

**IDENTIFICATION OF OROMOTOR IMPAIRMENTS
PERCEIVED BY PARENTS RELATED TO FEEDING
DIFFICULTIES IN CHILDREN WITH CEREBRAL PALSY**

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ABSTRACT

One hundred and twenty two parents of children with cerebral palsy (CP) were participated in the study. The average age of children with CP in this study was 9.4 years with a range of 3-15 years. Majority of the children were male, representing a male to female ratio of nearly 3:1. Feeding problems observed in participants included sucking and swallowing problems, inability to self-feed, inadequate feeding skills, regurgitation, coughing and choking during feeding, recurrent chest infections, oral motor dysfunction, vomiting, cry/extensor dystonia during feeding, drooling, hypertonic tongue and inadequate tongue lateralization. Feeding problems were present in all sampled children. Prevalence of feeding problems was high in this study in contrast to another report which may be attributed to poor developmental age of our cases. In spite of environmental circumstances, cultural barriers and level of priority given to feeding, careers of a disabled child living in Pakistan, who have minimal formal education and live in abject poverty, are able to change care-giving practices significantly as a result of training with positive consequences for both child and caregiver. Further training is necessary for

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professionals who work with children in CP to enable them to fully understand the complexity of the disorder, as well as to update knowledge about current dietary interventions related to oromotor impairments and related research.

Key Words: Cerebral palsy, Oromotor impairments, Feeding difficulties, Dysphagia, Swallowing problems

I.Introduction

1.1 Background of the Study

Cerebral Palsy (CP) is an umbrella term used to describe a group of non-progressive motor impairment syndromes caused by lesions or anomalies of the developing brain, arising before, during or after birth. These syndromes are characterized by the dysfunction of movement, posture and muscle tone. Cerebral palsy is usually accompanied by sensory deficits, learning disabilities, behavioral disorders and seizures (Del Giudice, 1997; Stanley *et al.*, 2000). The likelihood and severity of associated disabilities increases with the increasing severity of the motor impairment (Stanley *et al.*, 2000). The degree of independence in activities of daily living is determined by the severity of the impairments, the amount of rehabilitation the child has / is receiving and the way in which the child is supported by their caregiver. The load on the caregiver likewise depends on the first two factors.

Cerebral palsy is usually classified using clinical descriptions of the type of muscle tone, bodily distribution and severity of the motor impairment. The most commonly used categories to describe type are spastic, athetoid, dystonic and hypotonic; the first being the most common. In terms of topography, the four commonly occurring distributions of cerebral palsy are quadriplegia, depicting the involvement of all limbs; diplegia, which describes the involvement of the lower limbs predominantly; and left/right hemiplegia, where one side of the body only is affected, with the upper limb usually more affected than the lower. In its mild presentation, an individual with Cerebral Palsy will be fully independent, in contrast to an individual with severe CP, who will be dependent on others for all aspects of daily living.

Global figures state that 2-2.5 in every 1000 children is born with CP, with additional numbers developing the condition in the early years of life (Stanley *et al.*, 2000). Risk factors pertaining to situations of poverty, such as low birth-weight, can increase this figure to as much as 50-60 per 1000 infants (Sullivan *et al.*, 2000). In Pakistan, national statistics regarding children with cerebral palsy are not available.

Researchers from the Centre for International Health and Development (UCL Institute of Child Health) have investigated the nutritional status of disabled children in Nigeria (Thompsett *et al.*, 1999), The Philippines (Socrates *et al.*, 2000) and India (Yousafzai *et al.*, 2003a, 2003c). These studies identified that children with CP were significantly less nourished than their counterparts in the West and also scored significantly below their siblings and neighbours in weight and height. They related these problems to feeding difficulties and concluded that there was an urgent need to address these issues.

