



Maternal Concerns Regarding Chewing Dysfunction in Children with Cerebral Palsy

© Selen Serel Arslan¹, © Numan Demir¹, © Aynur Ayşe Karaduman²

¹Hacettepe University Faculty of Physical Therapy and Rehabilitation, Department of Neurological Physiotherapy and Rehabilitation, Ankara, Turkey

²Lokman Hekim University Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Ankara, Turkey

ABSTRACT

Aim: The aim of this study was to investigate the concerns of those mothers with children with cerebral palsy (CP) who were referred for a chewing evaluation, and the relationship between their chewing performance levels and the concerns of their mothers.

Materials and Methods: A total of 55 children with CP, and their mothers were included in this study. Age, gender, height, weight, and type of CP were noted. The Karaduman Chewing Performance Scale (KCPS) was used to define the chewing performance level. Children with a KCPS level of 0 were categorized as “children without chewing dysfunction”, and children with KCPS level 1 to IV were defined as “children with chewing dysfunction”. The Turkish version of the Feeding/Swallowing Impact Survey (T-FS-IS) was used to evaluate the maternal concerns relating to the child’s feeding and swallowing problems.

Results: The mean age of children was 4.45 ± 2.56 (minimum=2, maximum=11) years, of which 58.2% were male. There was a moderate to strong correlation between the KCPS and daily activities, worry, feeding difficulties and the total score from the T-FS-IS ($p < 0.001$, $r = 0.71$, $r = 0.64$, $r = 0.72$, $r = 0.74$, respectively). The mothers of those children with chewing dysfunction reported more problems in the total score and all subscales of the T-FS-IS than those mothers of children without any chewing dysfunction ($p < 0.01$).

Conclusion: This study suggests that the chewing performance levels of children were associated with their mothers’ concerns, and those mothers of children with CP who had chewing dysfunction have higher concerns relating to feeding-swallowing difficulties. This knowledge regarding maternal perception indicates that clinicians should consider the concerns of the mothers during the management of chewing dysfunction.

Keywords: Child, cerebral palsy, parent, concern, chewing dysfunction

Introduction

Cerebral palsy (CP) is a group of permanent disorders of movement and posture causing physical disability in childhood. In addition, children with CP may experience several disabilities including cognitive problems, hearing and visual abnormalities, communication disorders, gastrointestinal problems and feeding difficulties (1).

Feeding is an important function for well-being and health throughout life, especially in childhood. Children with CP commonly have feeding difficulties, which may cause inadequate growth, inappropriate nutritional status, prolonged mealtimes, delayed oral feeding skills, and respiratory problems (2). Chewing dysfunction is one of the most important feeding difficulties seen in children with CP (3,4). It can lead to an inability to intake any solid food (5,6),

Address for Correspondence

Selen Serel Arslan, Hacettepe University Faculty of Physical Therapy and Rehabilitation, Ankara, Turkey
Phone: +90 535 664 30 07 E-mail: selen.serel@hacettepe.edu.tr ORCID: orcid.org/0000-0002-2463-7503

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and may cause insufficient obtainment of the necessary nutrition and hydration. Therefore, chewing dysfunction can affect growth and general health, and also result in stressful interactions between children and their parents (7). Therefore, chewing dysfunction in children with CP can affect both the child and their parents.

Family participation and motivation is very important in the management of feeding difficulties. In particular, mothers experience difficulties during caring for a child who has feeding and swallowing difficulties, which often cause a heavy burden (8,9). There are several factors to consider including coping with mealtime challenges, participating in medical and rehabilitative treatments and supporting the educational aspect of the child. Thus, having a child with feeding difficulties is a stressful situation for the parents (8-11). Increased anxiety levels in parents decreases their competence, and was found to be associated with less responsive feeding practices (12). Therefore, it is important to define parental concerns regarding their children with CP who have chewing dysfunction. However, to the best of our knowledge, the concerns of the mothers of children with CP relating to their chewing dysfunction and its impact on their quality of life had not been previously examined. We aimed to investigate the concerns of the mothers of children with CP who suffer from chewing dysfunction, and the relationship between the chewing performance levels and the concerns of the mothers.

Materials and Methods

The present study was conducted at a department of physical therapy and rehabilitation at a university hospital. This study was approved by the Non-invasive Clinical Research Ethics Committee of the Hacettepe University (approval number: GO21/206, approval date: 23.02.2021). A written informed consent form in accordance with the Declaration of Helsinki was obtained before enrollment.

