

Feeding Difficulties in Premature and Full Term Children. A Comparison Between Ages

Dificultades alimentarias en niños prematuros y a término. Una comparación entre edades

Hauser Maria Paulina*
Taborda Ruth Alejandra**
Oiberman Alicia Juana***

Resumen

El objetivo de esta investigación fue determinar si existían diferencias en la prevalencia de problemas de alimentación en niños prematuros y a término en dos rangos de edad. Método: la muestra estuvo formada por 270 niños. Se utilizó la EADAN. Resultados: los niños extremadamente prematuros tuvieron la mayor prevalencia de dificultades alimentarias. Los prematuros presentaron más indicadores de dificultades de alimentación durante los 2 años de vida, pero estos comportamientos se resuelven a partir de los 25 meses. En los niños a término aparecen indicadores de dificultades de alimentación a partir de los 25 meses. Conclusiones: la conducta alimentaria tiende a mejorar con la edad en los prematuros. En

los niños a término, los indicadores aparecen a los 25 meses.

Palabras claves: Desórdenes en la alimentación; Nacimiento prematuro; Diferencias de edad

Abstract

The main objective of this research was to determine whether there were differences in the prevalence of feeding problems in premature and full-term children at two age ranges. Methods: The sample consisted in 270 children. We used the EADAN. Results: extremely preterm children had the higher prevalence of feeding difficulties. Preterm infants presented a wide range of indicators of feeding difficulties during the first 2 years of life. However, these behaviors tend to

*Ph.D. National Scientific and Technical Research Council (CONICET); Del Salvador University Argentina. Faculty of Psychology and Psychopedagogy, Buenos Aires, Argentina. Mail de contacto: mariapaulina.hauser@usal.edu.ar

**Ph.D. National University of San Luis. Faculty of Psychology, Argentina. Mail de contacto: taborda.alejandra@gmail.com

***Ph.D., National Scientific and Technical Research Council (CONICET), Argentina. Mail de contacto: aoiberma@psi.uba.ar

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resolve from 25 months of age. In the full-term children group, some behaviors related to feeding difficulties appear from 25 months onwards. Conclusions: feeding behavior tend to improve with age at preterm group. However, in full-term children behaviors related to feeding difficulties appear from 25 months onwards.

Keywords: Feeding Disorders; Premature Birth; Age Differences.

Introduction

Feeding problems are very common among young children, have a negative impact on their development and are associated with greater stress during feeding, poor growth and delayed cognitive development (van Dijk et al., 2011). Different studies have shown feeding problems seem to appear at age of 3 on average according to parent's reports (Arias-Guillen et al., 2020). At lower-middle-income countries some environmental conditions as poverty, inappropriate feeding environment as well as disorganization during mealtimes deepen biological and psychosocial risks which often contribute to feeding impairments on infants (Eales et al., 2020).

Inappropriate feeding practices, such as early introduction of solid foods, insufficient quantities, inadequate complementary foods, and reduced feeding practices are associated with higher prevalence of feeding problems during childhood. These factors might be related to cultural and socioeconomic factors (Fuls et al., 2020). Recent research has demonstrated that child feeding practices in low-income families in Buenos Aires, Argentina, are influenced by parent's work demands—like

lack of work or demanding work schedules that prevent mothers of monitoring their children daily eating—, issues related to household insecurity like not having enough money to buy food for their families, or financial difficulties that limit the type of food they consume (Lindsay et al., 2012).

It has been described that one of the population groups most at risk of presenting feeding disorders is that of infants born premature. The risk increases in very premature infants, those who have suffered severe neonatal complications (Dodrill, 2011) and in premature with lower birth weight (Thoyre, 2007; Rogers et al., 2018). Different studies have demonstrated that preterm children frequently present feeding difficulties at 2 years of corrected age (Crapnell et al., 2015; Johnson et al., 2016).

At 2 years of age, moderately premature children had more feeding difficulties compared to full term children (14.9% vs. 9.5%). Main difficulties reported were related to gag reflex, choking, nausea, rejection, selectivity of food, crying and spitting food. Ejecting food out of the mouth, gagging and holding food in the mouth have been described as determinant of feeding problems (Chung et al., 2014).