Feeding difficulties in children with CP have been identified as a major factor associated with both growth failure and nutritional deficits (Shapiro *et al.*, 1986, Gisel and Patrick, 1988; Thommessen *et al.*, 1991a, 1991b, 1991c; Stallings *et al.*, 1993a, 1993b, 1996; Dhal *et al.*, 1996; Troughton and Hill, 2001; Fung *et al.*, 2002) and have been cited as one of the most powerful prognostic factors for survival (Eyman *et al.*, 1990 cited in Sullivan and Rosenbloom, 1996; Strauss *et al.*, 1998; Reddihough *et al.*, 2001). Despite the fact that many studies not only identify the co-existence of malnutrition and feeding difficulties, but also observe associations between degree of feeding disability and the level of malnutrition, some researchers have remained sceptical of a causal link between the two, suggesting that poor growth and undernutrition may rather be due to unusually high energy needs in children with spasticity or athetosis, leading to inadequate nutritional levels being achieved (Shapiro *et al.*, 1986; Dahl *et al.*, 1996). Stallings *et al.*, (1996) showed however, that energy requirements for the 61 children with SQCP in their study were reduced in all areas (resting energy expenditure, physical activity, and total energy expenditure) and far less than those required for non-disabled children of a similar size.

‘Feeding’ is a complex activity which is divided by clinicians into five phases. The first is the *pre-oral phase*, which involves getting food/drink to the mouth and therefore necessitates the

appropriate gross motor skills for this. This is followed by the *oralphase*, which involves manipulating food/drink in the mouth and pushing it back ready to be swallowed, therefore requiring adequate lip closure, tongue and jaw movement. The *pharyngeal phase*, or the 'swallow', involves a series of mechanical adjustments triggered by sensory stimuli to ensure that the airway and nasal cavities are protected and that food/drink passes into the oesophagus without being aspirated or nasally regurgitated. The *oesophageal phase* refers the food/drink moving down through the cardiac sphincter into the stomach. Feeding therefore requires a complex combination of sensory and motor abilities and is consequently affected by impairments in this area. Swallowing itself necessitates the use of 31 pairs of striated muscles and is susceptible to problems at all levels of the central nervous system.

Children with CP can have difficulties at all stages of eating and drinking. The most commonly reported problems in the literature include difficulties with self-feeding, chewing and swallowing (Suzuki *et al.*, 1991; Field *et al.*, 2003; Sullivan *et al.*, 2000). Other issues outlined by Reilly *et al.* (1995) include food refusal, lack of initiation to take food offered, problems with biting and sucking, drooling, food/fluid loss during feeding, and sequencing and rhythmicity difficulties.

1.2 Previous Work:

Pakistan, as in other social sectors is a late starter in the field of special education also. Systematic data concerning these and other problems in this population are lacking. Considering this fact, the study investigated the oromotor impairments among children with cerebral palsy which create feeding difficulties.

1.3 Justification/Scope:

The focus of the study was to:

- Identify oromotor impairments in children with CP which are causing feeding difficulties.
- Measure the differences which are associated with oromotor impairments and consequently creating feeding difficulties in different types of children with CP.
- Measure the consequences of oral-motor impairments which effect parents' daily life.

1.4 Objectives

The primary objective was to determine which factors influence the dietary intake and consequently the nutritional status of children with CP. This study gathered information about the following common feeding problems and health related issues in children with CP:

- Selective eating habits
- Limited variety in diet
- Difficulty accepting new foods (neophobia)
- Anxiety around eating
- Difficult behavior during mealtimes
- Family stress due to the problem

Limitations

The target population for the study was children with moderate-severe cerebral palsy (CP) living in the cosmopolitan city of Karachi. Limitations of this study include sample sizes, question wording and accuracy of the measurement methods of oromotor impairments. Thus the results cannot be extrapolated to the entire cerebral palsy community. This study was partially based on qualitative data and therefore there is a need to repeat the study on a specific quantified population, and ideally do case-control studies to comparing children with CP to children with typical development. It would be useful to directly observe the study population and have in-depth interviews with parents and caregivers to clarify some of the perceptions expressed in these findings. Finally, the information gathered in this study by the investigator was still useful to determine feeding difficulties of cerebral palsy children related with oromotor impairments.

II. Research Methodology

2.1 Sampling

The total study population consisted of 122 participants with a response rate of 82% therefore the sample population was statistically significant. Simple random sampling was used. The following inclusion and exclusion criteria were applied:

Inclusion criteria

1. Parents/ caregivers of children formally diagnosed with CP

2. Parents and caregivers of children aged 3-16 years
3. Both male and female participants
4. Members of school's PTA
5. Residing in Karachi

Exclusion criteria

6. Parents/ caregivers of children aged 3-16 years who have not been formally diagnosed with CP
7. Parents/ caregivers of children with CP who are not going to school
8. Parents/ caregivers who reside in violence prone areas
9. Parents/ caregivers of children with ASD who do not agree to take part in the study

2.2 Instruments

The following instruments were used by the investigator for collection of data:

- Case History
- Nutritional Perception Assessment
- Parenting Stress Index-Short Form

Case History is the first step of assessment. It was used by the investigator to collect maximum information of the children. It involved completing a biographical form that included such diverse information as the child's birth and development history, illness, medication taken, scores on Adaptive Behavior Scale and adjustment to school and home.

