

RESEARCH REPORT

PREVALENCE OF FUNCTIONAL FEEDING PROBLEMS IN CEREBRAL PALSY CHILDREN OF KARACHI

ABSTRACT

BACKGROUND AND AIMS

Cerebral palsy is a neurodevelopmental disability that not only affects sensory, motor or cognition domains but also oral motor area that may lead to difficulties in eating, chewing, swallowing, sucking or drooling etc. Therefore, this study aims to determine the prevalence of functional feeding problems in CP children of Karachi to evaluate their needs of feeding and role of rehabilitation regarding it.

METHODOLOGY

The cross-sectional survey was conducted on Cerebral Palsy children aged between 6-12 years with the number of participants n=40, recruited through the non-probability sampling technique. The data was collected through Functional Feeding Assessment Scale (FFA) taken from Multi-disciplinary Feeding Profile (MFP).

RESULTS

A sample of 40 participants with Cerebral Palsy were enrolled in the study. This consisted of 8 boys and 32 girls with mean age 8.67 ± 1.93 years. It was showed that participants have an average score in all domains of Functional Feeding as the oral motor area is affected due to Cerebral Palsy.

CONCLUSION

It was concluded that CP children suffer from a number of functional feeding problems that may lead to poor nutrition, loss of appetite and decreased quality of life. The large scale surveys are recommended for the identification of feeding problems in CP using standardised tools.

KEYWORDS

Cerebral Palsy, Diplegic, Feeding, Oral-motor, Management, Rehabilitation.

Mah-e-liqa Qureshi

Occupational Therapist
Department of Occupational Therapy
Centre for Autism Rehabilitation and
Training, Sindh, Karachi.
maheliqa_qureshi@hotmail.com

[Qureshi M, Prevalence of Functional Feeding Problems in Cerebral Palsy Children (aged 6-12) years of Karachi. Pak. j. rehabil. 2020;9(1): 11-16]

INTRODUCTION

Cerebral Palsy (CP) is defined as the most common developmental disability estimated from 1.5 to more than 4 per 1,000 children of a defined age range¹. CP is caused due to non-progressive brain lesions based on neuromuscular movements, causing functional limitations. The onset occurs at birth and persists throughout the lifespan². The symptoms may include increased or fluctuating muscle tone, hyperactive/exaggerated reflexes, decreased muscle coordination, involuntary movements and difficulties in walking, hand use, eating, excessive drooling, and speaking - making it the most common cause of severe motor disability among children^{3,4}. Moreover, other disabilities like seizure disorders, mental retardation or learning disabilities often co-occur with CP⁵. In addition, due to fine or gross motor involvement, CP children frequently have oral-motor involvement that may include dysphagia of either type i.e. oral, pharyngeal or esophageal which may result in speech impairment, inadequate appetite and nutrition⁶⁻⁷.

A number of studies suggested that the oral-motor dysfunction, subsequently with feeding problems has been observed in up to 90% of preschooler mild CP children that showed evidence of oral-motor involvement and reduced functional feeding skills⁸. Furthermore, the prevalence of feeding problems in CP children appears to be positively correlated with the disorder's severity and extent of motor involvement. The disease may affect oral motor skills, speech delay, difficulties with swallowing and sucking or drooling etc.¹⁻⁴. Moreover, as the oral motor function progresses, it causes retardation and adverse consequences on physical and social health^{3,5}. However, the pathogenesis of neurological lesion causing feeding problem is still unknown^{4,5}. Breathing is inhalation and exhalation while aspiration is inhalation of foreign body into lungs that can cause adverse pulmonary conditions⁶⁻⁷. Moreover, it also causes loss of appetite and stressful meal time as one cannot take food to the mouth, although the severity of these problems differ in individuals with lack of sensorimotor, fine and gross motor coordination and cognitive deficits⁷⁻⁸. The feeding problems have a clinical significance that may influence the activities of daily living because the dysfunction can lead to progressive abnormalities if not addressed early. According to a study, the feeding problem causes difficulty in swallowing and chewing, and ultimately leads to excessive saliva formation, known as drooling that leads to pneumonia and untidiness of mouth⁹⁻¹⁰.

