

Feeding Problems Score and Its Related Factors in Two-Year-Old Children Born Very-Preterm and Full-Term

Abstract

Background: Many very-preterm infants have difficulty in oral feeding during the first months of life after discharge. Since studies surveying the presence of feeding problems after the first year of life are limited and cultural/psychosocial differences can affect results, so the aim of this study was to compare scores of a feeding problems test between very-preterm and full-term born children at the age of 2 and study the relationship between obtained scores and explanatory variables. **Materials and Methods:** This is a retrospective descriptive-analytic study conducted in 2014 in Semnan city of Iran. Thirty-eight 2-year-old children with the history of very-preterm birth were selected by census sampling method and 38 full-term babies born in the same hospital were selected randomly. The Iranian version of Lewinshon Feeding Disorders questionnaire was used and the relationship between explanatory variables and the total score of the questionnaire was surveyed in each group by Mann-Whitney and linear regression tests. **Results:** Mean (SD) gestational age and weight of birth were 30.47 (1.63) weeks and 1630 (310) grams respectively in the very-preterm group. Feeding scores were not significantly higher in very-preterm babies, neither in total score ($p > 0.05$) nor in subtests. A relationship was just found between total feeding score and female gender both in the exposed group ($\beta = -0.36, p = 0.01$) and non-exposed group ($\beta = -0.49, p = 0.002$). **Conclusions:** Two-year-old children born very preterm did not have higher feeding problems scores than full-term born peers. Male gender was related to more feeding problems at 2 years of age.

Keywords: Feeding and eating disorders, newborn intensive care units, premature birth

Introduction

Feeding problems is one of the important issues in the process of development and growth of children. Kerzner has classified feeding problems into three categories that includes small intake, limitation in variety of foods, and fear of feeding that can have organic and nonorganic reasons.^[1] Premature birth negatively effects on attainment of feeding milestones and preterm babies are at the risk of oral feeding problems and delay in oral feeding milestones achievement.^[2] Early oral stimulation in preterm infants with gavage feeding can accelerate the transition to oral feeding and reduces the length of hospitalization.^[3] In the hospitals of Iran, oral stimulations for preterm infants and feeding consultations to mothers are mainly presented by nurses and speech therapists.

According to the guideline of American Academy of Pediatrics, one recommended criteria for discharging preterm infants from the hospital is having a safe feeding.^[4] However, some studies have indicated that such infants are discharged before achieving full oral feeding or appropriate coordination in eating so their parents report more feeding problems in them.^[5] Such babies especially who are born at a lower gestational age and those with medical problems are prone to feeding problems in first year of life.^[6] Nevertheless, there are few studies of eating and feeding problems in preterm infants after one year of life and results are sometimes contradictory.^[7-14]

On the other hand, it can be assumed that even if preterm infants compensate their slower eating skills growth after the first year of life, feeding problems would still

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remain because of unpleasant experiences and disgust of eating in them. Since eating disorders are associated with psychosocial problems,^[1] outcomes may vary somewhat in societies with different cultures and healthcare systems. In Iran, no study has conducted to investigate the feeding problems of preterm born children after discharge; hence, this study aimed to compare feeding problems scores in very-preterm and full-term born babies and study the relation of some explanatory variables with total score of the test in each of the groups.

Materials and Methods

This is a retrospective descriptive-analytic cross-sectional study conducted in August 2014. The exposure was very-preterm birth (gestational age of 28-32 weeks) and main outcome measure was score of feeding problems test. In the exposed group, census sampling method was used to select preterm children with corrected age of 2 who were born in Amirmomenin hospital; the only educational hospital with Neonatal Intensive Care Unit (NICU) in Semnan city where the study was conducted. These children were born from June 2011 to July 2012 and due to limited number of them, all eligible babies were entered in the study. Sixty-two out of 118 of these children were eligible and available and so they were invited to the study. Forty-four cases participated in the study but later four of them were excluded because of mother's depression and two cases were excluded because of incomplete questionnaire form answered.

Non-exposed group included 2-year-old full-term children (gestational age of 38–41 weeks) born in the same hospital as the exposed group were born and were selected through random sampling method. In this group, first 100 babies among all full-term children born from August 2011 to August 2012 were selected randomly and then babies were selected among them randomly to enter the study. If they were not interested or eligible, were replaced. Forty-three invited mothers did not participate. The two groups were matched in terms of gender, age, economic status, and mothers' educational level. Exclusion criteria in this study was children's oral problems and neurological problems such as seizure and cerebral palsy and also mothers' psychological problems base on their self-report and result of the Persian version of Beck Depression Inventory-Short Form Items (BDI-13). In this study, Lewinsohn children's feeding disorders questionnaire^[15] which was revised and validated by Zeinali *et al.* in Iran was used.^[16] This questionnaire consists of five sections and includes 57 states. The maximum score of each subtest is 15 for mother's satisfaction, 11 for feeding behavior, 13 for eating tensions, 11 for the variety of foods, 7 for physical symptoms, respectively. Then scores of all subtests are added up and the total score of feeding test is calculated. Higher scores in each section indicate more feeding problems in that part. Internal consistency