The instrument for '**Nutritional Perception Assessment**' was developed by the investigators which based on the Behavioral Pediatric Feeding Assessment Scale (BPFAS). The purpose of the tool was to evaluate the feelings of parents regarding feeding their child and their nutritional knowledge and confidence. Thirty questions were developed by the researcher and separated into four constructs:

- Questions asked parents about their own personal nutritional knowledge and whether they felt confident about it.
- The Nutritional Status of the Child construct addressed how parents felt about their child's nourishment and weight.
- The Nutritional Knowledge Sources section aimed to identify where participants were obtaining their nutritional knowledge.
- The final section addressed Child Feeding Behaviors.

The Parenting Stress Index-Short Form (Abidin, 1995) is a 36 item questionnaire to measure parenting stress in a quick and concise manner. The Parenting Stress Index-Full Version was first developed in 1976 based on the theoretical model that parental stress is based on noticeable child characteristics, parent characteristics, and situational variables of the role of being a parent. These items were chosen based on a factor analysis in which three sub-groups were found. These are parental distress, parent-child dysfunctional interaction, and difficult child. The short form is designed to take around 10 minutes to complete for parents of children 0 years to 12 years of age. Scores range from 36 to 180 with higher scores correlating to more stress.

2.2 Procedure

The investigator contacted the principals of special education centers to obtain permission in order to recruit participants. The introductory letter's page of the study explained the aims of the study and then directed respondents to the *informed consent* form. All the relevant information about the study was provided in the informed consent form, including the aim and purpose of the study and how the data will be used in the future. It was specified that the questionnaire was aimed at parents/caregivers who have children with CP aged 3-16 years and living in Karachi. Parents/caregivers then had to decide if they were willing to participate in the study. Parents/caregivers who decided to participate in the study had three options in completing and returning the questionnaire to the investigator:

1. Completing the informed consent form and survey by him/herself and then returning the completed questionnaire
2. Requesting an interview session

3. Requesting help from class teacher

Majority of the participants chose to complete the questionnaire in an interview session. The researcher did have only 22 acceptances to fill in questionnaire in a self-reported style. In order to obtain a representative sample, it was decided during the planning of the research to seek help from principals for conducting interview or collection of questionnaires until the required number of participants was obtained. However, after three months, the researcher found that the response rate was very slow and not sufficient for the study to be statistically significant. The researcher then made personal contacted to all participants via email, telephone or in person to raise awareness of the study and to ask for participation of those meeting the inclusion criteria. Following this process, the data collection timeframe was extended, and the participation increased significantly to exceed the target of minimum 50 completed questionnaires. There were 175 study participants and 122 completed all sections of the questionnaire.

2.3 Analysis of Data

The researcher compiled a Microsoft Excel (2007) spreadsheet numbered according to each completed questionnaire and divided into categories by allocating values for each question. Qualitative data was summarized according to the main themes and was reported in the results section of this thesis. Distributions of variables were presented with frequency tables. Medians or means were used as the measures of central location for ordinal and continuous responses and standard deviations and quartiles as indicators of spread.

III. Findings

3.1 Clinical Information

One hundred and twenty two parents / caregivers participated in the study if their children were diagnosed with CP and aged 3-15 years. The average age of children with CP in this study was 9.4 years (Table 1).

Table 1: Age Range (in years) of the Participants (n=122)

Age (in years)	No. of Children	Percentage
3	4	3
4	7	6
5	7	6
6	10	8
7	12	10
8	10	8
9	15	13
10	9	7
11	9	7
12	11	9
13	12	10
14	9	7
15	7	6
Total	122	100

*Percentages reported as whole numbers

Seventy four percent of children were male (n=90) and only 26% female (n=32), representing a male to female ratio of nearly 3:1.