A number of studies revealed that oral-motor exercises are effective in reducing feeding problem through active and passive exercises and sensory applications that increase stability and endurance of smooth muscle fibers¹¹. Moreover, these exercises provide sensory input that enhances the feeding mechanism as well as mouth control.¹² Whereas, electrical stimulation and vibration may also normalise oral motor mechanism. Although these

treatment strategies are most commonly applied by PT's, OT's and other healthcare providers, a debate exists regarding the effectiveness of these exercises¹³. Despite the severity of problems, prolonged feeding disorders result in a cascade of negative effects that may result in physical, emotional and cognitive development¹⁴. A study reported that feeding difficulties in children with moderate to severe CP, resulted in a poor nutritional status and health¹³⁻¹⁴. As a result, these children are at a high-risk of developing feeding and swallowing disorders that may have significant health implications including inadequate caloric intake and acute or chronic state of malnutrition¹³⁻¹⁵. In addition, children with CP face difficulty in achieving a nutritional intake that is sufficient to sustain a normal growth due to communication difficulties that inhibit requests for food, impaired expressions of food preferences, poor self-feeding skills and varying degrees of oral-motor dysfunction. Further complications may include aspiration of food and gastro-esophageal reflux affecting up to 75% CP children. It has been proven by studies that malnutrition in CP individuals is the most important thing to consider as that of poor, fine and gross motor and cognitive function since a proper diet is required for health. However, limited studies are available to evaluate the rate of prevalence in feeding problems and interventions addressing it therefore, this study aims to determine the prevalence of functional feeding problems in CP children of Karachi to evaluate their needs of feeding and the role of rehabilitation regarding it. The multidisciplinary team should make a strategic plan to provide professionals on a location basis so there will be teaching support for children²⁶. As far as clinical measures regarding the pediatric oral motor feeding assessments tools is concerned, 12 assessment tools were identified including evaluating and screening of oral motor feeding problems and observing the feeding process. Most of the assessments were made for the children with developmental disabilities²⁸.

METHODOLOGY

Study Setting

Data was collected from special educational institutes, as well as primary and tertiary care centres of Karachi.

Target Population

Cerebral Palsy children aged 6-12 years.

Study Design

Cross-sectional study.

Duration Of Study

6-8 months.

Sampling Technique

Non-Probability Convenience Sampling Technique.

Sample Size

N=40.

**Sample Selection
Inclusion Criteria**

Spastic Diplegic Cerebral Palsy children aged 6-12 years with a mild to moderate condition classified according to Gross Motor Function Classification System Level were included.

Exclusion Criteria

Parents/guardians who refused the participation of their child, and children with severe conditions or secondary complications were excluded.

Data Collection Procedure

Data was collected from special educational institutes and rehabilitation departments of tertiary care hospitals from Karachi. All the subjects with diagnosed Cerebral Palsy with respect to inclusion criteria were recruited through the convenience sampling technique. Before the assessment, the participants' primary caregivers were provided with informed consent in order to provide detailed information about the study. Followed by the consent, functional feeding problems were assessed by using the Functional Feeding Assessment scale (FFA) taken from the Multi-disciplinary Feeding Profile (MFP).

Data Collection Tool

Data was collected through Functional Feeding Assessment scale (FFA) taken from the Multi-disciplinary Feeding Profile (MFP). The assessment will be based on the normal and abnormal patterns in the following section such as feeding, biting, chewing, cup/straw drinking and drooling occurring during eating. These will be categorised on responses of "Adequate", "Poor", "Absent", "Unable to Determine" and "N/A" on the scale of 1-5.

Data Analysis Strategy

Data was entered on SPSS (Statistical Product and Service Solutions) software. Participant's demographic details were represented through descriptive statistics, whereas the participant's assessment of feeding problems in each of the section was represented through frequency and percentage.

Ethical Considerations

All participants were given informed consent in order to provide detailed information regarding the study. Before commencement of the study, consent was taken to proceed further. The information of all the participants was kept confidential, whereas, participants could also refuse any time to take part in the study or provide any information related to the study.

RESULTS

A sample of 40 participants with Spastic Diplegic Cerebral Palsy enrolled in the study. This consisted of 8 males and 32 females with mean age 8.67 ± 1.93 .

On the Functional Feeding Assessment scale of the Multi-disciplinary Feeding Profile, it was reported that in spoon-feeding domain of FFA, highest mean

scores of 3.08 ± 0.79 and 3.00 ± 0.84 were reported in open mouth to sight of spoon and keeping lips closed during swallowing. Abnormal patterns percentage are shown in Figure-1.

