França MC, Giugliani ER, Oliveira LD, Weigert EM, Santo LC, Köhler CV, et al. [Uso de mamadeira no primeiro mês de vida: determinantes e influência na técnica de amamentação](#). Rev Saude Publica. 2008;42:607-14.
8. de Oliveira MI, Camacho LA, Tedstone AE. [Extending breastfeeding duration through primary care: a systematic review of perinatal and postnatal interventions](#). J Hum Lact. 2001;17:326-43.
9. Vinha VH. Traumas mamilares (ferimentos): prevenção e cuidados. In: Vinha VH, editor. O livro da amamentação. São Paulo: CLR Balieiro; 1999. p. 45-54.
10. Abrão AC, Coca KP. Apoio à mãe durante a amamentação: atribuições da enfermeira. In: Issler H, editor. O Aleitamento materno no contexto atual: políticas, práticas e bases científicas. São Paulo: Sarvier; 2008. p. 347-54.
11. Novak FR, de Almeida JA, de Souza e Silva R. [Casca de banana: uma possível fonte de infecção no tratamento de fissuras mamilares](#). J Pediatr (Rio J). 2003;79:221-6.
12. Shimoda GT, Silva IA, Santos JL. [Características, frequência e fatores presentes na ocorrência de lesão de mamilos em nutrizes](#). Rev Bras Enferm. 2005;58:529-34.
13. Biancuzzo M. Sore nipples: prevention and problem-solving. Herndon: WMC Worldwide; 2000.
14. Blyth R, Smyth W, Flenady V. Antenatal nipple care for increasing the duration of breastfeeding (Protocol for a Cochrane Review). In: The Cochrane Library, Issue 1, 2004. Oxford: Update Software.
15. World Health Organization. Second stage of labour: deliver the baby and give immediate newborn care. In: World Health Organization. Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice. Geneva: World Health Organization; 2003. p. D10-1.
16. Lawrence RA, Lawrence RM. Management of the mother-infant nursing couple. In: Lawrence RA, Lawrence RM. Breastfeeding: a guide for the medical profession. 6th ed. St. Louis: Mosby; 2005. p.255-316.
17. Vinha VH, Pelá NT, Shimo AK, Scochi CG. Trauma mamilar: proposta de tratamento. Femina.1987;15:370-8.
18. Carvalhaes MA, Corrêa CR. [Identificação de dificuldades no início do aleitamento materno mediante aplicação de protocolo](#). J Pediatr (Rio J). 2003;79:13-20.
19. Ziemer MM, Cooper DM, Pigeon JG. [Evaluation of a dressing to reduce nipple pain and improve nipple skin condition in breastfeeding women](#). Nurs Res. 1995;44:347-51.
20. Giugliani ER, Lamounier JA. Aleitamento materno: uma contribuição científica para a prática do profissional de saúde. J Pediatr (Rio J). 2004;80:S117-8.
21. Pelá NT. O aleitamento materno do recém-nascido: fatores mamários condicionantes. Bol Oficina Sanit Panam. 1983;94:133-41.
22. World Health Organization/CHD. Evidence for ten steps to successful breastfeeding. Geneva: WHO/CHD/98.9; 1998.
23. Susin LR, Giugliani ER. [Inclusion of fathers in an intervention to promote breastfeeding: impact on breastfeeding rates](#). J Hum Lact. 2008;24:386-92; quiz 451-3.
24. Pontes CM, Alexandrino AC, Osório MM. [The participation of fathers in the breastfeeding process: experiences, knowledge, behaviors and emotions](#). J Pediatr (Rio J). 2008;84:357-64.
25. Lavergne NA. [Does application of tea bags to sore nipples while breastfeeding provide effective relief?](#) J Obstet Gynecol Neonatal Nurs. 1997;26:53-8.
26. Brasil. Ministério da Saúde. Secretaria de Políticas Públicas de Saúde. Área Técnica de Saúde da Mulher. Parto, aborto e puerpério: assistência humanizada à mulher. Brasília: Ministério da Saúde; 2001.
27. Mortensen EL, Michaelsen KF, Sanders SA, Reinisch JM. [The association between duration of breastfeeding and adult intelligence](#). JAMA. 2002;287:2365-71.

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