Table 2: Gender of the Participants

Gender	No. of Children	Percentage
Male	90	74
Female	32	26
Total	122	100

*Percentages reported as whole numbers

The majority of children (71%, n=87) had a diagnosis of spastic (pyramidal) cerebral palsy in which their muscle tone is increased. As a consequences, the muscles of that group of children

were stiff (spastic) and physically their movements were jerky or awkward. Twenty three percent (n=28) had athetoid cerebral palsy and they have uncontrolled movements that were slow and writhing. Finally, only 6% (n=7) sampled children had balance and coordination problems (ataxic cerebral palsy). The athetoid and ataxia are also classified as dyskinetic or extrapyramidal type of cerebral palsy.

Table 3: Type of CP among Participants

Diagnosis	No. of Children	Percentage
Spastic (pyramidal)	87	71
Dyskinetic (extrapyramidal)		
1. Athetoid	28	23
2. Ataxia	7	6
Total	122	100

*Percentages reported as whole numbers

The part of body affected in cerebral palsy was determined by the physician's medical diagnosis documented in school's record, which includes CP Tetraplegia, CP Hemiplegia, and CP Diplegia. A higher percentage of CP Tetraplegia (45%, n=54), followed by CP Hemiplegia (39%, n=48) were found in this sample, with a lower percentage (16%, n=20) of CP Diplegia diagnoses. Table 6 summarizes the frequency of each medical diagnosis for children in this sample.

Table 4: Medical Diagnosis

Medical Diagnosis	No. of Children	Percentage
CP Tetraplegia	54	45
CP Hemiplegia	48	39
CP Diplegia	20	16
Total	122	100

*Percentages reported as whole numbers

3.2 Specific Feeding Difficulties

The difficulty reported by the parents about children's feeding ability to swallow shows in Table 5. In sum, majority of the children (20%, n=24) had difficulty in getting food off spoon with lips, followed by children were take long time to swallow bites of food (18%, n=22) and during meal their food and liquids leak out of corners of mouth (16%, n=20). Only four percent parents reported that their children's food and/or liquid gone while six percent mentioned that children either coughs when receiving liquids (water/milk/juice) or was press tongue forward when swallowing.

Table 5: Frequency of Specific Feeding Difficulties

Feeding Difficulties	No. of Children	Percentage
Has difficulty in getting food off spoon with lips	24	20
Takes long time to swallow bites of food	22	18
Food and liquids leak out of corners of mouth	20	16
Food gets stuck in gums	17	14
Swallows large pieces of food without chewing	11	9
Chokes on food	9	7
Coughs when receiving liquids	7	6
Presses tongue forward when swallowing	7	6
Food and/or liquid goes	5	4
Total	122	100

*Percentages reported as whole numbers

Findings suggested that there were hug differences between participants in relation to feeding skills and food refusal. The positive response rate which is in percentage rated as low scored item. Ninty percent (90%) parents were conscious about feeding problems of their children with

CP. Ten per cent did not perceive feeding as a significant problem but on observation by the investigator even these children were also found to have feeding problems (Table 6).

Table 6: Feeding Problems Reported by Parents

Feeding Problems	Reported by parents (Percentage)
1. Lacking self-feeding	90
2. Improper tongue lateralization	84
3. Problems in chewing	81
4. Problems in swallowing	63
5. Show choking/cough during feeding	62
6. Fail to control drooling	52
7. Tongue is hypertonic	43
8. Does not take solid food	33
9. Limited temporo-mandibular movement	29
10. Constipation	25
11. Chest infections	23
12. Problem in sucking	23
13. Nausea/vomiting	23
14. No closure of lips around spoon	20
15. Inappropriate mouth opening	14
16. Cry during feeding	10

*Percentages reported as whole numbers

3.3 Feeding and Nutritional Perception Assessment

Table 7 shows parental perceptions of their nutritional knowledge. Majority of the parents (72% of 88 parents) agreed or strongly agreed about they felt confident in their nutritional knowledge. Similar trend was appeared where 75% of parents (N=92) were agreed to have confident about where they obtain their nutritional knowledge. Seventy six percent (76%) of parents showed

disagreement and accepted that they are seriously lacking basic nutritional knowledge. Majority of them needed to obtain more knowledge about nutritional affairs. It was alarmingly to saw that majority of the parents (74%) had not consult with a qualified dietitian for their child.