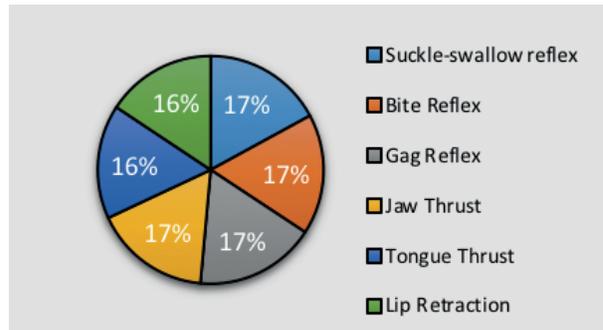


Figure.1 Abnormal patterns on spoon-feeding domain of FFA

In biting, all the participants have scored an average in all normal patterns while highest reported in exhibits controlled (graded) bite i.e. 2.73 ± 1.06 , breaks through arrowroot cookie i.e. 2.73 ± 0.90 , jaw thrust i.e. 2.90 ± 0.81 and gag reflex 2.80 ± 0.93 respectively, as shown in Figure-2.

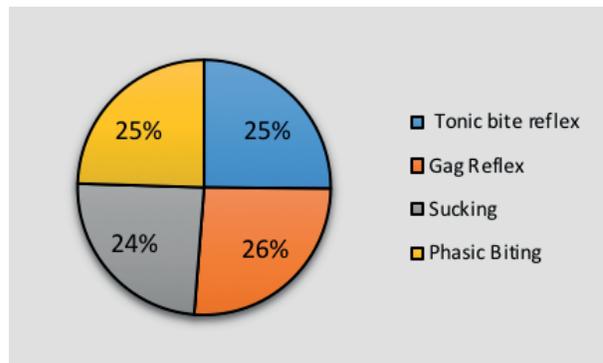


Figure.2 Abnormal patterns on biting domain of FFA

Similarly, in chewing, cup drinking and swallowing, all participants scored an average in normal and abnormal patterns with highest being reported in holds head steady, slightly forward in midline i.e. 2.90 ± 0.81 and transports solids to back of mouth i.e. straw reflex i.e. 2.90 ± 0.90 as shown in Fig-3.

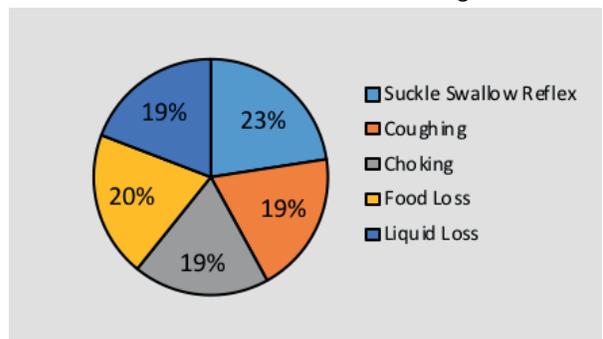


Figure.3 Abnormal patterns on chewing, cup drinking and swallowing domain of FFA

It was also showed that participants had drooling issues i.e. wet lips (28%), wet chin to overt drooling (27%), excess saliva in mouth (20%) respectively.

DISCUSSION

The findings of this study revealed that children with CP have functional feeding problems on an average with mean scores in every domain of normal and abnormal patterns. It was revealed that swallowing, biting, drinking and proper feeding skills that play an important role in children's development are impaired and may lead to secondary complications. CP is a chronic developmental disorder that severely affects motor component of an individual resulting in adverse health consequences, yet various efforts have failed to prevent its occurrence³⁻⁵. Moreover, in most of the cases, the cause of CP is unknown and prematurity remains the most common risk factor among children. Thereby, these children suffer from multiple potential disabilities⁴. However, normal development requires appropriate oral skills as well as voluntary and involuntary movements of oro-facial and tongue muscles and coordination for sucking, swallowing and chewing purposes. However, in children with CP, normal functioning of these muscles are impaired due to abnormal tension and articulation of the tongue, and palate. Moreover, the sensory defects in these areas leads to the risk of strangulation, resulting in swallowing and drooling issues¹³. Apparently, these deficits result from the impairment of the upper motor neuron, causing swallowing disorder, problems in the formation of food morsel and delayed transfer of the solid and liquid food from the oral cavity to the gastrointestinal tract.

