

## Feeding Problems and Nutritional Status in Children with Cerebral Palsy: Rehabilitation and Management Approaches - A Narrative Review

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### ABSTRACT

Feeding problems are a significant concern for children with cerebral palsy (CP). This narrative review aims to discuss the etiology of feeding problems in children with cerebral palsy (CP), including the types of CP, allied health conditions, oral motor dysfunction, severity of gross motor impairment, gastrointestinal problems, and sensory issues. It also examines the importance of nutritional status, management strategies for children with CP, and the role of caregivers in the feeding process. A comprehensive literature review was conducted to analyse and understand the feeding problems faced by children with CP, their nutritional status, and effective management and rehabilitation strategies. Studies indicate that children with CP frequently encounter feeding difficulties due to motor impairments and related health issues, requiring assistance from care givers. Proper nutrition is crucial for preventing malnutrition and enhancing quality of life. In India, there is a lack of extensive research on the prevalence, nutritional status, and management of children with CP, highlighting the need for focused studies to develop disability-sensitive health and nutrition programs.

**Key Words:** Cerebral Palsy, feeding problems, nutritional status, rehabilitation, management, care givers

### INTRODUCTION

*“Leave no one behind”*

(United Nations Sustainable Development Group, 2024)

Cerebral palsy (CP) is the most prevalent kind of motor impairment that affects a person's movement, muscle coordination, balance and posture. Cerebral refers to the brain and palsy refers to the inability to use the muscles (Birth Injury Center, 2024; Centers for Disease Control and Prevention, 2024). In high-income countries, the birth prevalence of pre and perinatal cerebral palsy is decreasing, whereas in low and middle-income countries, birth prevalence is markedly higher and the current birth rate of Cerebral palsy is 1.6 per 1000 live births in high-income countries (McIntyre *et al.*, 2022). A worldwide published literature stated that the range of CP is found to be 1.5 to 4 per thousand live births but in India, the range is larger from 2.08 to 3.88 per 1000 live births (Ramanandi & Shukla, 2022).

The common causes of cerebral palsy include maternal infections, gene mutations, fetal stroke (PLEXUS, n.d), bacterial and viral infections, low birth and premature births, multiple births, like twins, triplets or more, prenatal exposure to drugs or alcohol (Cerebral Palsy Guide, 2024), brain damage, abnormal development in the brain, brain haemorrhage, oxygen deprivation in the brain also known as asphyxia (Cerebral Palsy Guide, 2024; NIH Eunice Kennedy Shriver National Institute of Child Health and Human Development, 2021). Asphyxia is considered one of the causative factors leading to the increased risk of CP and accounts for 6-8 percent of cases. Certain factors that contribute to birth asphyxia are umbilical cord problems, excessive bleeding during pregnancy or labour, abnormal position during labour, cephalopelvic disproportion, and maternal shock (My Child at Cerebral Palsy.org, 2024). Cerebral palsy cannot be cured but can be managed by using proper resources and therapies, thereby helping the child to improve the quality of life (NEMOURS. Kids Health, 2021).

The role of a multi disciplinary team approach is essential as children with CP are associated with secondary medical conditions and this team approach will help the child to develop into productive adults (Patel *et al.*, 2020).

Physical development is impacted by feeding issues, particularly in children with cerebral palsy, for a variety of reasons, including difficulty sucking, chewing, swallowing, loss of appetite, avoidance of novel foods, and prolonged meal times. Timely treatment of feeding problems is essential to prevent growth and development retardation, which otherwise can harm morbidity and mortality. Since feeding issues are closely related to growth and development, they are considered to be more significant than other issues (Cemali *et al.*, 2023). The objective of this review is to understand the feeding problems and nutritional status of children with cerebral palsy, focusing on rehabilitation, management approaches, and the role of caregivers in improving their quality of life.