Table 7: Responses to Knowledge about Nutrition

Nutritional Knowledge	Disagree	Neutral	Agree
1. Feel confidence about nutritional knowledge	12%	16%	72%
2. Feel confidence about where to obtain nutritional knowledge	10%	15%	75%
3. Serious lack in basic nutritional knowledge	76%	10%	14%
4. Feel to have nutritional knowledge needed to care for child	14%	14%	72%
5. Willing to obtain nutritional information	8%	19%	73%
6. Have consult a dietitian in hospital for child	74%	4%	22%

*Percentages reported as whole numbers

Parent perceptions about nutritional status of their child are present in Table 8. Sixty three (63%) parents were confident about that their child was well-nourished. Thirty six (36%) were indicated that their child was indeed getting adequate vitamins and minerals. Remaining 19% were showed neutral response. Seventy (70%) parents reported that their child was overweight. Seventy four percent of parents reported that their child was getting enough to eat and 68% parents showed disagreement.

Table 8: Responses to Nutritional Status of Child

Nutritional Status of Child	Disagree	Neutral	Agree
7. Believe that child is well-nourished	26%	11%	63%
8. Do not agree that child is currently taking	36%	19%	45%

sufficient amount of vitamins/minerals			
9. Concerned about the nutritional status of child	24%	9%	67%
10. child is not overweight	23%	6%	71%
11. Believe that child is getting enough to eat	13%	13%	74%
12. Refuse to accept child's obesity	68%	6%	26%
13. Child is underweight	87%	9%	4%
14. Medication(s) influences on child's nutritional status	36%	38%	26%

*Percentages reported as whole numbers

Table 9 presents parents' perceptions related to child feeding behaviors. Seventy (70%) parents were disagreed that their child's feeding behaviors influence nutritional status. Fifty percent parents felt that it is inappropriate for their child to eat alone and not join others at the table. Forty two percent reported to feel frustration at meal time, while 58% of parents disagreed to feeling stressed when feeding their child. Almost all parents (98%) disagreed that their child creates mess at meal time. Also, 42% of parents were not worried about that their child is not eating at school. Sixty seven percent (67%) agreed that their child refused to try new foods and 53% agreed that their child misbehaves because s/he does not like presented food.

Table 9: Responses to Child Feeding Behaviors

Child Feeding Behaviors	Disagree	Neutral	Agree
Child's feeding behaviors influence his/her nutritional status.	70%	7%	23%
Do not feel it is inappropriate for child not to join other family members at dinning time.	50%	14%	36%
Never get frustrated when trying to feed child.	58%	16%	26%

Child throws food at meal time.	98%	–	2%
Not worried that child is not eating at school.	42%	30%	28%
Child refuses to try new food items.	28%	5%	67%
Feel anxiety when feeding child.	58%	16%	26%
Child misbehavior is due to disliking the food presented.	47%	26%	47%

*Percentages reported as whole numbers

According to Table 10 the majority of the parents were not able to identify the factors that need to be taken into consideration when feeding a child with CP. This is alarming and very negative, which cannot be helpful to maintain oral feeding.

To determine the parents' reported practices in the management of oromotor impairments in children with CP, the participants were asked to indicate, whether different consistencies affected the ease of swallowing, and which consistencies they considered to be the easiest to swallow for a child with CP.

Ninety percent (90%) of the participants indicated that the different consistencies affected the ease of swallow. However, the parents were not always familiar with the type of consistencies that would be easier for the child to swallow. Table 36 presents the parents' perceptions of the ease with which children with CP could swallow certain consistencies.

Table 10: Parents' Perceptions of the Degree of Difficulty with which Children with CP Swallow Various Food Consistencies (n=122)

	Percentage of Responses				
	Easy to	Fairly	Difficult	Very	Impossibl

	swallow	easy to swallow	to swallow	difficult to swallow	e to swallow
Thin liquids	43%	27%	18%	10%	2%
Thick liquids	34%	44%	17%	3%	2%
Purees	12%	40%	23%	15%	10%
Soft solid food	14%	13%	46%	15%	12%
Crumbly food	13%	20%	25%	27%	15%
Mixed consistency food	10%	25%	25%	20%	20%
Sticky food	6%	17%	30%	40%	7%

*Percentages reported as whole numbers

Pureed food is usually easier for a child with CP to swallow than liquid because it can maintain its shape in the mouth and stimulate the swallow. As present in Table 33 the majority of the parents found that (12% easy to swallow plus 48% fairly easy to swallow) children with CP were able to swallow purred food easily. It is apparent that the parents were unsure which consistencies are overall the easiest consistencies for children with CP to swallow, as only 14% of the parents indicated that the soft food was easy to swallow. The responses in the same table were also evenly distributed across the Likert scale. A similar result was found regarding the parents' perceptions of the ease with which children with CP swallowed food of a mixed consistency. From the table it is apparent that 35% (10% easy to swallow plus 25% fairly easy to swallow) of the parents found that food with a mixed consistency is easy for a child with CP to swallow.

