

Knowledge, Attitude and Practice of Mothers with Preterm Infants in Terms of Feeding

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Abstract

Aim: To examine knowledge, attitude, and practice (KAP) of mothers with preterm infants in terms of feeding.

Method: Forty-one mothers of orally fed preterm infants with a corrected age of less than 6 months were included in the study. A questionnaire about KAP of mothers regarding infant feeding was administered. The Spielberger State Trait Anxiety Inventory was completed to measure the anxiety level of mothers.

Results: It was found that 58.5% of the mothers had had high level of knowledge. In terms of practice, 58.5% of the mothers had a good practice level. The mothers had mild state anxiety and moderate trait anxiety. A strong positive correlation was found between the level of knowledge and practice. A good negative correlation was found between state anxiety and the level of knowledge, the level of practice, and between trait anxiety and the level of knowledge. There was a moderate negative correlation between trait anxiety and the level of practice.

Interpretation: Although mothers have high levels of knowledge and practice about feeding preterm infants and have positive attitudes, they still have anxiety. Therefore, feeding counseling services during the growth process of the infant will reveal positive results for both mothers and infants.

What Is Known

- Despite the proven benefits of breastfeeding, the frequency and duration of breastfeeding in preterm infants were found to be lower compared to term infants.
- Training and support programs are planned for mothers to increase the frequency and duration of breastfeeding in preterm infants

What is New

- The mothers of preterm infants had a high level of knowledge and practice regarding feeding, which were found to be related to the presence of feeding education.
- The mothers of preterm infants had positive attitudes regarding infant feeding.
- The mothers had mild state anxiety and moderate trait anxiety.
- The mother's anxiety level was related to the level of knowledge and practice regarding feeding.

Introduction

Advances in neonatal care have increased the survival rate of very small and extremely preterm infants. The increase in the survival rate increased the risk of feeding problems as well as motor and sensory impairment (1, 2).

The general immaturity in the behavior and reactions of preterm infants also reflected in their feeding behaviors. Irregular sucking patterns can be seen in many preterm infants. Preterm infants may engage in long pauses after 3-5 sucks during a sucking activity or they may not be able to initiate sucking spontaneously. Another sucking pattern that can be seen in preterm infants is dysfunctional sucking. In addition to immaturity features, neurological problems can also be a contributing factor for dysfunctional sucking pattern (3). The rate of dysfunctional and irregular sucking patterns in preterm infants was reported to be 50% (4).

Moreover, it was reported that aspiration rate was higher in preterm infants compared to term infants, and dysphagia was seen at a rate of 26% in preterm infants (5). Difficulties in transitioning to oral feeding in preterm infants often continue after discharge (6). In a study conducted in the United States, 69% of term infants discharged from the hospital can started to be breastfed by their mothers, while this rate decreased to 50% in preterm infants (7). Despite the proven benefits of breastfeeding, the frequency and duration of breastfeeding in preterm infants were found to be lower compared to term infants (8). Hawdon et al. reported that less than 1% of 18-24 month-old preterm infants with a history of Neonatal Intensive Care Unit (NICU) were tube fed, although more than 50% of their parents observed problems in feeding behavior (4). Therefore, it should be considered that preterm infants may have feeding and swallowing problems.

It is necessary to wait until preterm infants are physiologically stable to start oral feeding (9). The transition to oral feeding could be expedited with practices including expression of breast milk methods (10), non-nutritive sucking practices (11), and kangaroo-care (12). In addition, training and support programs are planned for mothers to increase the frequency and duration of breastfeeding in preterm infants (11, 13). Mothers are expected to play an active role in all these processes (14). The infants discharged from the NICU continue the feeding process with their mothers. To ensure effective and safe breastfeeding, mothers should be aware of the risks of prematurity. In addition, it was shown that feeding preterm infants at planned intervals in response to cues (hunger, satiety, and stress) rather than a volume-based feeding approach is more successful (14), thereby mothers need to know and be able to read cues regarding feeding their infants (15). It is necessary for the mother to be able to cope with issues regarding the feeding of the infant confidently; therefore, their knowledge level about feeding should be sufficient, and their practices should be effective (14).

There exists no study in the literature evaluating the knowledge and practices of mothers with preterm infants about infant feeding. Therefore, it was aimed to examine the knowledge, attitude, and practice (KAP) of mothers with preterm infants in terms of infant feeding in this study.