Participants

Children who (i) were diagnosed as CP, (ii) were above the age of 2 years, (iii) had full oral feeding, (iv) were referred for a chewing evaluation, and their mothers were included in this study. The demographic information of the children including their age and gender, anthropometric measurements including height and weight, and their type of CP were recorded. Height-for-age (HAZ) and weight-for-age (WAZ) scores as nutritional indicators were calculated using the World Health Organization (WHO) Anthro Plus software (13).

Evaluation Procedures

The gross motor functional level was determined using the Gross Motor Function Classification System (GMFCS) (14). It is a standardized system to classify the functional motor levels of children in terms of five levels. GMFCS level 1 describes the most independent functional motor level, and GMFCS level 5 describes the most dependent functional motor level (14). An increasing level indicates a higher level of dependence.

Feeding related descriptive information including transition time to additional and solid food, duration of mealtimes, number of meals, initial teething time, number of teeth, and the food consistencies which the child could consume were recorded.

The chewing performance level was determined using the Karaduman Chewing Performance Scale (KCPS) (15). The KCPS is a five level classification system which is used to determine chewing performance levels in children. Increasing levels indicate decreased chewing performance levels. Level 0 refers to normal chewing function, and level 4 refers to no biting or chewing.

The children were positioned in a sitting position, and a standard biscuit was presented in front of their mouth for them to bite on and chew. An experienced physical therapist scored the chewing performance levels of the children using the KCPS. Those children with KCPS level 0 were categorized as "children without chewing dysfunction", and children with KCPS levels of 1 to IV were categorized as "children with chewing dysfunction".

The maternal concerns relating to the child's feeding and swallowing problems were evaluated by means of the Turkish Version of the Feeding/Swallowing Impact Survey (T-FS-IS) (16,17). The T-FS-IS is a parent report instrument to measure the effects of feeding and swallowing problems on the quality of life of the caregivers. It has 18 questions with three major categories, namely "daily activities", "worry", and "feeding difficulty". Each question is answered on a 5-point Likert scale ranging from 1 (never) to 5 (almost always). An average score for each subscale and an average total score are calculated, and higher scores show higher levels of concerns relating to feeding-swallowing difficulties.

Statistical Analysis

Statistical power analysis was performed using G*Power. A total of 55 children with CP, and their mothers have a 0.5 effect size, 5% type 1 error margin, and 81% statistical power conditions to detect the relationship between the chewing

performance levels of the children and the concerns of their mothers as statistically significant.

Statistical analysis was performed using the IBM-SPSS for Windows version 20 software (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated as numbers and percentages for qualitative data, and medians, 25th and 75th percentiles for quantitative variables. The Mann-Whitney U test was used to compare the T-FS-IS scores between those children with chewing dysfunctions and those children without chewing dysfunction. Correlation between T-FS-IS and KCPS was assessed using the non-parametric Spearman correlation coefficient. A Spearman correlation coefficient of less than 0.30 indicates a weak correlation, between 0.30 and 0.70 indicates a moderate correlation, and greater than 0.70 indicates a strong correlation (18). A p-value of less than 0.05 was interpreted as statistical significance.

Results

A total of 55 children with CP and their mothers (primary caregivers) were included in the present study. The descriptive characteristics of the children are shown in Table I.

25.5% (n=14) of the children had normal chewing function while the remaining 74.5% had some degree of difficulties with chewing. 25.5% (n=14) of the children were in level 0, 9.1% (n=5) were in level 1, 16.4% (n=9) were in level 2, 21.8% (n=12) were in level 3, and 27.3% (n=15) were in level 4 according to the KCPS classifications.

The median scores of daily activities, worry, feeding difficulties and the total score from the T-FS-IS were 3 (1.3-3.7), 2.71 (1.43-4.14), 2.16 (1.117-3.00), and 2.72 (1.38-3.61), respectively.

A moderate to strong correlation between the KCPS and daily activities, worry, feeding difficulties and the total score from the T-FS-IS was detected ($p < 0.001$, $r = 0.71$, $r = 0.64$, $r = 0.72$, $r = 0.74$, respectively).

The mothers of those children with chewing dysfunction (those children with KCPS levels 1 to 4) reported more problems in the total score and all subscales of the T-FS-IS than for those children without chewing dysfunction (those children with KCPS level 0) ($p < 0.01$) (Table II). The mothers' responses for each question of the T-FS-IS are shown in Table III.