Multiple studies have stated that various nutritional and physical factors are related to poor growth in CP that may include oral-motor impairments, incompetency in swallowing and poor nutritional status¹⁶⁻¹⁷. Further, these problems include refusal to take food, lack of initiation, biting, chewing difficulties etc. Similarly, in our study, due to the small sample size, oral dysphagia is still unexplored although it is common in children with CP that they have a problem in feeding skills based on the dysfunctions of oral-motor movement such as dysarthria, apraxia, or drooling differences. The oral dysphagia is associated with severe complications, such as pulmonary aspiration and esophagitis etc. Thus, the child will be able to refuse the food¹⁸⁻¹⁹. It was also observed that the feeding domain was not thoroughly assessed by the therapist despite the standardised tools and questionnaire. However, no satisfactory tool has been established for the assessment of dysphagia. Several studies have shown that rehabilitation of dysphagia involves multiple professions in the treatment of physically disabled children with CP or other developmental disability²⁰. Multidisciplinary orofacial therapies are also determined to be helpful in a clinical examination of dysphagia. A study conducted recently indicated that Nordic Orofacial Test-Screening (NOT-S) is a comprehensive screening method in children with cerebral palsy. It is also an effective and valuable tool for the comprehensive screening of orofacial dysfunctions.²¹ Although, feeding difficulties are increasing in cerebral palsy children with gross

motor problem and increasing age that may have an effect on physical as well as mental development²². Studies have concluded that impaired self-feeding skills are also associated with oro-facial involvement that may exacerbate growth retardation of CP children while according to some researchers, inadequate nutritional intake resulting from feeding difficulties is likely to be the main cause for the developmental delay. It has been evident that CP children with poor feeding problems have lower global health as compared to children with disorders other than CP²⁰⁻²². Therefore, a valid screening tool must be utilised for the assessment of feeding problems in children to prevent from under nutrition²³. Moreover, CP children without oral-motor involvement initially presented feeding problems but these difficulties were resolved as the children acquired more skills.

According to the neuroanatomical location of the lesion, studies have found that the severity of swallowing disorders varies in different types of CP^{13,22}. Athetoid CP had the lowest severity of problems, whereas spastic Diplegic classification is more evident. The difference is due to the severity of swallowing problems that may be related to the extent and location of the neurological lesion²⁴. In particular, CP is due to the two-sided injury of the pyramidal and extrapyramidal pathways with more damage to the corticospinal and corticomedullary pathways malfunction subsequently to more oral motor impairments and severe swallowing disorders as well as malfunctioning of the orofacial and even aspiration²³.

Despite the difficulties, early identification is necessary in life for children with oral-motor involvement that appear to persist with the development¹⁹. Therefore, large scale surveys are essential for the identification of oral motor or feeding problems in children with CP and number of trials must be conducted to determine the efficacy of multidisciplinary interventions for the management of dysphagia. Future investigations should utilise a longitudinal approach to inspect the development of feeding skills in CP children with varying degrees of oral-motor involvement.

Feeding problems are therefore crucial to investigate as they have a negative impact on the child's health and lead to a poor nutritional status and decreased quality of life. Although there are certain factors that aggravate swallowing problems in CP children with spastic and flaccid paralysis, these children have an inappropriate status while eating²⁰. Therefore, in order to have proper nutrition, it is necessary to implement appropriate intervention and strategy. A child has to sit in a knee bending position that is kneeling on the floor with head and trunk rotated in one direction (in the center of gravity), whereas the neck is slightly forwarded to allow respiratory and oral movements. Such procedures are helpful to overcome feeding difficulties in these children. However, in spastic and flaccid children, this ideal condition is always not possible due to severe respiratory problems and aspiration. Another prevalence study revealed that