Table 11 gives details of the incidence of some of the more common deprivations mentioned by parents. Lack of energy was a major problem for mothers, with almost half the group sustaining some loss. Generally, mothers acknowledged the existence of, but did not resent, this hardship; for instance, one mother commented: 'Sometimes I get wearied out looking after him, but I would want to be caring for him myself. It would be a lot harder for me if I wasn't caring for him. I would worry more. I just love him and like doing things for him.'

Table 11: Parents Experiencing Hardship Due to CP Child

Hardship	Mothers	Fathers
Less energy	44	8
Less spare time	34	13
Less fun in life	32	17
Less spare time with spouse	24	17
Less money to spend on self	20	11

Similarly, about a third of the mothers, but only a small number of fathers, acknowledged that they had less spare time and less fun in life because of the illness. One mother described it this way: 'Whenever you go out he's always on your mind, and you wonder if you do go out will they cover him and keep him dry and make sure he comes to no harm.' In the same vein, a father remarked: 'Certainly we have less fun in life, because even if you're out you wonder how he's getting on, is he sick tonight or coughing.' However, most parents adapted to the disability and found that, despite it, they could still lead something approximating to a normal social life. Illustrating this, one mother confided: 'When we thought about him at first, we felt we could never be happy again. We wanted him so much—but it is amazing how you adapt to these things.'

The parents' awareness of the symptoms of oromotor impairments related with feeding difficulties in children with CP was inconsistent. The majority of the parents were aware of the more visible symptoms of oromotor difficulties such as difficulties starting the swallow, lengthened mealtime and weight loss. It is, however, of concern that not all of the parents were

aware that symptoms such as coughing before, during and after the swallow and the presence of pneumonia are the possible symptoms. These symptoms are, however, insufficient for the identification of feeding difficulties faced by children with CP and the more subtle symptoms of oromotor impairments, such as changes in voice, also need to be taken into consideration.

Obviously, as with any other regular commitment, treatment can tax the strength and coping abilities of the parents concerned. More subtle difficulties may arise, however. For example, by accepting full responsibility for the child's daily care, parents may feel implicated in the disability outcome, and if the child fails to thrive despite their endeavors they may feel doubly guilty. Some parents, despite full intellectual understanding of the necessity for constant care, and apparent acceptance of the task may find difficulties in complying with the required regime. Their consequent sense of guilt may produce tensions in relationships with other caring personnel. Similarly, some parents may become disturbed because they feel they are adding to their child's distress, and they may thus be tempted to withhold the therapy. Equally, where treatment becomes the focus for the expression of the child's more general resentment, insecure parents may seek to end it, being unwilling to accept and cope with their child's hostility. As a result, in many families, treatment may evoke very mixed emotions and some ambivalence, being regarded as a double-edged sword—both useful and distressing.

IV. Conclusion

The issues for feeding difficulties in children with cerebral palsy and their carers are universal and common themes exist for both, regardless of availability of resources, education, socioeconomic circumstances or culture. The five key issues are as follows:

1. Deficiencies in diet and underfeeding.
2. Inappropriate food consistency, increasing the risks of aspiration and reducing nutritional intake.
3. Inappropriate positioning, increasing the risks of aspiration and limiting the child's skills of independence.

4. Unresponsive and insensitive feeding practices.
5. Inadequate fluid intake.

In spite of environmental circumstances, cultural barriers and level of priority given to feeding, careers of a disabled child living in Pakistan, who have minimal formal education and live in abject poverty, are able to change care-giving practices significantly as a result of training with positive consequences for both child and caregiver.

The prevalence of oromotor problems in children with CP needs further investigation with large case-control studies. It would also be interesting to investigate whether children with CP have a higher incidence of food allergy/ intolerance than in the general population. Assessment of nutritional status in children with CP should be assessed using anthropometric parameters, biomarkers and clinical parameters.

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