Materials And Methods

Study design

This is a cross-sectional descriptive study. The study was conducted at the Faculty of Physical Therapy and Rehabilitation at Hacettepe University with the cooperation of the Department of Physiotherapy and Rehabilitation at Ondokuz Mayıs University. The Hacettepe University Non-Interventional Clinical Research Ethics Committee approved the study protocol (Approval number = GO21/796).

Participants

The inclusion criteria were volunteer mothers who (i) aged 18 years and over, (ii) had a preterm infant whose gestational age was 36 weeks and less, whose corrected age was between 0-6 months, who discharged from the NICU and still fed by orally.

Procedure

All evaluations were performed by phone call to reduce the risk of transmission due to the COVID-19 pandemic. The purpose of the study was explained to the participants, and they were invited to participate in the study. An e-mail consent form was sent to the mothers who agreed to participate in the study. Participants were asked to read and approve the form, and send it back via e-mail. An appointment was made with the mothers whose consent was taken, and interviews were held. An interview took an average of 40 minutes.

The KAP surveys are the most commonly used tool to gather information about what is known, believed, and practiced on a particular topic (16). The KAP questionnaire was designed by two physical therapists according to literature review and clinical experience. The questionnaire was tested by a pilot survey distribution for clarity. There were three physical therapists who were university-affiliated experts with a minimum of 5-year work experience, who routinely encountered preterm infants in practice. According to their feedback, minor modifications were made to improve interpretation of the questions. The final questionnaire include four main parts (Appendix I);

1. *Sociodemographic information:* In this section, information about preterm infant, family, birth, and feeding education was questioned.
2. *Evaluation of the mother's level of knowledge in terms of feeding:* This section consisted of 16 questions. In the first 15 questions, the participants were asked to answer True/False questions. Each question had only one correct answer. Correct answers received 1 point, and wrong answers received 0 points. Therefore, the total knowledge score ranged from 0 to 15 points. In addition, the total score was evaluated according to the Bloom's cut-off point. According to the Bloom's cut-off point, the level of knowledge was divided into "low", "moderate", and "high" level of knowledge: 59% or less of the total score indicates low level knowledge, 60%-79% was medium level knowledge, and 80%-100% was high level knowledge (17). In the 16th question, the mother was asked to evaluate her own level of knowledge about feeding on a Likert-type scale between 0 and 10 points.
3. *Evaluation of the mother's attitude in terms of feeding:* This section included a total of 5 statements about mothers' attitudes in terms of feeding. They were asked to answer Yes/No for each statement. The results are expressed as frequency.

4. Evaluation of the mother's feeding practices: There were 12 questions in this section. The participants were asked whether they did the necessary practices or not through Yes/No questions. A value of 0 for 'no' answers, and a value of 1 for 'yes' answers was given. The total score ranged from 0 to 12. Scores were analyzed at 3 levels including good practice, appropriate practice, and poor practice: 81%-100% of the total score was evaluated as good practice, 51%-80% as appropriate practice, and less than 50% as poor practice (18).

In addition, the Spielberger State Trait Anxiety Inventory (STAI) was used to determine the mothers' anxiety levels. The Turkish version of the STAI scale is commonly used as a valid and reliable scale (19). The STAI has two subscales, and each subscale consists of 20 items. The first subscale measures state anxiety (S-STAI), which indicates the momentary state of anxiety. The second subscale measures trait anxiety (T-STAI), which indicates the long-lasting anxiety. Scores from subscales range from 20 to 80. High scores on each subscale indicate more anxiety. A cut-off point of 39-40 was suggested for STAI to detect clinically significant symptoms (20). In STAI, 0-19 points are considered as no anxiety, 20-39 points as mild anxiety, 40-59 points as moderate anxiety, 60-79 points as severe anxiety, and 80 points and above as panic. (19).

Statistical analysis

In this study, power analysis was performed with the help of a pilot study. For power analysis in the pilot study, statistical power values for each statistical significance test were obtained using the G*POWER program. Buang et al. (2019) found a statistically significant correlation of 0.378 between the mother's knowledge level about feeding and the level of practice related to feeding (21). Based on this, in the power analysis performed for a minimum relationship of 0.378, a statistical power level of 80.5% was obtained at a 95% confidence level. In line with these results, it was aimed to reach a minimum of 39 people in the study.

The IBM SPSS Statistics 26 was used for the analysis of the study data. The conformity of the variables to the normal distribution was examined using visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests).

Descriptive statistics were analyzed by frequency tables and percentages for nominal and ordinal data, median and interquartile range (IQR) for non-normally distributed numerical data, and the mean and standard deviation for normally distributed numerical data.

