

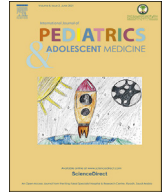
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Original article

Breastfeeding preterm born infant: Chance and challenge

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ABSTRACT

Background and Objectives: For preterm infants, breastmilk plays an important role in their development, but mothers encounter a number of barriers to breastfeeding. The aim of this study was to investigate breastfeeding prevalence in preterm infants and to examine factors that may face mothers when starting to feed at-breast and their impact on the result.

Methods: Women (N = 79) with preterm infants (N = 84) were interviewed within the follow-up program in Latvia during a six-month period in 2018 using the original study protocol.

Results: 61.9% infants were breastfed and 38.1% were not. The median infant birth weight in breastfed group was 1730 g, the median duration of tube feeding 21 days. The median age when started to feed at-breast 33 days. Later only 40.4% infants were still feeding at-breast. A relationship was found between breastfeeding and the mother's confidence during pregnancy that she would breastfeed ($P < .05$). 98% mothers who began to feed at-breast, during pregnancy were confident that they would breastfeed. 54.2% women who started to breastfeed as success mentioned medical staff training, 29.2% family support.

The median birth weight in the non-breastfed group was 1494 g, the median duration of tube feeding 21 days. 50% women who did not begin to breastfeed had not received enough information about breastfeeding; 17.2% during pregnancy were not confident that they would breastfeed. 38.7% women stated infants' inability to suckle as failure, 22.6% thought they had no milk. Mothers under 32 years were more likely not to breastfeed their infant (OR = 0.8, 95% CI 0.33–1.96).

Conclusion: Most mothers began to breastfeed immediately, less than half continued later. Women did not receive enough family support. Young maternal age was associated with decrease in breastfeeding. Mothers with higher education were more likely to breastfeed. Being born extremely preterm and very preterm were associated with the least chance of being breastfed.

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1. Introduction

Breastmilk plays an important role in the preterm infant development. It reduces the risks of necrotizing enterocolitis (NEC) associated with feeding infants with formula, sepsis and mortality [1]. Preterm infants who have received breastmilk have improved long-term growth, neurological and cognitive development [2–4].

Due to reduction of NEC, the American Academy of Pediatrics also recommends human donor milk instead of artificial milk for preterm born infants [1].

However, for preterm infants breastfeeding may be a challenge and due to their immature physiological and neurodevelopmental systems, they encounter several problems. Depending on a gestational age they have a weak suck and difficulties of breathing and swallowing coordination. [5]. At first, the mothers begin to express breast milk by a breast pump several times per day and the infants are fed through a tube. When infants can suck, they are fed with a bottle. Later, some mothers can transit to exclusive feeding at the breast in a short period of time without problems. Others take much more time and experience this process as a challenge [6].

Unfortunately, mothers of preterm infants are often unaware of

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the advantages of feeding at-breast [6]. Desiring their infants to gain weight as soon as possible to be discharged home, they are often encouraged to express breast milk and feed children by bottle. The lack of informational and emotional support is a reason why most mothers feed infants with formula without transitioning to breastfeeding. They experience difficulties in taking full responsibility for their infants' nutrition in the same way as parents of healthy infants born at term and are often dependent on medical staff advice and support [7].

During hospitalization in the neonatal intensive care unit, women may have a lactation expert consultation only if they ask for it or if a physician sends for a visit. There is no practice of regular visits of a lactation expert for all the mothers in the unit. Thus, being aware of advantages of feeding preterm infants at the breast may also be helpful to medical staff in providing support and information to these mothers [6].

In Latvia, according to the National Statistical Data Year 2018, the exclusive breastfeeding rate of term born infants in maternal departments was 82.5%, but at the age of six weeks this number shrank to 43.3%, at the age of three months it was 32.7% and only 17.4% at the age of six months [8,9].

However, there is no data available about trends in breastfeeding preterm infants. Thus, the aim of this study was to investigate breastfeeding prevalence in preterm infants within the follow-up program and to examine some factors that may face mothers starting to feed at the breast and an impact of these factors on the result.

