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## Comparative analysis of parental views on the eating habits of premature and full-term infants: A perspective study

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### Abstract

Feeding is a complex process, and that's why feeding difficulties are so common in early childhood. Prematurity appears to be a risk factor for increased feeding problems, so our goal was to evaluate the effect of prematurity on children's feeding behavior. We also intended to identify situations that have a significant impact on the child's and family's life and refer them to a specialized consultation. In our study participated 109 children (51 preterm and 58 full-term), whose parents answered the Behavioral Pediatrics Feeding Assessment Scale and a demographic questionnaire. It was found that the perception of feeding difficulties is higher in parents of preterm children, likewise the perception of those problems, and although not statistically significant, the risk of feeding difficulties is higher in the preterm group compared to the other one.

**Keywords:** Prematurity, feeding difficulties, children, normative development, parental perception

### Introduction

Despite the seemingly instinctive ease with which many children eat and feed, there are complex interactions between genetic, biological, psychological, sociocultural, familial, and environmental factors that can hinder the development of healthy eating habits and behaviors [1]. Considering being such a complex process, it is not surprising that feeding difficulties (FD) are very common in early childhood [2]. It is well established in the literature that children with FD often have underlying neurodevelopmental, behavioral, or other medical disorders [2]. But, while there is a well-established association between FD and specific groups of patients with metabolic (e.g., cystic fibrosis) or neurodevelopmental (e.g., autism spectrum disorder) disorders, it is also true that difficulties in this domain are highly prevalent in the general population during early childhood, starting to decline from age four. The incidence rates found in various studies range from 25 to 45% in children with normative development and can reach up to about 90% in children with neurodevelopmental disorders [3, 4].

Regarding children with a history of prematurity, some studies had found a higher risk of FD up to six years [5, 6, 7, 8, 9], while other hadn't. [10, 11, 12] Samara *et al.* [6] verified that children with a history of extreme prematurity (gestational age up to 25 weeks and 6 days) were two to five times more likely to have FD, which would only be partially explained by the coexistence of neurological, neurodevelopmental, or general behavioral problems.

Prematurity is considered to have a significant impact on overall health, as premature children have a higher risk of adverse neonatal events, long-term behavioral and neurodevelopmental sequelae, lower cognitive function, respiratory disorders, and other comorbidities [13] Their care is associated with high costs and multiple hospitalizations, both after birth and during childhood [14] Problems with feeding behavior in this population often play a substantial, yet underestimated role. Due to the "prematurity-associated difficulties" (e.g. inability to coordinate sucking and swallowing, gastroesophageal reflux, dysmotility, and high prevalence of systemic disease), the prevalence of FD among preterm children is estimated to be more frequent the lower their gestational age [15].

Preschool years are the ideal time to diagnose and intervene in cases of FD, as numerous studies have found a positive correlation between the persistence of FD and psychopathology. Until the age of five, children improve their oral motor skills what helps

them to integrate better in the family dynamics. This is the final point of a critical period. After this phase, it may be more difficult to acquire these feeding skills due to reduced neuroplasticity [16, 17]. It is important to recognize the presence of FD in this age group to optimize intervention strategies and minimize some of their negative impacts, which can persist into adulthood [18, 19].

With this study, we aim to evaluate the effect of prematurity (<34 weeks of gestation) on children's feeding behavior, as well as identify situations in which FD have a significant impact on the child's and family's life. If something a normal was identified, we additionally referred them to the proper medical specialist.

**Materials and Methods Study design**

Our observational and cross-sectional study was submitted and approved by the Ethics Committee of Dr. patnam Mahender Reddy Institute of Medical Science, written informed consent was obtained from the guardians' child. The questionnaire was answered through a phone call or sent home by mail and returned electronically or via a sealed envelope. From this study, we excluded children with some pathologies such as cerebral palsy, epilepsy, neurodevelopmental disorders (autism spectrum disorder, global developmental delay) and those fed by tube feeding.

**Participants**

A total of 109 children participated in the study (with a similar proportion between sexes), of with a gestational age of 34 weeks or less. Of these, 10 children had died in the meantime and 14 children were excluded according to the criteria defined above. From the remaining 137 children, we contacted 101 by phone call, of which 51 responded to the questionnaire. Furthermore, 85 children were selected from Escola Santa Maria's nursery, and we got 58 responses from parents of children aged between two and five years.

**Instruments**

A demographic questionnaire was applied, which collected demographic data (such as the child's date of birth and sex, age, education, and employment status of the child's parents, if they have siblings and their age, and the child's pathological history).