Discussion

The present study shows that the chewing performance level was found to be associated with the T-FS-IS, and those

mothers of children with CP who had chewing dysfunction reported more concerns relating to feeding and swallowing problems.

Table I. The descriptive characteristics of the children (n=55)		
	Median	(25-75%)
Age (year)	3.75	2.12-5.87
WAZ	-0.68	-2.66-0.00
HAZ	-2.91	-3.90/-0.86
Feeding related characteristics		
Transition time to additional food (month)	6	6-8
Transition time to solid food (month)	8.5	8-12
Duration of mealtime (min)	27.5	14.75-30.00
Number of meals	4	3-5
Initial teething time (month)	8	7-12
Number of teeth	15	9-19
Food consistency		Number (percentage)
Liquid intake	55 (100%)	
Viscous intake	55 (100%)	
Puree intake	28 (50.9%)	
Solid intake	15 (27.3%)	
Sex		
Female	23 (41.8%)	
Male	32 (58.2%)	
GMFCS		
Level 1	12 (21.8%)	
Level 2	11 (20.0%)	
Level 3	9 (16.4%)	
Level 4	8 (14.5%)	
Level 5	15 (27.3%)	
Type of cerebral palsy		
Unilateral spastic	29 (52.7%)	
Bilateral spastic	26 (47.3%)	
KCPS		
Level 0	14 (25.5%)	
Level 1	5 (9.1%)	
Level 2	9 (16.4%)	
Level 3	12 (21.8%)	
Level 4	15 (27.3%)	
WAZ: Weight-for-age Z-score, HAZ: Height-for-age Z-score		

Table II. The Turkish Feeding/Swallowing Impact Survey scores of those mothers of children with and without chewing dysfunction

Turkish Feeding/Swallowing Impact Survey	Mothers of children with chewing dysfunction		Mothers of children without chewing dysfunction		p-value
	Median	(25-75%)	Median	(25-75%)	
Daily activities (1-5)	3,440	2.15-3.90	1	1-1	<0.01
Worry (1-5)	3.43	1.92-4.57	1	1-1.57	<0.01
Feeding difficulties (1-5)	2.50	1.66-3.37	1	1-1.17	<0.01
Total (1-5)	3.00	2.24-3.85	1	1-1.28	<0.01

Table III. The mothers' responses for each question of the T-FS-IS

Turkish Feeding/Swallowing Impact Survey	Mothers of children with chewing dysfunction	Mothers of children without chewing dysfunction	p-value
In the past ONE month, as a result of your child's feeding/swallowing problems, how often have you had problems carrying out your daily activities?	Median (25-75%)	Median (25-75%)	
To do my job, go to school, or work around the house	3 (2-5)	1 (1-1)	0.001
To get help from others because they are scared to feed or take care of my child	3 (2-4)	1 (1-1)	0.001
To leave my child because I am scared to have other people feed or take care of my child	5 (1-5)	1 (1-1)	0.002
To make plans or go out to eat with my family	5 (3-5)	1 (1-1)	0.001
To be too tired to do the things I want or need to do.	4 (2-5)	1 (1-1)	<0.01
In the past ONE month, as a result of your child's feeding/swallowing problems, how often have you had problems with worrying?			
My child's general health	3 (1-4)	1 (1-2)	0.15
My child does not get enough to eat or drink	4 (3-5)	1 (1-1.25)	<0.01
How others will react to my child's feeding/swallowing problems.	3 (2-3)	1 (1-1.50)	0.005
How my child breathes when feeding and whether my child will choke.	3 (2-4)	1 (1-1.50)	0.001
My child will never eat and drink like other children.	4 (3-5)	1 (1-1.25)	<0.01
Whether I am doing enough to help with my child's feeding/swallowing problems	3 (1-4)	1 (1-2)	0.010
How my child's feeding/swallowing problems affect others in my family.	2 (1-3)	1 (1-2.25)	0.286
In the past ONE month, as a result of your child's feeding/swallowing problems, how often have you had problems feeding your child?			
To feed my child because it takes a long time to prepare liquids and foods the "right" way.	5 (2-5)	1 (1-1)	<0.01
To feed my child because I don't know how to prepare liquids and foods.	1 (1-4)	1 (1-1)	0.028
To feed my child because others give my child liquids or foods that are not allowed.	2 (1-3)	1 (1-1)	0.011
To feed my child because I don't know how long these problems will last.	5 (3-5)	1 (1-1.25)	<0.01
To feed my child because family members or professionals have different opinions about taking care of my child's feeding/swallowing problems.	3 (1-5)	1 (1-1.25)	0.010
To feed my child because I do not get enough information about how to get my child to eat and drink like other children.	3 (1-4)	1 (1-1.25)	0.031