of this questionnaire is obtained by Cronbach's alpha method for the total scale equal to 74%, and 0.83, 0.77, 0.65, 0.67, and 0.55 for each factor, respectively. Persian Beck depression inventory short form items (BDI-13) was used as a screening test for excluding mothers with depression.^[17] This instrument indicated good reliability with Cronbach's alpha of 0.85 and strong construct validity based on moderate to strong positive correlations with other measures of mental health issues. Data were analyzed using SPSS16 (SPSS Inc., Chicago, IL, USA). Normal distribution of data was checked by Shapiro-Wilk test. Then Mann-Whitney test was used to compare mean values between the groups. Finally, to achieve normal distribution of total score, L_n transformation was done and regression analysis was used for the transformed variable. Primary and final models of linear regression (enter and backward) were used to assess the relationship between total score of feeding test and some explanatory variables in each group. In this study p value <0.05 was considered as significant.

Ethical considerations

The study was approved by Ethics Committee of Semnan University of Medical Sciences (ethical code: 93/435488). Consent forms were signed by mothers before the study began and participants were informed of their right to withdraw from the study at any time.

Results

Mean (SD) gestational age and weight of birth were 30.47 (1.63) weeks and 1.63 (0.31) kg, respectively, in very-preterm group and 39.15 (0.82) weeks and 3.25 (0.68) kg in full-term group. Mean (SD) weight of preterm and full-term children were 12.20 (1.95) kg and 13.27 (1.37) kg, respectively, at the age of 2 when the study began. Fourteen girls (36.84%) and 24 boys (63.15%) in each of the groups entered the study. In both groups 47.36% of mothers had preliminary education, 5.26% diploma and 47.36% university degree. In terms of financial status, 47.36% of families had intermediate income, 5.26% low and 47.36% very low income in both groups. Mean (SD) gavage duration was 38.02 (16.25) days with the minimum of 18 and maximum of 75 in the preterm group, while full-term born children had no history of gavage. Children's characteristics are shown in Table 1.

As shown in Table 2, mean total score of feeding problems test and all subtests except for the variety of foods were higher in the very-preterm group which means more problems in this group of children but the differences were not significant ($z = 0.43$, $p > 0.05$). Results of the relationship between the total score of feeding test and some explanatory variables in very-preterm and full-term groups are presented in Tables 3 and 4 by using both enter and backward form of linear regression test. As shown in Table 3, in the very-preterm group feeding total score had a

significant relation to female gender ($\beta = -0.36, p = 0.01$). In the full-term group, this significant relationship was also seen between the total score of feeding test and female gender ($\beta = -0.49, p = 0.002$) as it is shown in Table 4.

Discussion

Comparing scores of feeding problems test between the two groups in this study showed no significant difference. This finding is in line with the study result of Nieuwenhuis *et al.* (2016), Johnson *et al.* (2015) and Migraine *et al.* (2013).^[7-9] In contrast, Jonsson *et al.* (2013), Samara *et al.* (2010) and Crapnel

et al. (2013) reported significantly more feeding problems in preterm born babies than their term born peers.^[10-12] Zimmerman *et al.* (2018) reported more feeding and swallowing difficulties in preterm born children than full-term born babies at the age of 2 too.^[13] In Sanchez study mothers reported more feeding problems in 3-year-old children born less than 30 weeks than term born peers but no significant difference was found after using a behavioral feeding assessment scale.^[14]

Maybe one reason why the score of feeding problems test between the two groups was not significantly different in our study is related to that we adjusted the groups and also excluded preterm born children with neurological or cognitive impairments. Many preterm infants are at risk of cognitive and motor problems; conditions which can lead to more oral motor and eating problems.^[18] Johnson *et al.* (2015) mentioned no more significant difference in feeding problems between 2-year-old children born preterm and their full-term born peers in their study by adjusting neurodevelopmental and behavioral factors.^[8] Also, Migraine *et al.* (2013) reported more feeding problems in 2-year-old children born preterm than their full-term peers, but the difference disappeared in their study after

Table 1: Comparing infants' characteristics between the two groups

	Mean rank			
	Age at birth (week)	Current age (month)	Weight at birth (kg)	Current weight (kg)
Very-preterm	19.50	39.12	19.79	31.84
Full-term	57.50	37.88	57.21	45.16
Z*	-7.60	-0.24	-7.39	-2.65
p	<0.001	0.80	<0.001	0.008