In our study we used the Behavioral Pediatrics Feeding Assessment Scale (BPFAS). According to Sanchez *et al.* and Jaafar NH., this questionnaire has the best reliability and validity data compared to various other feeding problem questionnaires applied to parents of preschool-aged children [18, 20]. The questionnaire consists of 35 items, 25 of them directed towards children's feeding behaviors and 10 directed towards parents' attitudes and behaviors. This evaluation is done on a Likert scale, from 1 (never) to 5 (always), and also through a dichotomous response (yes or no), taking into account if certain behavior or attitude is regarded as problematic by the family. For positive

questions (such as "Eats fruits," "Enjoys mealtime," etc.), the obtained score was reversed, so a higher score on the BPFAS would raise the severity of feeding problems. We requested the use of the BPFAS questionnaire and its translation to European Portuguese to the author William B. Crist [21].

The BPFAS allows to obtain the following data: Total frequency score, Total problem score, Child behavior's frequency, Parent's feelings/strategies' frequency, Child behavior's problems, and Parent's feelings/strategies' problems perceived by caregivers. The values of the following subscales were also calculated: "diet selectivity" - related to children's acceptance of certain food groups and new foods [i.e., fruits; milk; vegetables; starchy foods (e.g., potatoes, rice); new foods] - a low score means that the child has a more varied diet, while a high score indicates a more restricted diet; and "poor parental strategies" - resulting from the use of threats, alternative meals and persuasive strategies to convince the child to eat. Cut-off points defined by Dovey, Jordan, Aldridge, & Martin in 2013 [22] were used for specific child and parent results. Marshall, Raatz, Ward & Dodrill's cut-off points in 2015 [23] were used for total scores.

**Statistical analysis**

In our statistical analysis, we used IBM® SPSS® software for Windows, version 27. Descriptive statistics were calculated from frequency/percentage (n/%) for qualitative data and mean ± standard deviation for quantitative data. The normality of distribution of the data was checked using the Kolmogorov-Smirnov test. Results with normal distribution were analyzed with parametric statistics and the remaining with non-parametric statistics. The internal consistency of the BPFAS questionnaire was verified for all items and for each subscale ("dietary selectivity" and "poor parenting strategies") using Cronbach's alpha test, where values ≥0.9 are considered "excellent", ≥0.8 "good", ≥0.7 "acceptable", ≥0.6 "questionable", ≥0.5 "poor", and <0.5 "unacceptable", according to Perrin [24]. For all cases, *p* values less than 0.05 were considered statistically significant.

**Results**

The demographic data of the participants are represented in Table 1. The sample includes 109 children (51 preterm and 58 full-term). In total, 109 parents responded to the survey, corresponding to a participation rate of 58.6%. With respect to these characteristics, there was a statistically significant difference between the two study groups in terms of child age (in months) – higher in the preterm group, mother and father's education levels – higher in the full-term group, and average age of siblings – higher in the preterm group. For the remaining parameters, no statistically significant differences were found.

**Table 1:** Demographic characteristics of the participants (preterm children vs. full-term children) and household

Children			
	Premature (N=51)	Full-term (N=58)	p
Male	20 (39, 2%)	27 (46, 6%)	0, 442
Child's age (in months)	Mean: 53, 96	Mean: 48,02	0, 025
	Deviation Error: 9, 89	Deviation Error: 12,79	
Household characteristics			
Mother's aGE (In years)	Mean: 38, 34	Mean: 38, 50	0, 713

	Standard deviation: 5, 73	Standard deviation: 3, 43	
Father's age (In years)	Mean: 41, 30	Mean: 39, 50	0, 183
	Standard deviation: 6, 95	Standard deviation: 4, 01	
Number of siblings	Mean: 1, 16	Mean: 1, 14	0, 705
	Standard deviation: 1, 08	Standard deviation: 0,81	
Average age of siblings	Mean: 7, 64	Mean: 4,88	0, 010
	Standard deviation: 4, 77	Standard deviation: 3,14	
Mother's education			<0,001
Up to 12th grade	26 (51, 0%)	1 (1, 7%)	
6 <sup>th</sup> Grade	6	-	
9 <sup>th</sup> Grade	6	-	
12 <sup>th</sup> Grade	14	1	
After 12th grade	24 (47, 1%)	57 (98, 3%)	
Bachelor's degree	17	32	
Master's degree	5	24	
Postgraduate studies	1	-	
Doctoral degree	1	1	
Mother's death	1 (2, 0%)	-	
Father's education			<0,001
Up to 12th grade	34 (66, 7%)	3 (5, 2%)	
4th Grade	3	0	
6th Grade	8	0	
8th Grade	2	0	
9th Grade	9	0	
12th Grade	12	3	
After 12th grade	16 (31, 4%)	55 (94, 8%)	
Bachelor's degree	12	32	
Master's degree	4	19	
Postgraduate studies	-	2	
Doctoral degree	-	2	
Father's data not mentioned	1 (2, 0%)	-	
<b>Mother's work situation</b>			
Employee	47 (92, 2%)	55 (94, 8%)	0,852
<b>Father's work situation</b>			
Employee	45 (88, 2%)	57 (98, 3%)	0,062