2. Methods

According to the data of World Health Organization from 184 countries 5–18% infants are born preterm every year [10]. From 2016 to 2018 the number of births per year in Latvia decreased from 21646 to 19130, where 5.6% of the infants were born preterm at the gestational age less than 37 weeks [9].

Since 2015 in Latvia, 4 s level perinatal centers with the preterm born infant follow-up program have existed. According to the Regulation of the Republic of Latvia, infants born before 34 gestational weeks are admitted to the follow-up program. Until the corrected age of two years, they regularly visit the outpatient clinic. The first visit is made in the 44th week of the corrected gestational age, a next visit in the third month, and later once in three months till the age of 18 months. The last visit is made in the 24th month of the corrected age. Every year in Latvia, approximately 200 infants are admitted to the follow-up program.

Mothers of preterm infants born before the 34th week of gestational age were interviewed once within the follow-up program at Children's Clinical University Hospital and Vidzeme Hospital during the six-month period in 2018 using the original Study Protocol. The questionnaire included a demographic section; characteristics about an infant – the gestational age divided into four groups in weeks + days: extremely preterm (25 + 6 weeks and less), very preterm (26 + 0–31 + 6 weeks) and moderately preterm (32 + 0–34 + 6 weeks), the birth weight and height, mother's previous experience of breastfeeding, her knowledge about successful breastfeeding; multichoice questions on the infant feeding type after birth, categorized as the tube, bottle, breastfeeding, the duration and age of transitioning to the next type of feeding. Another section of protocol included the data about the infant on the day of a visit – the corrected age, weight and height, feeding type. The last part included multichoice questions with an option to write open answers about typical problems when starting to feed at the breast and factors that have made breastfeeding successful. The term breastfeeding was used only for breastfeeding at-breast, excluding feeding with breast milk by bottle or tube.

A statistical analysis was performed for each of the two groups: breastfed infants and non-breastfed infants. Binominal data are presented with a number and percentage as well as data with a skewed distribution with a median and interquartile range (IQR). The Spearman rank-order correlation coefficient and Chi-Square statistic were used. Data from the logistic regression models are presented with ORs and 95% CIs. The statistical significance level was set at $P < .05$ in all analyses, and calculations were performed with SPSS (IBM Corp, Released 2012, IBM SPSS Statistics for Windows, V.21.0, Armonk, New York, USA: IBM Corp). Parents were informed about the study and signed the agreement of participation. This study was approved by local Ethics Committee.

3. Results

The study included the data of 79 mothers and their 84 preterm infants, of which 52 (61.9%) were fed at-breast and 32 (38.1%) were not. Seventy-four mothers had a singleton pregnancy, whereas five experienced a twin pregnancy. The gestational age (GA) groups and breastfeeding status are seen in Table 1. The distribution of the infants' corrected age at the time of the follow up visit is presented in Fig. 1.

3.1. Breastfed infants

The median birth weight in this group was 1730 g (IQR 1377–2207), minimal weight 740 g. The median duration of tube feeding 21 days (IQR 5–30). The median age when transitioning to bottle 14 days (IQR 2–44). The median age when started to feed at-breast 33 days (IQR 21–60). On the day of the follow-up visit only 21 (40.4%) infants were still feeding at-breast.

The median mother's age was 32 years (IQR 30–35), father's age 34 years (IQR 30–37). 40 (80%) mothers had higher education, 35 (70%) women were married. 38 (73.1%) women had more than one child and 33 (86.8%) of them had breastfed older children with the median duration of 8 months (IQR 6–12).

During pregnancy, 51 (98%) women were confident that they would breastfeed and 30 (60%) of them had received enough information about breastfeeding before. As a contributing factor to successful breastfeeding, 26 (54.2%) women mentioned medical staff training, 14 (29.2%) family support, nine (18.8%) women used nipple shields, and seven women (14.6%) shared experience with other mothers. Twenty-one (43.8%) women mentioned their own answers: seven believed that it was the best for their children, six women shared experience with other children, five mentioned their self-belief and patience, two women had a lactation expert consultation and one woman wrote nothing.

There was a relationship between breastfeeding and the mother's confidence during pregnancy that she would breastfeed later ($P < .05$). There was a negative correlation between the mother's age and child's gestational age ($P < .05$), between the father's age and child's gestational age ($P < .05$).