*Mann-Whitney U test

Table 2: Comparing mean scores of feeding subjects between the two groups

	Mean rank					
	Mother's satisfaction	Feeding behaviors	Eating tensions	Variety of foods	Physical symptoms	Total score of feeding test
Very-preterm	40.03	41.13	39.97	38.50	41.18	39.61
Full-term	36.97	35.87	37.03	38.50	35.82	37.39
Z*	0.61	1.05	0.58	0	1.10	0.43
p	0.53	0.29	0.55	>0.999	0.27	0.66

*Mann-Whitney U test

Table 3: Correlation between total feeding score and explanatory variables in preterm children

Variable	B	Primary Model				B	Final Model			
		Std. Error	β	t	p		Std. Error	β	t	p
Age at birth (month)	0.90	0.54	0.29	1.68	0.10	0.09	0.05	0.31	1.90	0.06
Weight at birth (Kg)	-0.40	0.27	-0.25	-1.51	0.14	-0.43	0.25	-0.26	-1.69	0.09
Gender [†]	-0.38	0.16	-0.37	-2.40	0.02	-0.37	0.15	-0.36	-2.46	0.01
Gavage duration (day)	0.009	0.004	0.32	1.98	0.05	0.009	0.004	0.32	1.99	0.05
Mother's education [‡]	0.02	0.08	0.05	0.29	0.76	-	-	-	-	-

B=Unstandardized Regression Coefficients, β = Standardized Regression Coefficients, [†]Male=1, Female=2, [‡]preliminary=0, diploma=1, university degree=2

Table 4: Correlation between total feeding score and explanatory variables in full-term children

Variable	B	Primary Model				B	Final Model			
		Std. Error	β	t	p		Std. Error	β	t	p
Age at birth (month)	-0.08	0.08	-0.15	-1.06	0.29	-	-	-	-	-
Weight at birth (Kg)	0.11	0.09	0.18	1.21	0.23	-	-	-	-	-
Gender [†]	-0.46	0.13	-0.51	-3.52	0.001	-0.44	0.13	-0.49	-3.41	0.002
Mother's education [‡]	-0.02	0.06	-0.06	-0.44	0.65	-	-	-	-	-

B=Unstandardized Regression Coefficients, β = Standardized Regression Coefficients, [†]Male=1, Female=2, [‡]preliminary=0, diploma=1, university degree=2

adjusting the groups in terms of maternal and neonatal characteristics.^[9]

Another reason for not higher feeding problems scores in preterm children would be related to this fact that high percentage of Iranian mothers, breastfed their infants as a result of government's policies and their social and religious beliefs compared with mothers of other countries.^[19] In this study, 86.84% of mothers with preterm born children versus 92.1% of mothers with full-term babies had fed their children breast milk or mainly breast milk plus formula at least during the first 6 months of life. The importance and advantages of breastfeeding are obvious and breast milk has an important role in neurogenesis and preterm infants derive a developmental benefit of it.^[20] Breastfeeding can also develop and improve the mother and child interaction because of maternal affection and touch.

In the full-term group, among studied explanatory variables, there was just a significant relationship between the total score of feeding problems test and female gender, as girls had less problems with mean (SD) score of 11.64 (4.39) than boys with mean (SD) score of 18.7 (7.81). This relationship was also significant in the preterm group as boys had more feeding problems than girls with mean (SD) score of 19.66 (8.98) versus 13.57 (6.83). Such a difference can be related to personality trait differences between boys and girls, as it is reported that children with more emotional temperaments have more feeding problems.^[21]

In this study we did not find a significant relationship between feeding problem scores and gavage duration in preterm children. Griffith *et al.* (2018) state that risk for delay in oral feeding success is higher in preterm infants who had extended durations of tube feeding.^[22] It is in line with this hypothesize that treatments including intestinal intubation, Continuous positive airway pressure (CPAP) on the nose, gastric tubes, and delay in oral feeding are inappropriate stimuli for newborns lead to damage of normal feeding and swallowing patterns.

As a whole, findings of this study can be good news for parents of healthy infants who are hospitalized because of very preterm birth. Giving information to such parents by NICU nurses would decrease their stress about babies' feeding problems in future and promote a positive feeding experience. However, small number of preterm babies born in Semnan which is a low populated city of Iran makes limitation in conclusion of this study. Some busy mothers refused to enter this study in both groups of children which can be resolved by using also an internet-based assessment and questionnaire for such caregivers in future studies. Another limitation of this study was using just a questionnaire which made it impossible to verify the validity of mothers' reports. So, in the next studies the researcher's assessment also can be used.

Conclusion

In conclusion, at 2 years of age, there were no significant differences in feeding problems between children born very-preterm and full-term children, even though scores of feeding problems were slightly prevalent in the very-preterm group. Due to more feeding problems in boys, both in full-term and preterm children, consultation to mothers about different traits of gender would be helpful to reduce their concerns and expectations.

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Conflicts of interest

Nothing to declare.

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