The reliability of the BPFAS was assessed through the internal consistency obtained by Cronbach's alpha test. Table 2 shows the alpha values for the total data obtained from the BPFAS, as well as for its subscales "Diet selectivity" and "Poor parenting strategies". The alpha values for the Total frequency score, Total problem score, and Child behavior's problems subscales can be classified as "good". The values for Child behavior's frequency and

Parent's feelings/strategies' problems are "acceptable", while the alpha values for Parent's feelings/strategies' frequency and "Diet selectivity" are "poor". The alpha value obtained for the "Poor parenting strategies" subscale is "unacceptable" and, for that reason, it wasn't included in the statistical analysis. This analysis allowed us to understand that this questionnaire was a good choice for our study.

**Table 2:** Reliability of the various parameters of BPFAS and its subscales, using Cronbach's alpha Test

BPFAS	Cronbach's alpha	Number of itens
Total frequency score	0, 82	35
Total problem score	0, 87	35
Child behavior: frequency	0, 76	25
Parent's feelings/strategies: frequency	0, 60	10
Child behavior: problems	0, 81	25
Parent's feelings/strategies: problems	0, 73	10
"Diet selectivity"	0, 56	6
"Poor parenting strategies"	0, 15	4

Differences in mean scores were evaluated among the two groups: preterm and full-term, as shown in Table 3. Results (Parent's feelings/strategies' problems) showed statistically significant differences, being higher in the preterm group (<0.001 for all three results). On the other hand, Total frequency score and Child behavior's frequency were

regarding parental perception of problems (Total problem score; Child behavior's problems; Parent's significantly higher in the full-term group (0.031 and 0.027, respectively). Regarding Parent's feelings/strategies' frequency and the subscale "diet selectivity", no statistically significant differences were found.

**3:** Comparison of the 2 groups regarding the average score obtained in the questionnaires

	Premature children Mean (SD)	Full-term children Mean (SD)	p
Total frequency score	62,49 (13,05)	66,17 (11,31)	0,031

Total problem score	8,37 (5,13)	5,14 (5,89)	<0,001
Child behavior: Frequency	43,02 (9,16)	46,05 (8,53)	0,027
Parent's feelings/strategies: Frequency	19,47 (4,93)	20,12 (3,89)	0,151
Child behavior: problems	5,92 (3,62)	3,60 (4,05)	<0,001
Parent's feelings/strategies: Problems	2,45 (1,85)	1,53 (2,27)	<0,001
"Diet selectivity"	9,67 (3,36)	10,12 (2,60)	0,226

Considering the cutoff points defined by Dovey and Marshall, statistically significant differences were obtained in the Total problem score, Child behavior's problems, and Parent's feelings/strategies' problems (0.035; 0.033; and <0.001, respectively), values presented in Table 4. About 45.1% of preterm children's parents have a Total problem score above the cutoff point, compared to 25.9% of parents of full-term children. Specifically for Child behavior's

problems, 53% of parents of premature children and 32.8% of parents of full-term children had a value above the cutoff point. Regarding parents' strategies and feelings, the perception of problems above the cutoff point was identified in 70.6% of parents of premature children compared to 29.3% of parents of full-term children. As for the other parameters, although not statistically significant, all percentages were higher in the premature group of children.

**Table 4:** Comparison of the groups considering the defined cut-off points

	Premature children (N=51)	Full-term children (N=58)	p
Total frequency score $\geq$ 84	5 (9, 8%)	5 (8, 6%)	0,831
Total problem score $\geq$ 9	23 (45, 1%)	15 (25, 9%)	0,035
Child behavior: frequency $\geq$ 61	3 (5, 9%)	3 (5, 2%)	0,871
Parent's feelings/strategies: frequency $\geq$ 20	20 (39, 2%)	32 (55, 2%)	0,096
Child behavior: problems $\geq$ 6	27 (53, 0%)	19 (32, 8%)	0,033
Parent's feelings/strategies: problems $\geq$ 2	36 (70, 6%)	17 (29, 3%)	<0,001