The Student's t test was used if the parametric test prerequisites were met, and if not, the Mann Whitney-U test was used to compare two groups. Relationships between categorical variables were analyzed with the Fisher's Exact Test and the Pearson Chi-Square test. The relationship between two continuous variables was evaluated with the Pearson Correlation Coefficient, and if the parametric test did not meet the prerequisites, the Spearman Correlation Coefficient was used. Correlation coefficients of 0.05–0.30 indicated a low correlation, 0.30–0.40 indicated a low-to-moderate correlation, 0.40–0.60 indicated a

moderate correlation, 0.60–0.70 indicated a good correlation, 0.70–0.75 indicated a strong correlation, and 0.75–1.00 indicated an excellent correlation (22). P value of <0.05 was considered statistically significant in all analyses.

Results

Forty-one preterm infants, and their mothers were included in the study. Descriptive information about infants and mothers is presented in Table 1 and Table 2, respectively.

Table 1
Descriptive information for preterm infants

	Median	IQR
	N	%
Gestational week (week)	30	29.60-31.66
Corrected age (month)	2	1.82-3.41
Birth weight (gram)	1300	1333.68-1721.48
Duration of NICU stay (day)	32	32.50-50.71
Then current weight (gram)	5000	4311.07-5582.58
Sex		
Female	20	48.2
Male	21	51.2
Type of Feeding		
Formula	24	58.6
Breastfeeding	6	14.6
Mix	11	26.8
History of feeding problems		
Orogastric tube usage	27	65.9
Gastroesophageal reflux	2	4.9
(IQR, Interquartile Range)		

Table 2
Descriptive information of mothers

	X±SD	Min-Max
	N	%
Age (year)	28.17 ± 4.90	24-41
Number of children	1.75 ± 0.88	1-5
Mode of delivery		
Vaginal	5	12.2
Caesarian	36	87.8
History of preterm birth in previous children		
Yes	8	19.5
No	33	81.5
Working status		
Working	15	36.6
Not working	26	63.4
Education level		
Primary school	15	36.6
High school	11	26.8
University	15	36.6
Family's income level		
Poor	16	39
Moderate	17	41.5
Good	8	19.5
Having feeding education		
Yes	33	80.5
No	8	19.5
Source of feeding education		
NICU discharge training	33	100

(X, mean; SD, Standard Deviation; IQR, Interquartile Range; Min, Minimum; Max, Maximum; NICU, Neonatal intensive care unit)

	X±SD	Min-Max
Other sources of feeding information		
NICU physician	9	22
Internet	10	24.4
Previous child experience	12	29.3
Breastfeeding counseling	2	4.3
(X, mean; SD, Standard Deviation; IQR, Interquartile Range; Min, Minimum; Max, Maximum; NICU, Neonatal intensive care unit)		

Mothers' knowledge and awareness regarding feeding

The median total knowledge score of the mothers about feeding was 12 (IQR, 10.58-12.19). A percentage of 12.2 (n=5) of the mothers had low, 29.3% (n=12) had medium, and 58.5% (n=24) had high level of knowledge regarding feeding.

The median of the knowledge score in which the mothers evaluated their own knowledge level was 8 (IQR, 7.61-8.57).

Mothers' attitudes regarding feeding

Mothers' attitudes regarding feeding were generally positive. Majority of the mothers reported that preterm infants are in a group that needs attention in terms of feeding and swallowing (97.6%, n=40), adequate feeding of the preterm infant is an important issue to be addressed (97.6%, n=40), mothers should be knowledgeable about feeding their infants (97.6%, n=40), and mothers can feed their infant more appropriately if they are knowledgeable (97.6%, n=40). All mothers (100%, n=41) thought that developmental problems may be seen in preterm infants if feeding is not adequate.

Mothers' feeding practices

The median total feeding practice score of the mothers was 10 (IQR, 9.22-10.43). A percentage of 7.3 (n=3) of the mothers had poor practice, 34.1% (n=14) had appropriate practice, and 58.5% (n=24) had good practice.

Mothers' anxiety levels

The mean S-STAI score of the mothers was 39.29 ± 12.13 (min=21, max=65) and the mean T-STAI score was 41.90 ± 10.86 (min=27, max=63). The mothers had mild state anxiety and moderate trait anxiety.

Relationship between knowledge, practice, anxiety levels and descriptive characteristics

A low-to-moderate positive correlation was found between the level of knowledge and the presence of feeding education ($p < 0.05$, $r = 0.312$).