3.2. Non-breastfed infants

There were 32 (38.1%) infants who were not fed at-breast. The median birth weight in this group was 1494 g (IQR 1023–1784) and the minimal weight was 670 g. The median duration of tube feeding was 21 days (IQR 14–44) and the median age when transitioning to bottle was also 21 days (IQR 11–48).

The median mother's age was 32 years (IQR 30–37), median father's age also 32 years (IQR 29–36). Eighteen (62.1%) mothers had higher education, and 20 (62.5%) were married. Nineteen women (65.5%) had more than one child and 14 (73.6%) of them had breastfed older children with the median duration of 6 months

Table 1
Breastfed and non-breastfed preterm infant gestational age groups (N = 84). Latvia, 2018.

	Breastfed infants, N (%)	Non-breastfed infants, N (%)
Extremely preterm born (in weeks + days) – 25 + 6 weeks and less	3 (5.8)	6 (18.8)
Very preterm born – 26 + 0–31 + 6 weeks	20 (38.5)	13 (40.6)
Moderately preterm born – 32 + 0–34 + 6 weeks	29 (55.8)	13 (40.6)
Total	52 (100)	32 (100)

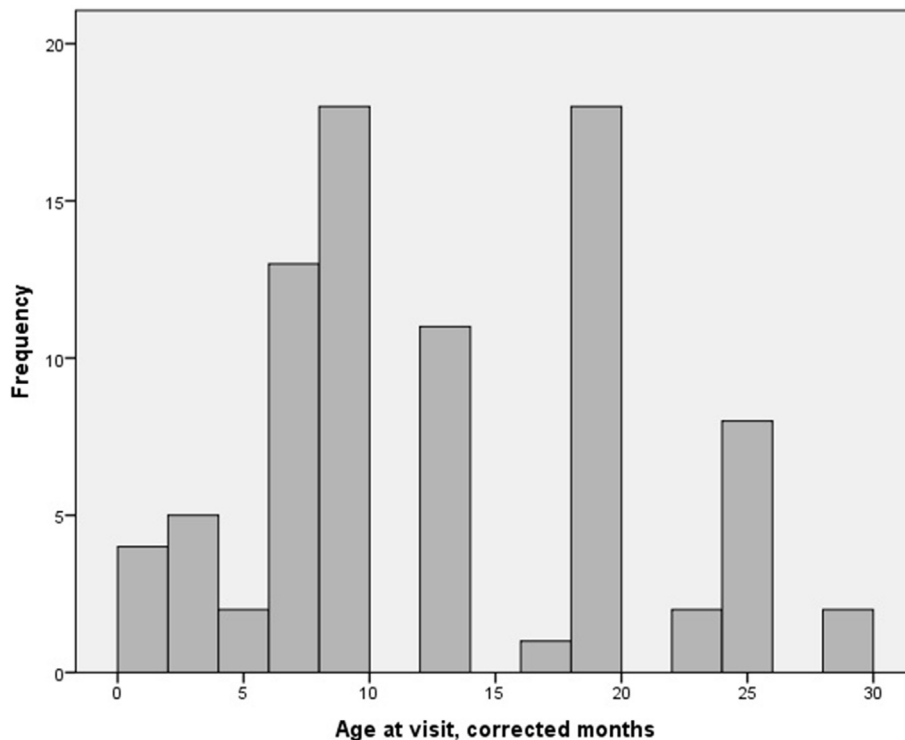


Fig. 1. The infants' corrected age distribution on the follow-up visit: total number N = 84, the median age - 12 months. Latvia, 2018.

(IQR 2–9).

During pregnancy, 24 women (82.8%) were confident that they would breastfeed later and 16 (51.6%) of them had not received enough information about breastfeeding before. As a failure to feed at-breast, 12 (38.7%) women stated the infants' inability to suckle, seven women (22.6%) thought they had no milk, three women were not confident that they would succeed, three women worried that infants could not eat a necessary amount of milk, two women were tired, one woman did not want to breastfeed, and one woman did not know how to breastfeed. Fifteen women (48.4%) mentioned their own answers of faced problems starting to feed at-breast: five women had run out of milk, five women stated that their newborn was too weak, but later could not understand how to suckle, two women had significant health problems, one woman's infant always fell asleep at the breast, one woman's infant choked, and one woman wrote there was nothing to interfere feeding at-breast.