A greater prevalence of feeding problems was found in children at 2 years of age who had been at Neonatal Intensive Care Unit (NICU). In the NICU sample, the prevalence of feeding problems did not differ between children born before 32 weeks gestational age and those children born after 32 weeks' gestational age. On the other hand, in children born before 32 weeks' gestational age being born small for gestational age was the most evident risk factor for later feeding problems (Hoogewest

et al., 2017). However, in a recent study conducted in preterm infants, (Van Dijk et al., 2016) found that premature infants presented scores that indicated absence of or slight feeding problems.

In the present paper, we report preliminary results obtained in a study of feeding difficulties in children. Our purpose was to determine whether there were differences in the prevalence of feeding problems in premature and full-term children. In addition, we were interested in knowing what behaviors considered as indicators of feeding difficulties occur more frequently in both groups at two age ranges, from 6 to 24 months and from 25 to 83 months.

Method

Participants

The sample consisted of 270 children, 180 full-term (mean age = 35 months; age range 6–83 months) and 90 preterm children (mean corrected age = 25 months; age range 6–83 months). Children with severe neonatal complications—such as Bronchopulmonary Dysplasia, Esophageal Atresia and Congenital abnormalities—were excluded.

Materials

To assess feeding behavior in children, a parent-report feeding scale was used. This scale, *Escala Argentina de Dificultades Alimentarias en Niños* (EADAN), translated as Argentine Scale of Feeding Difficulties in Children (Hauser et al., 2019) is a translation and standardization of the Montreal Children's Hospital Feeding Scale questionnaire (MCH-FS; Ramsay et al., 2011) on the Argentinean population.

The EADAN allows identifying

feeding problems in young children and consists of 14 items that explore different aspects of feeding: oromotor, sensorimotor, appetite, maternal concerns about feeding, behaviors at the time of feeding, strategies used by the mother, and family reactions to the feeding of the child. The person in charge of feeding the child is asked to score the 14 items on a seven-point Likert scale. A total score is obtained from the addition of all the items. That raw score then becomes a T score that indicates absence of feeding difficulties, or presence of mild, moderate or severe feeding difficulties. As the score increases, the severity of the difficulties increases (Ramsay et al., 2011).

Psychometric properties of the EADAN were analyzed in an Argentinean sample (Hauser et al., 2019).

Procedure

The present paper is part of a research approved by the ethical committee of Faculty of Psychology, National University of San Luis. The parents in the study were contacted privately and the objective and procedure of the study was explained. The parents accepted to be part of the project after signing a written informed consent.

Feeding behaviors were measured between July 2017 and June 2019. Parents answered the EADAN during the time they were waiting for the pediatric control in three institutions. Those parents that had more than one child in the range of required age answered a questionnaire for each one. Before the questionnaire administration, parents were asked about demographic information as well as perinatal background of the child.

Statistical Analyses

Statistical analyses were conducted using IBM SPSS Statistics 21. Pearson correlation coefficient was calculated for the possible association between the children's feeding behaviors and demographic characteristics. The EADAN score and items of the questionnaire were also correlated with perinatal characteristics, and Pearson coefficient was used to establish whether feeding behaviors are associated with these backgrounds. Alpha of 0.05 was used to determine significance.

Results

Sample Characteristics

A total of 270 parents participated in the research and complete the children's feeding questionnaire. Children characteristics are listed in Table 1 and neonatal background of preterm children are presented in Table 2.

Feeding Difficulties

Of the 270 children, 237 did not have feeding difficulties, 18 had mild difficulties, 8 exhibited moderate difficulties and 7 had severe difficulties.

The results show that feeding difficulties are more frequent in extremely preterm infants (two children - 18%) and full-term infants (23 children - 13%). Feeding difficulties decrease in the group of moderately preterm (six children - 10%) and very preterm children (two infants - 9%; See Table 3).

The extremely preterm infants remained more than 60 days on the neonatal ward (82%), they presented extremely low weight at birth (82%) and all of them needed tube feeding (100%). Male preterm were found to have more feeding difficulties than female (16% vs. 5%).