A moderate positive correlation was found between the level of practice and the educational status of the mother, the economic status of the family, and the presence of feeding education ($p < 0.05$, $r = 0.514$, $r = 0.411$, $r = 0.514$, respectively).

There was a moderate negative correlation between S-STAI and educational status of the mother and the presence of feeding education ($p < 0.05$, $r = -0.481$, $r = -0.425$, respectively). A moderate negative correlation was found between T-STAI and mother's education level and feeding education ($p < 0.05$, $r = -0.404$, $r = -0.461$, respectively).

A strong positive correlation was found between the level of knowledge and practice ($p < 0.01$, $r = 0.724$).

A good negative correlation was found between S-STAI and the level of knowledge, the level of practice ($p < 0.001$, $r = -0.675$, $r = -0.637$, respectively). There was a good negative correlation between T-STAI and the level of knowledge ($p < 0.001$, $r = -0.631$). There was a moderate negative correlation between T-STAI and the level of practice ($p < 0.001$, $r = -0.538$, respectively). (Table 3)

Table 3
Relationships between knowledge, practice, and anxiety levels

	S-STAI	Knowledge Level	Practice Level
T-STAI	p=0.000** $r=0.757$	p=0.000** $r=-0.631$	p=0.000** $r=-0.538$
S-STAI		p=0.000** $r=-0.675$	p=0.000** $r=-0.637$
Knowledge Level			p=0.000** $r=0.724$

(** $p < 0.001$; r, correlation coefficient, S-STAI, State Anxiety Level; T-STAI, Trait Anxiety Level)

Discussion

The feeding process in preterm infants is a difficult process for both infants and mothers due to adverse factors such as neonatal morbidities, poor contact with parents, delayed breastfeeding, and other factors (23). In order to manage this process correctly, mothers should have knowledge about feeding of the preterm infant and be able to make effective and reliable practices. Therefore, it was aimed to examine the knowledge, attitude, and practice of mothers about feeding their preterm infants. In this current study,

majority of mothers had high level of knowledge and practice about infant feeding, and also had positive attitudes about feeding their infants.

More than half (58.6%) of the preterm infants in our study were bottle-fed, and the proportion of infants fed by breastfeeding was very low. In a study conducted with preterm infants, similar to our study, the rates of feeding with breastfeeding were very low, and therefore, the success rate could increase with specific interventions and better support (23).

In addition, most of the preterm infants had a history of orogastric tube feeding during NICU stay. McCain et al. reported that feeding methods alternative to oral feeding are used when preterm infants cannot achieve sucking-swallowing-respiratory coordination (24). Raol et al. reported that sucking-swallowing-respiratory coordination was achieved in the 34th week of gestation (25). Most of the preterm infants in this study had a history of orogastric tube feeding may be associated with an average of 30 weeks of gestation.

Most of the mothers in the present study were young and first-time mothers, and majority of them (80.5%) were trained during discharge from the NICU. Rohana et al. conducted a KAP study in mothers of preterm infants about the sudden infant death syndrome, it was revealed that mothers mostly obtained information by doing research on the Internet (26). Therefore, considering the information pollution in the internet environment, it would be more appropriate for mothers to be educated by health professionals, as in our study, instead of getting information from the Internet.

In our study, 58.5% of the mothers of preterm infants had a high level of knowledge, and mothers evaluated their own level of knowledge as high. Meier et al. reported that feeding problems of preterm infants are often caused by the lack of knowledge and practice. In addition, it has been reported that mothers generally receive advice from friends and families rather than healthcare professionals, and these recommendations are not suitable for preterm infants or infants at risk. It was emphasized that a standardized education should be given to mothers by a NICU nurse (13). In our study, the majority of the mothers received feeding training during NICU discharge. Thereby, it was thought that NICU training contributes to the knowledge level of mothers about feeding.

Lewallen et al. reported that mothers usually received feeding education and support during the NICU stay, however most were not supported at home. They reported that mothers of preterm infants should also be educated about feeding after discharge (27). In our study, a low-to-moderate relationship was found between feeding education and the level of knowledge. Thus, it can be concluded that training programs aimed at educating preterm infant mothers on feeding should be supported.

Ahmed et al. provided 5 sessions of feeding education to mothers of preterm infants and the training program not only improved the practices of mothers, but also increased their knowledge about feeding and prematurity (28). In our study, a strong relationship was found between the level of knowledge and practice. Thus, it can be concluded that if the mothers have a good level of knowledge about infant feeding, they make more effective and safe practices.