36% had motor speech problems, 21% feeding disabilities, and 22% had severe drooling. It was showed that all impairments were significantly related to poor gross-motor function and intellectual impairment. Although CP children are considered for with the individualised treatment plan that constitutes the combination of interventions in multidisciplinary rehabilitation, yet provision of family centered services is important in the rehabilitation. Moreover, palliative care is not the only solution to improve the quality of life. Furthermore, in cooperation with the child, his/her family members should be involved in a multidisciplinary rehabilitation. Therefore, the multidisciplinary team of rehabilitation work can achieve the child's target or goal. Hence, it was suggested to address the needs of the disorder thereby targeting the interventions that might be helpful to reduce the symptoms, although, insufficient evidence is available to determine the role of oral motor exercises on children with sensorimotor deficits and swallowing problems²⁴⁻²⁵. Also, there are a number of limitations in this study, including a relatively less sample size and outpatient settings for the recruitment of participants. Furthermore, a time constraint also prevents to explore more in this domain. Yet, types were not investigated based on the classification of the CP as feeding problems with this regard may have varying prevalence of feeding problems in Pakistani CP children. Subsequently, certain clinical measures have been used over a period of time to assess the oral-motor dysfunction in CP children¹²⁻¹³. Multiple studies highlighted the use of standardised assessments including speech problems, chewing, and feeding, swallowing or excessive drooling³⁻⁴. Moreover, a reliable and validated questionnaire or objective measurement might be helpful to rule out the feeding problems, therefore accurate evaluation is essential. However, exact prevalence is yet to be known due to limitations of available evidences at national and international levels. Future studies might be beneficial to provide an appropriate therapeutic intervention that not only affects the quality of life of these children, but also prevents direct impact on the emotional and physical health of these children. Thus, use of standardised tools in assessment of functional feeding problems are crucial to evaluate the issues, thereby facilitating for effective treatment strategies for CP. Feeding difficulties with the involvement of oral-motor impairments that can affect chewing, food ingestion and self-feeding are most common and can be severe. These difficulties may impact the caregivers for feeding their child, it can also further reduce nutritional intake²⁷.

CONCLUSION

It was concluded that CP children suffer from a number of functional feeding problems that may lead to poor nutrition, loss of appetite and decreased quality of life. Large scale surveys are recommended for the identification of feeding problems in CP using standardised tools. Furthermore, appropriate therapeutic interventions are suggested to prevent these impairments and

facilitate healthy feeding to the children.

REFERENCES

- [1] Speyer, Cordier , Kim, Cocks , Michou, Gillan Prevalence of drooling, swallowing, and feeding problems in cerebral palsy across the lifespan: a systematic review and meta-analyses. *DMCN*. 2019 Vol. 61, Issue. 11 .1249-1258.
- [2] Omar OM, Khalil M, Abd El-Ghany HM, Abdallah AM, Omar TE. Intervention program to improve feeding, swallowing, and nutritional problems in children with cerebral palsy. *Alexandria Med J*. 2017;30(3):85.
- [3] Panteliadis CP, editor. *Cerebral palsy: a multidisciplinary approach*. Springer; 2018.
- [4] Gadow KD. *Children on Medication Volume I: Hyperactivity, Learning Disabilities, and Mental Retardation*. Routledge; 2018.
- [5] Albright IA. Profil Oral-Motor Skills Pada Pasien Cerebral Palsy Di Instalasi Rehabilitasi Medik RSUD Dr. Soetomo. 2019.
- [6] Wang L, Hou M, Jingli Ji, Liu Q. Drooling in cerebral palsy and its relationship with dysphagia and gross motor functioning. *Chinese J. Rehabilitation Med*. 2018;40(2):118-22.
- [7] Scarpato E, Staiano A, Molteni M, Terrone G, Mazzocchi A, Agostoni C. Nutritional assessment and intervention in children with cerebral palsy: a practical approach. *Int J Food Sci Nutr*. 2017;68(6):763-70.
- [8] Pinto VV, Alves LA, Mendes FM, Ciamponi AL. The nutritional state of children and adolescents with cerebral palsy is associated with oral motor dysfunction and social conditions: a cross sectional study. *BMC neurology*. 2016;16(1):55.
- [9] Dehghan L, Dalvand H, Bayani M, Shamsoddini A. Frequency of Oral Motor Dysfunction during Feeding and Some of Its Effective Factors in Children with Cerebral Palsy. *J Arak Uni Med Sci*. 2019;22(2):47-56.
- [10] Gokce S. Oral motor impairment in children with feeding disorder. *J pediatr gastr nutr*. 2016; 63(3):e40.
- [11] Arvedson JC, Lefton-Greif MA. Overview of Diagnosis and Treatment. *Pediatric Swallowing and Feeding: Assessment and Management*. 2019 26:1.
- [12] Boel L, Pernet K, Toussaint M, Ides K, Leemans G, Haan J, Van Hoorenbeeck K, Verhulst S. Respiratory morbidity in children with cerebral palsy: an overview. *Dev Med Child Neurol*. 2019;61(6):646-53.
- [13] Asgarshirazi M, Farokhzadeh-Soltani M, Keihanidost Z, Shariat M. Evaluation of feeding disorders including gastro-esophageal reflux and Oropharyngeal dysfunction in children with cerebral palsy. *JFRH*. 2017;11(4):197.
- [14] Usman H. Frequency of Feeding Problems in Children with Cerebral Palsy. *Journal of Islamabad Medical & Dental College*. 2017;6(1): 31-4.