The mothers young age was significantly associated with decrease in breastfeeding. Infants, whose mothers age was between 23 and 32 years, had an OR of 0.8 (95% CI 0.33–1.96) of not being breastfed compared to infants whose mother age was 33–43 years.

Infants gestational age of 25 weeks and less had an OR of 0.3 (95% CI 0.06–1.53) of not being breastfed compared to infants born on 26–31 gestational weeks. Very preterm born infants (26–31 GA) had an OR of 0.7 (95% CI 0.27–1.79) of not being breastfed compared

to those, who were born moderately preterm (32–34 GA).

There was a positive correlation between the father's age and infant's birth weight ($P < .008$).

4. Discussion

The present findings showed that 61.9% of preterm born infants were fed at-breast and 40.4% of them continued after discharge. This study has some limitations, since the infants visited the outpatient clinic at certain age, the distribution of their age on the day of visit is unequal, so these results could not represent total duration of breastfeeding in preterm born infants. Second, as the sample size in breastfed and non-breastfed group was different and distributed unproportionally, logistic regression analysis for some dependent variables was impossible to perform.

In line with these results, Gianni et al. found that at discharge, any breastfeeding was recorded in 66% of preterm infants, with 27% of those infants being exclusively breastfed [11]. Other studies reported breastfeeding prevalence in very preterm infants. According to Rodrigues et al., 25.2% very preterm infants were exclusively on breast milk and 40.7% had mixed feeding [12]. Overall, in Bonnet et al. European multiregional cohort study, 34.4% very preterm infant were still breastfed at 6 months of age [13].

Notably, almost all mothers during pregnancy were confident that they would breastfeed, according to Gianni et al., where 86%

declared that prior to delivery, they had decided to breastfeed their infant [11]. A mother's previous positive breastfeeding experience was reported more frequently in the group of breastfed infants, with longer median duration of breastfeeding older children. Mother's confidence during pregnancy that she would breastfeed was associated with successful breastfeeding.

For half of breastfeeding women, medical staff training was a contributing factor for successful breastfeeding; what may indicate the relative lack of provision of maternal support and education from health care professionals. These findings are consistent with previous data by Gianni et al., where the importance of breastfeeding support by healthcare professionals was emphasized by 40% of the respondents [11]. Unfortunately, only 29.2% mothers declared family support.

Some women believed that breastfeeding was the best for the infant and was beneficial for the infant's health. Accordingly, Alves et al. found that the main facilitators of human milk supply were its contribution to infant growth and well-being (51.4%) and parents' knowledge of breastfeeding benefits (27.6%) [14].

Mothers with higher education were more likely to breastfeed. Accordingly to Herich et al. at discharge, the use of mother's own milk, exclusively or not, and feeding directly at the breast were significantly more likely for mothers with an upper secondary education or higher [15].

However, maternal age was associated with decrease in breastfeeding (mothers under 32 were more likely not to breastfeed their infant). Being born at 26–31 weeks of gestational age compared with being born at 32–34 weeks were associated with the least chance of being breastfed. In line with these results, Bonnet et al. found that mothers under 25 were more likely to stop breastfeeding before six months [13].

Women who did not begin to breastfeed seemed to be more unconfident in their ability to feed at-breast and had less breastfeeding experience. When transitioning to breastfeeding, they encountered several problems like milk reduction, fear of inadequacy of milk supply, the child's inability to suckle successfully, as well as psychological stress. These findings are in agreement with previously published data. Alves et al. found that difficulties with milk production in association with worries regarding an inadequate milk supply were perceived by parents as the main barriers to breastfeeding [14]. These results underline the need for providing a supportive breastfeeding environment by health professionals, within a family centre care context, focusing on the promotion of direct breastfeeding. Considering the proven benefits of maternal milk, strategies to support breastfeeding should be targeted to mothers with less education and younger age.