T-FS-IS: Turkish Version of the Feeding/Swallowing Impact Survey

This study indicates that the mothers of children with CP who had chewing dysfunction reported greater concerns in all subscales of the T-FS-IS (daily activities, worry, feeding difficulties and the total score). Children with CP may have difficulties in chewing function (19), and this may result in a restriction in the intake of the range of food textures of which these children can safely and efficiently consume (5,19). Their diet primarily consists of liquidized or pureed food textures (5,7). Therefore, we hypothesized that chewing dysfunction would increase maternal concern, and found that the mothers of children with CP who had chewing dysfunction reported more concerns relating to feeding and swallowing problems compared to those mothers of children with CP who had normal chewing function. They reported more negative perceptions of time demands on their daily activities, worry about their child's well-being, and challenges about providing care for their feeding difficulties. There may be several reasons for this. Having a child with a chronic illness already creates a burden on the family, and accompanying problems relating to the daily care of these children brings an additional burden (20,21). The possible reasons for this may be listed as (i) the need for preparation to provide appropriate food texture for those children with chewing dysfunction, (ii) increased meal preparation time, (iii) longer meal lengths, (iv) time restrictions in daily life, (v) feeling incapable of helping their child, and (vi) negative mealtime behaviors and their consequences (i.e., choking, vomiting, crying, etc.), and (vii) being unable to fully participate in social interactions. Looking at the responses on a question by question basis, the mothers reported that they were concerned about each question regarding carrying out their daily activities. They were more worried about their child's general health, and if the child was not getting enough to eat or drink, or if the child would ever be able to eat or drink like other children. In terms of the problems regarding the feeding category, they were mostly concerned with the necessity of the longer time to prepare liquids and foods the "right" way, and not knowing how long these problems would last. These findings are also very important in allowing us to provide a definition for the effects of chewing dysfunction on mothers for clinicians.

There is relationship between chewing performance levels and all parameters of the T-FS-IS, which suggests that decreased chewing performance levels are related to higher problematic perceptions of the mothers, and increased chewing performance levels are related to

lower problematic perceptions of the mothers. This linear correlation aligns with the comparison between those mothers of children with and without chewing dysfunction. These findings are important as chewing function has been shown to be an important function not only for the children themselves but also for their parents. In addition, these results suggest that maternal concerns should be evaluated and considered during the planning of the management of chewing dysfunction.

Study Limitations

The present study also has some limitations. The number of subjects included in the groups of children with or without chewing dysfunction was not equal. A study in which these groups are homogeneous can be planned. In addition, a healthy control group could be added for comparisons to highlight the findings. Another weak point may be the evaluation of just the mothers' responses because the primary caregivers are mothers. However, the fathers' role is also very important in families, and therefore both parents could be evaluated in future study designs. In addition, the effect of chewing training programs on parental concerns could also be assessed.

Conclusion

It is important for clinicians to know if chewing dysfunction affects parents. This study suggests that decreased chewing performance levels are associated with higher maternal concerns relating to feeding-swallowing difficulties in children with CP, and those mothers of children with chewing dysfunction reported higher concerns relating to feeding-swallowing difficulties. Therefore, special attention or additional support should be given if a child with CP has problems with solid food intake/chewing, and clinicians should also consider the quality of life of these mothers during the management of chewing dysfunctions.

Ethics

Ethics Committee Approval: This study was approved by the Non-invasive Clinical Research Ethics Committee of the Hacettepe University (approval number: GO21/206, approval date: 23.02.2021).

Informed Consent: A written informed consent form in accordance with the Declaration of Helsinki was obtained before enrollment.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: S.S.A., N.D., A.A.K., Design: S.S.A., N.D., A.A.K., Supervision: S.S.A., N.D., A.A.K., Data Collection and/or Processing: S.S.A., N.D., Analysis and/or Interpretation: S.S.A., N.D., A.A.K., Literature Search: S.S.A., Writing: S.S.A.

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