- [15] Serel Arslan S, Demir NU, Karaduman AA. Effect of a new treatment protocol called Functional Chewing Training on chewing function in children with cerebral palsy: a double-blind randomised controlled trial. *J. Oral Rehabil.* 2017;44(1):43-50.
- [16] Awan WA, Aftab A, Janjua UI, Ramzan R, Khan N. Effectiveness Of Kinesio Taping With Oromotor Exercises In Improving Drooling In Cerebral Palsy Children. *J. Rehabil.* 2017 4;1(02):21-7.
- [17] Goday PS, Huh SY, Silverman A, Lukens CT, Dodrill P, Cohen SS, Delaney AL, Feuling MB, Noel RJ, Gisel E, Kenzer A. Pediatric feeding disorder: consensus definition and conceptual framework. *J Pediatr Gastr Nutr.* 2019;68(1):124.
- [18] Seo SM, Min KC. Systematic Review of Method for Application of Oral Sensorimotor Intervention for Feeding Disorders in Children with Cerebral Palsy. *Phys. Ther. Rehabil. Sci.* 2019;8(3):31-41.
- [19] Gutierrez GM, Siqueira VL, Loyola-Rodriguez JP, Diniz MB, Guaré RO, Ferreira AC, Santos MT. Effects of treatments for drooling on caries risk in children and adolescents with cerebral palsy. *Medicina oral, patologia oral y cirugia bucal.* 2019;24(2):e204.
- [20] Akhter N, Khan AA, Ayyub A. Motor impairment and skeletal mineralization in children with cerebral palsy. *J Pak Med Assoc.* 2017;67(2):200-3.
- [21] Gulati S, Sondhi V. Cerebral palsy: an overview. *Indian J. Pediatr.* 2018;85(11):1006-16.
Benfer KA, Weir KA, Bell KL, Nahar B, Ware RS,
- [22] Davies PS, Boyd RN. Oropharyngeal dysphagia in children with cerebral palsy: comparisons between a high-and low-resource country. *Disabil Rehabil.* 2017;39(23):2404-12.
- [23] Yi YG, Oh BM, Seo HG, Shin HI, Bang MS. Dysphagia-related quality of life in adults with cerebral palsy on full oral diet without enteral nutrition. *Dysphagia.* 2019 ;34(2):201-9.
- [24] Khamis A, Novak I, Morgan C, Tzannes G, Pettigrew J, Cowell J, Badawi N. Motor Learning Feeding Interventions for Infants at Risk of Cerebral Palsy: A Systematic Review. *Dysphagia.* 2019 8:1-7.
- [25] Cavalcante-Leão BL, Todero SR, Ferreira FM, Gavião MB, Fraiz FC. Profile of orofacial dysfunction in Brazilian children using the Nordic Orofacial Test-Screening. *Acta Odontologica Scandinavica.* 2017;75(4):262-7.
- [26] Chaplin S. Assessment and management of cerebral palsy in the under-25s. *Prescriber.* 2017 ;28(5):41-4.
- [27] Polack S, Adams M, O'banion D, Baltussen M, Asante S, Kerac M, Gladstone M, Zuurmond M. Children with cerebral palsy in Ghana: malnutrition, feeding challenges, and caregiver quality of life. *Dev Med Child Neurol.* 2018;60(9):914-21.
- [28] Barton C, Bickell M, Fucile S. Pediatric oral motor feeding assessments: A systematic review. *Phys Occup Ther Pediatr.* 2018;38(2):190-209.
- [29] Snik DA, Jongerius PH, de Roos NM, Verschuren O. Nutritional care: The 'poor child' of clinical care in children with cerebral palsy. *J. Pediatr. Rehabil. Med.* 2019;12(2):133-8.