5. Conclusions

The results show further insight into the maternal experience regarding the main facilitators and barriers to breastfeeding preterm born infant. Most of the mothers began to breastfeed preterm born infants, but less than half of them continued to breastfeed later. Women did not receive enough family support when transitioning to breastfeeding. Younger maternal age was associated with decrease in breastfeeding. Mothers with higher education were more likely to breastfeed. Being born extremely preterm and very preterm were associated with the least chance of being

breastfed. Healthcare professionals should provide more support and education in order to address known barriers to breastfeeding and endorse breastfeeding in mothers of preterm born infants.

CRedit authorship contribution statement

Svetlana Zukova: Conceptualization, Formal analysis, Investigation, Writing - original draft. **Valda Krumina:** Conceptualization, Methodology, Validation, Resources, Supervision. **Jelena Buce-niece:** Conceptualization, Methodology, Writing - review & editing.

Declaration of competing interest

The Authors have no interests to declare.

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References

- [1] Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics* 2012;129:e827–41.
- [2] Lucas A, Morely R, Cole TJ, Gore SM, Lucas PJ, Crowle P, et al. Early diet in preterm babies and developmental status at 18 months. *Lancet* 1990;335:1477–81.
- [3] Lucas A, Morley R, Cole TJ, Lister G, Leeson-Payne C. Breast milk and subsequent intelligence quotient in children born preterm. *Lancet* 1992;339:261–4.
- [4] Bier JA, Oliver T, Ferguson AE, Vohr BR. Human milk improves cognitive and motor development of premature infants during infancy. *J Hum Lactation* 2002;18:361–7.
- [5] Lau C. Development of suck and swallow mechanisms in infants. *Ann Nutr Metab* 2015;66(Suppl 5):7–14.
- [6] Buckley KM, Charles GE. Benefits and challenges of transitioning preterm infants to at-breast feedings. *Int Breastfeed J* 2006;1:13.
- [7] Niela-Vilén H, Axelin A, Melender HL, Salanterä S. Aiming to be a breastfeeding mother in a neonatal intensive care unit and at home: a thematic analysis of peer-support group discussion in social media. *Matern Child Nutr* 2015 Oct;11(4):712–26.
- [8] Centre for Disease Prevention and Control. Children's health statistics in Latvia 2010 – 2018. Available at, https://www.spkc.gov.lv/upload/Veselibas%20aprupes%20statistika/Statistikas%20dati/2019/31.05.2019/bernu_veseliba_2018_27052019.xlsx. [Accessed 1 October 2019].
- [9] Medical birth register of the Centre for Disease Prevention and Control. Statistics on deliveries and newborns in Latvia 2008 - 2018. Available at, https://www.spkc.gov.lv/upload/Veselibas%20aprupes%20statistika/Statistikas%20dati/2019/21.06.2019/dzemdibas_un_jaundzimusie_2018_21062019.doc. [Accessed 1 October 2019].
- [10] World Health Organisation. Preterm birth. Available at, <https://www.who.int/news-room/fact-sheets/detail/preterm-birth>. [Accessed 1 October 2019].
- [11] Gianni ML, Bezze EN, Sannino P, Baro M, Roggero P, Muscolo S, et al. Maternal views on facilitators of and barriers to breastfeeding preterm infants. *BMC Pediatr* 2018 Dec;18(1):283.
- [12] Rodrigues C, Teixeira R, Fonseca MJ, Zeitlin J, Barros H. Prevalence and duration of breast milk feeding in very preterm infants: a 3-year follow-up study and a systematic literature review. *Paediatr Perinat Epidemiol* 2018;32:237–46.
- [13] Bonnet C, Blondel B, Piedvache A, Wilson E, Bonamy AK, Gortner L, et al. Low breastfeeding continuation to 6 months for very preterm infants: AE european multiregional cohort study. *Matern Child Nutr* 2019 Jan;15(1). e12657.
- [14] Alves E, Magano R, Amorim M, Nogueira C, Silva S. Factors influencing parent reports of facilitators and barriers to human milk supply in neonatal intensive care units. *J Hum Lactation* 2016;32:695–703.
- [15] Herich LC, Cuttini M, Croci I, Franco F, Di Lallo D, Baronciani D, et al. Maternal education is associated with disparities in breastfeeding at time of discharge but not at initiation of enteral feeding in the neonatal intensive care unit. *J Pediatr* 2017 Mar 1;182:59–65.