Pearson correlation analysis shows that there exists a strong positive statistical association between the EADAN total score

Table 1

Sample Characteristics (N=270)

Characteristic	Preterm infants (N=90)	Full-term infants (N=180)
Child sex (Female/Male)	40 (44%) / 50 (56%)	90 (50%) / 90 (50%)
Gestational age (mean, SD) weeks	32.32 (3.22)	39.11 (1.14)
Birth weight (mean, SD) grams	1778 (720)	3310 (460)
Child development at assessment with EEDP*	Normal 76 (84%) Risk 4 (4%) Retardation 10 (11%)	172 (96%) 2 (1%) 6 (3%)

* Rodríguez et al., 1978

Table 2*Neonatal Background of Preterm Children (N=90)*

Neonatal background		Extremely preterm (< 28 weeks) (N=11)	Very preterm (31–28 weeks) (N=21)	Moderately preterm (32-36 weeks) (N=58)
Child age at participation (mean, SD) (corrected age)		25.82 (17.81)	20.52 (19.75)	26.29 (21.83)
Gestational age (mean, SD)		26.18 (0.60)	29.95 (0.80)	34.34 (1.56)
Birth weight	(mean, SD)	866 (960)	1340 (210)	2110 (680)
	<1500 g	11	18	11
	<2500 g	0	3	29
	>2500 g	0	0	18
Duration of hospitalization	(mean, SD)	94.18 (24.81)	51.29 (13.07)	19.28 (20.63)
	None	0	0	17
	1 to 60days	2	16	38
	>60 days	9	5	3
Feeding tube		11	21	34
Breathing assistance	Not required	0	2	33
	Nasal cannula	1	2	6
	CPAP, Halo, MV	10	17	19

and child age at the time of participation in the study ($r = .181^{**}$; $p = .003$). For statistical analysis, preterm and full-term children group have been divided by age, from 6 to 24 months and from 25 to 83 months.

Correlations were found between EADAN's items and demographic characteristics. In the 6 to 24 months preterm group, a negative correlation was found between the moment children start refusing to eat and weight. Early refusal to eat may cause poor weight gain. There is also a significant correlation between child

behavior during meals and gestational age as well as time of hospitalization. Parents reported child behavior during mealtime gets worse as gestational age decreases and the time children remained hospitalized increases. In this group, another significant association was found between the frequency of behaviors such as gagging, spitting or vomiting with certain types of food and gestational age as well as birth weight. This means that as children gestational age and birth weight decrease, these behaviors are observed more frequently during semi-solids

Table 3*Association Between EADAN Score and Gestational Age (N=270)*

Gestational age at birth (in weeks)	Corrected age at time of assessment (mean, SD)	No difficulties N=237	Feeding Difficulties N=33
Extremely preterm (< 28)	25.82 (17.81)	9 (82%)	2 (18%)
Very preterm (31–28)	20.52 (19.75)	19 (91%)	2 (9%)
Moderately preterm (32-36)	26.29 (21.83)	52 (90%)	6 (10%)
Full-term (≥ 37)	35.26 (22.81)	157 (87%)	23 (13%)

eating. In the same way, child behavior of holding food in his/her mouth without swallowing it seems to be more frequent in children with lower birth weight. Another relevant finding suggests that parents of children born with lower gestational age, lower weight and who remained more time at neonatal ward considered they children were growing worse than those children born at term and with adequate weight (See Table 4).

In the preterm group from 25 to 83 months, a significant correlation was found between the moment the child start refusing to eat during mealtimes and gestational age, birth weight and time of hospitalization. This indicates children with lower gestational age, lower birth weight and longer hospitalization in NICU present early refusal to eat (See Table 4).

In the 6 to 24 months full-term children group, an association is observed between child age at the time of assessment and child's chewing or sucking abilities.

Parents considered that younger children present poorer abilities. On the other hand, at the full-term children group from 25 to 83 months, results show that parents more frequently had to follow their child around or use distraction to achieve child eat in children with poor weight. Besides, there is a negative correlation between child weight and parent's perception of child growth. It seems parents considered that as weight decreases their children have poorer growth. Finally, a positive correlation was found between time of hospitalization at neonatal ward and child's feeding influence in family relationship. Also, a significant positive association was found between time of hospitalization and child behavior of holding food in his/her mouth without swallowing it. These results indicate that as time of hospitalization at NICU increased, the negative influence of child's feeding in family relationship and the behavior of holding food in his/her mouth also did (See Table 5).