## Discussion

FD during early childhood are associated with negative impact on food variability, growth, and neurodevelopment in children and are a significant concern for parents. Some studies have linked prematurity to persistent FD [10], but others have been contradicting that, suggesting that these problems are generally resolved in early childhood [11, 12]. Sanchez *et al.* [10], comparing feeding behaviors of children born <30 weeks gestation and full-term children, found no differences. However, in the same study, they realized that parental concerns about their children's feeding differed, with higher concerns in the group of children born <30 weeks gestation [10]. This could suggest that parents of premature children had persistent, unfounded concerns, or that early FD in these children had not been fully resolved. In that study, it was also found that premature children with lower birth weight had higher BPFAS scores, indicating greater parental concern and more negative attitudes and strategies towards feeding. However, researchers did not find a causal effect between birth weight and child feeding behavior at the age of three, suggesting that birth weight could affect parents' perceptions and behaviors but not necessarily the child's outcomes. One possible explanation is that low birth weight is associated with parental hyper-vigilance, as both health professionals and parents insist on helping the child reach a normal weight. This parental pressure imposed on child during feeding has been associated with both growth failure and FD, which in turn increases parents' insistence, leading to a vicious cycle [25]. Obviously lead to differences in the prevalence of these problems. For example, Nieuwenhuis *et al.* [11] used the Screeninglijst Eetgedrag Peuters (SEP) questionnaire, a validated Dutch version of the Montreal Children's Hospital Feeding Scale, which, with only 14 questions, may not identify the same FD as the BPFAS.

In this study, we aimed to compare eating behaviors, feelings, and strategies used by parents of two groups of children: preterm and full-term. We found that the results related to parents' perception of problems were significantly

different between the two groups, with the preterm group scoring higher. We also found that the Total frequency score, which indicates a higher risk of FD, and the Child behavior's frequency were significantly higher in the full-term group, which may be explained by their lower ages. FD have a high prevalence in early childhood but tend to decline after age four.

Considering the parents' greater perception of problems in premature children, a possible explanation is that parents of premature children, due to the more stressful experiences lived since their birth, adopt a posture of greater vigilance and alertness regarding their growth. The discrepancy between the results related to total scores and those related to the problems perceived by parents can be explained by the distinctness of these two components in detecting the "severity" of feeding problems. Thus, abnormal Total frequency scores would be more indicative of severe FD, while abnormal Total problem score would be more sensitive to milder FD. Parents consider mealtime as one of the most anxiety-generating activities in the education of their children [27], so it is of great importance to identify risk situations, such as high family stress or children with difficult feeding behaviors, to improve and prevent the negative impacts that may arise. There are several proposals for intervention in this area: meal structuring, appetite manipulation, reinforcement-based procedures, gradual exposure and systematic desensitization, introducing food in a play environment, and parental instruction [28-32]. A child learns to eat through observation and by the example of other family members, which highlights the importance to integrate them at mealtime and systematically expose to positive feeding patterns [33].

In a previous study [34] that evaluated the beliefs of mothers of preschool-aged children with a history of prematurity (gestational age less than 32 weeks), it was found that the turbulent experiences that parents face since early on may lead to concerns about their later psychomotor development, leading them to prioritize stimulating behaviors and neglecting social issues and discipline. According to Seidl-

de-Moura *et al.* [35], mothers who value stimulation, autonomy, and responsibility in their children use less restrictive practices and value "discipline" less, allowing the child to explore the environment, which is consistent with what was previously reported. This may lead mothers of premature children, who are excessively worried, to acquire behaviors and strategies that they believe will improve their children's eating behavior, but in reality, may compromise the children's eating habits. For example, parents can use distractions during meals, such as toys or screens, to improve their children's eating behavior, ignore the unfavorable impact this may have on the child's eating behavior [36].

Our study aimed to investigate the role of prematurity in eating behaviors and parental perception of those behaviors, to guide those who require a multidisciplinary approach. It is essential to provide space in pediatric healthcare appointments to discuss parental concerns regarding their children's eating habits, distinguishing between challenging but normative situations and those that constitute clinical concerns. The last ones should be referred for further evaluation.

A strength of our study was the use of a dietary questionnaire with the best reliability and validity data applied to parents. On the other hand, a limitation of our study, which is inevitable in all studies using participant/parent-filled questionnaires, is the reliability of these scales and the potential for over or underestimation errors. Another less positive aspect of our study was the non-inclusion of children's weight at the time of the questionnaire. Since the questionnaires were filled out remotely, answers regarding the child's weight would be highly subject to error, as parents could provide an estimate of their child's weight or mention the weight from the last doctor's visit. Subsequent studies should consider increasing the number of participants, with more homogeneous ages, and preferably including children up to four years of age, as this is the most critical time for the occurrence of feeding problems.

## Conclusion

With this study, it was possible to conclude that the perception of FD is higher in parents of premature children, who show greater concern for the child's behaviors and their way of dealing with this situation. Although not statistically significant, the risk of FD is higher in the premature children group compared to the full-term children group.

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