Another favorable finding in the current study was the positive attitudes of mothers regarding feeding. Mothers thought that preterm infants are in a group that needs attention in terms of feeding and swallowing. They stated that adequate feeding of preterm infants is an important issue that should be followed up to prevent developmental problems, and mothers should be knowledgeable about feeding for maintaining better practices. The positive attitude of mothers of preterm infant is crucial to provide a quality care. It was known that preterm infants have problems in oral feeding due to differences in muscle tone, sucking-swallowing-respiratory coordination, regulation and endurance (29-31). These often cause malnutrition in preterm infants, and feeding is associated with long-term motor, cognitive and neurodevelopmental outcomes (32). It is known that the mothers' knowledge and attitudes are important for maintaining better practices (13).

In general, feeding practices of mothers that support knowledge and attitude results were also seen as appropriate and good. Lubbe et al. reported that mothers performed better practices when they learned to understand hunger, satiety, and stress cues about their infants (14). In our study, presence of feeding education was found to be related to the level of practice. As a result, the feeding education given by the health professional may enable mothers to practice feeding effectively and safely.

In our study, the mothers had a mild level of momentary and a moderate level of long-lasting anxiety. After NICU discharge, parents are asked to take responsibility for the daily care of their high-risk infants at home, which causes stress on parents. Studies have reported that the anxiety experienced while providing care increases after discharge, and can persist for 6 months or longer for mothers of preterm infants (33, 34).

Lubbe et al. reported that mothers who applied the cue-based feeding method had better care skills, which result in decreased stress related to feeding (14). Pickler et al. reported that the infant's weight gain increased, the hospital stay was shortened with the cue-based feeding method, and thereby, the parental workload decreased, care skills increased, and stress levels decreased (32). In our study, it was found that as the level of knowledge increased, the level of practice of the mothers increased, and the level of anxiety of the mothers decreased as the level of knowledge and practice increased. Based on this, it is thought that the effective and correct practice performed with appropriate knowledge reduces the mother's workload and anxiety level.

This present study is the first to reveal the KAP of mothers with preterm infants in terms of feeding, and to investigate the relationship between these factors and anxiety levels. In future studies, the KAP and concerns of mothers who received feeding education and support both in the NICU and after discharge can be evaluated. The key points of the study and our recommendations are:

- Mothers of preterm infants should be trained by health professionals about infant feeding.
- Infant feeding counseling and education should be given not only during and discharge from NICU, but also continue after discharge.

- Mothers' anxiety levels and workload can be decreased by effective and correct practice performed with knowledge. In addition, mothers should be supported in coping with anxiety.

Conclusion

Mothers of preterm infants have a high level of knowledge, positive attitudes, and good practice regarding feeding. While the feeding education received by mothers with preterm infants before NICU discharge positively affects the mothers' infant feeding attitudes and behaviors. However, they still have momentary and moderate level of long-lasting anxiety. The level of knowledge and practice of mothers about feeding are related to their anxiety levels. Thus, feeding counseling services provided during the growth process of the infant will reveal positive results for both mothers and infants.

Statements And Declarations

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. The authors have stated they had no interests that might be perceived as posing a conflict or bias.

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Conflicts of interest/Competing interests:

The authors report no declarations of interest.

Availability of data and material:

The datasets generated and/or analysed during the current study are not publicly available due to ethical considerations.

Code availability:

Note applicable.

Authors' contributions:

SNK (lead author) made substantive contributions to the study design development, collected and analyzed all data, and was the lead writer. NCB (second author) contributed to study design development.

NK (third author) contributed to study design development and writing. All authors read and approved the final manuscript.

Ethics approval:

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Hacettepe University Non-Interventional Clinical Research Ethics Committee approved the study protocol (Approval number = G021/796).

Consent to participate:

The purpose of the study was explained to the participants, and they were invited to participate in the study. An e-mail consent form was sent to the mothers who agreed to participate in the study. Participants were asked to read and approve the form and send it back via e-mail. An appointment was made with the mothers whose consent was taken, and interviews were held.

Consent for publication: Not applicable

Abbreviations

IQR : Interquartile Range

KAP : Knowledge, Attitude and Practice

NICU : Neonatal Intensive Care Unit

S-STAI: State anxiety level

STAI : The Spielberger State Trait Anxiety Inventory

T-STAI: Trait anxiety level

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