Table 4

Correlations Between Items of the EADAN and Children's Characteristics in Preterm Group (N=90)

EADAN's questions	Child age	Weight	Gestational age	Birth weight	Time of hospitalization at NICU
Preterm group (6 to 24 months) N=55					
When does your child start refusing to eat during mealtime?	r= -.048 p= .727	r= -.274* p= .043	r= -.119 p= .389	r= -.234 p= .086	r= .161 p= .241
How does your child behave during meals?	r= .160 p= .245	r= .169 p= .217	r= -.324* p= .016	r= -.218 p= .110	r= .307* p= .022
Does your child gag or spit or vomit with certain types or food?	r= -.031 p= .824	r= -.126 p= .359	r= -.329* p= .014	r= -.335* p= .012	r= .230 p= .091
Does your child hold food in his/her mouth without swallowing it?	r= .144 p= .295	r= -.074 p= .589	r= -.190 p= .164	r= -.266* p= .049	r= .237 p= .081
How do you find your child's growth?	r= .117 p= .395	r= -.298* p= .027	r= -.367** p= .006	r= -.452** p= .001	r= .414** p= .002
Preterm group (25 to 83 months) N=35					
When does your child start refusing to eat during mealtime?	r= .032 p= .855	r= -.151 p= .386	r= -.403* p= .016	r= -.389* p= .021	r= .464** p= .005

*Correlation is significant at the .05 level (two-tailed).

**Correlation is significant at the .01 level (two-tailed).

Discussion

This research represents a first attempt to address the study of feeding difficulties in children using an instrument for detection in the field of pediatric consultation adapted to the context of Argentina.

The results indicate that there

is a prevalence of feeding difficulties in extremely preterm children (18%). The results match with those reported in the literature regarding the greater likelihood of children born very premature to present alterations in early childhood feeding (van Dijk et al., 2011; Dodrill, 2011; Johnson et al., 2016; Hoogewest et al., 2017). Eating

Table 5

Correlations Between Items of the EADAN and Children's Characteristics in Full Term Group (N=180)

EADAN's questions	Child age	Weight	Gestational age	Birth weight	Time of hospitalization at NICU
Full term group (6 to 24 months) N= 73					
How are your child's chewing (or sucking) abilities?	r= -.247* p= .035	r= -.118 p= .320	r= -.063 p= .596	r= -.040 p= .735	r= -.088 p= .460
Full term group (25 to 83 months) N=107					
Does your child hold food in his/her mouth without swallowing it?	r= -.062 p= .528	r= -.006 p= .952	r= .029 p= .770	r= .055 p= .576	r= .341** p= .000
Do you have to follow your child around or use distractions so that your child will eat?	r= -.077 p= .428	r= -.217* p= .026	r= -.038 p= .697	r= -.128 p= .189	r= -.107 p= .273
How do you find your child's growth?	r= -.124 p= .204	r= -.233* p= .017	r= .150 p= .123	r= -.107 p= .272	r= .034 p= .724
How does your child's feeding influence your family relationship?	r= .150 p= .123	r= .153 p= .119	r= -.054 p= .578	r= -.032 p= .740	r= .281** p= .003

*Correlation is significant at the .05 level (two-tailed).

**Correlation is significant at the .01 level (two-tailed).

difficulties in extremely preterm infants are explained because they have the lowest gestational age (mean=26.18), lowest birth weight (mean=866 grams) and greater duration of hospitalization (mean=94.18 days) compared with the rest of preterm children.

Our findings show birth weight is a remarkable factor associated with future feeding problems in the total sample, since

low weight at birth increases the risk of infants feeding difficulties as has been stated in previous studies (Thoyre, 2007, Rogers et al., 2018).

However, when comparing the entire group of premature children with the full-term group, there were not greater differences in feeding difficulties (11% vs. 13%). These results could be explained considering that 69% of preterm children

were healthy and did not present major complications of prematurity that could have increased the risk of developing feeding difficulties. Similar results were found by Van Dijk et al. (2016), it seems to be related with the lack of health problems and a development almost typical for age. In fact, the slight prevalence of feeding difficulties in full-term children can be interpreted considering that feeding behavior is not surely stable across time; conversely it is characterized by daily and meal to meal fluctuations (Van Dijk et al., 2016).

Age of testing could be an important factor related with our results. It could be noted that our preterm infants presented a wide range of behavior considered as indicators of feeding difficulties during the first 2 years of life—such as early refusal to eat, difficult behavior during mealtime, gagging, spitting or vomiting with certain types of food, holding food in his/her mouth without swallowing it. However, these behaviors tend to resolve from 25 months of age. On the opposite, in full-term children group, some behaviors related to feeding difficulties appear from 25 months onwards, such as rejection to eat—that contributes to the use of strategies as follow the child around or use distraction to get the child to eat—, or behavior such as holding food in his/her mouth without swallowing it. These findings are consistent with previous studies showing greater prevalence of feeding difficulties at 2 years in premature and at 3 years in general population (Arias-Guillen et al., 2020; Crapnell et al., 2015; Johnson et al., 2016; Chung et al., 2014; Hoogewest et al., 2017).

A special reference may be done about environmental conditions where

the families of the sample live. Previous studies have shown that disorganization during mealtimes, insufficient quantities, inadequate complementary foods and poor monitoring of children's daily eating contribute to feeding problems on infants (Eales et al., 2020; Fuls et al., 2020; Lindsay et al., 2012). It can be hypothesized these conditions affects equally both preterm and full-term children deepening biological and psychosocial risks.

In this study, we found that 14% of children who had been at the neonatal ward have feeding difficulties while only 12% of children who did not remain hospitalized during neonatal period presented feeding problems. Even though this difference is not really significant, our findings are in line with previous studies (Hoogewerf et al., 2017). However, our findings differ from previous studies (Hoogewerf et al., 2017) since we found more feeding difficulties (27%) in children born before 32 weeks gestational age (extremely preterm and very preterm children) compared with children born after 32 weeks gestational age (moderately preterm and full-term children; 23%).

The findings regarding the prevalence of gagging, spiting, or vomiting as well as holding food in the mouth without swallowing it should be carefully considered. Parents reported that these behaviors were more frequent in the age range of 6 to 24 months in children born premature, born with low weight and low gestational age. Pushing food out of the mouth, gagging, maintaining food in the mouth and crying have been described as determinant to detect whether a child has feeding problems (Chung et al., 2014). The present pilot study has demonstrated that EADAN question 7

is very useful because it relates to a specific benchmark of problematic feeding behaviors such as gagging and spitting food. In the same sense, the frequency of holding food in the mouth without swallowing it, as well as the parental strategies of following their children around or using distractions to get them to eat, increases in full-term children from 25 months and could be considered as signs of feeding problems. In this respect, it is important to consider that early identification of these behaviors as well as their permanency over time may be significant in order to identify and prevent feeding difficulties. In this sense, it is necessary to remark that individual items are very important when working with children with feeding problems, more important in some cases than total score.

In our study, parents of children born prematurely, with low weight or hospitalized for longer periods at the NICU expressed that their children do not achieve adequate growth, that is, that they remained underweight and at risk. Certain aspects linked to the experience of having a premature child seem to influence the perception of parents about feeding their children and weight gain. Parents reported more symptoms of feeding problems and poor growth in childhood in children born premature. It can be thought that the representation parents build of their premature child may have an impact on the way feeding is displayed later. If parents continue to see him or her as a small, low-birth weight infant, they may resort to unsuitable strategies to get the child to eat or increase intake, which could affect the

relationship between them (Van Dijk et al., 2016).

This study has some limitations. First, the impossibility of evaluating children behavior at different points of time since feeding is considered a dynamic process. Second, our study did not assess the influence of parent-child interactions in feeding difficulties. Currently, we are studying whether there is an association between the level of difficulties detected by the questionnaire and the observation of children feeding situations. Finally, the findings are also limited by a small sample size.

In conclusion, the present study explores feeding difficulties in premature and full-term children at two age ranges—6 to 24 months and 25 to 83 months. Prematurity, associated with low birth weight and longer time of hospitalization, are predisposing factors to developing feeding difficulties in childhood. Specific behaviors, such as gagging, spitting, vomiting, and holding food in the mouth without swallowing it, could be considered determining factors to identify feeding difficulties in preterm infants. It is important to highlight that feeding behavior tend to improve with age at the preterm group. It could be thought that, as their medical status gets better, so it does their feeding behavior. However, in full-term children group some behaviors related to feeding difficulties appear from 25 months onwards. The results of this study might contribute to understanding factors associated with these difficulties as well as their incidence in future development.

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