METHODOLOGY

A comprehensive search was conducted across various sources such as Google Scholar, Pub Med, Scopus, Web of Science and open-access platforms. The search prioritized studies from 2015 onwards that addressed feeding problems, nutritional status, rehabilitation, management, and caregiver roles in

children with cerebral palsy. Relevant articles were selected to provide an overview of current knowledge, key themes, and research gaps.

RESULTS AND DISCUSSION

This review examines the feeding problems in children with cerebral palsy, emphasizing their etiology, nutritional status, rehabilitation and management approaches, and the role of care givers in addressing these challenges. Addressing these challenges can guide strategies to enhance nutrition, growth and quality of life for children with CP.

ETIOLOGY OF FEEDING PROBLEMS

Feeding problems are marked by a variety of feeding or mealtime behaviours that are considered problematic for a child or family (Royals Children's Hospital Melbourne, n.d.). The prevalence rate of feeding difficulties among non-disabled children is 25 to 35 per cent, whereas in the case of children with disabilities, the prevalence rate is higher, from 40 per cent to 80 per cent (Yang, 2017). Children who suffer from cerebral palsy encounter a variety of feeding difficulties due to various factors (Aggarwal *et al.*, 2015). From the literature, factors that cause feeding problems can be identified (Cemali *et al.*, 2023). Some of the major causes of feeding problems often faced by children with Cerebral palsy are listed in Figure 1 and explained.

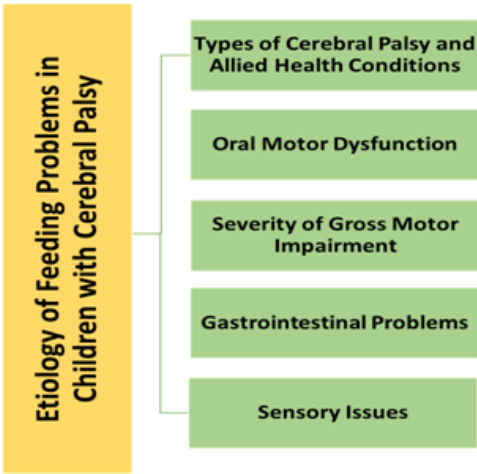


Fig. 1. Etiology of Feeding Problems in Children with Cerebral Palsy

# 1. Type of Cerebral Palsy and Allied Health

**Conditions:** There are different forms of cerebral palsy. They are spastic, athetoid/dyskinetic, hypotonic, ataxic, and mixed cerebral palsy (Birth Injury Justice Centre, 2024). Approximately 70 to 80 per cent of the cases are reported with spastic cerebral palsy (SCP) (Ozkan, 2018; Cerebral Palsy Guidance, 2024; Memorial Hermann, 2024). Due to increased muscle tone and persistent primitive reflexes, children with SCP experience poor posture and movement abnormalities, which restrict their ability to walk quickly, maintain balance, and perform specific movements(Hui *et al.*, 2024). The second most common type of cerebral palsy is Athetoid or Dyskinetic cerebral palsy (DCP) (Li & Arya., 2022) which accounts for 10-15 per cent (Dias & Dias, 2017). This type of cerebral palsy occurs due to non-progressive lesions in the basal ganglia or thalamus, or as a result of abnormal positions or movements caused by a lack of control over muscle tone or coordination (Monbaliu *et al.*, 2017). Ataxia is identified due to the dysfunctioning in coordination of goal-directed movements, causing abnormalities in trunk and gait, trembling, and slurred speech (Eggink *et al.*, 2017) and is affected by less than 5 percent (Dias & Dias 2017). Hypotonic CP is an uncommon kind of cerebral palsy that refers to weak muscle tones also known as hypotonic or

floppy muscles. (Healthline, 2024). Some people may have to face challenges and symptoms of more than one cerebral palsy, which can be termed as mixed cerebral palsy (PLEXUS, n.d; Cerebral Palsy Guidance, 2024) Most often it is a blend of spastic and dyskinetic cerebral palsy (Cerebral Palsy Guidance, 2024) and its about 15.4 per cent (PLEXUS, n.d; Cerebral Palsy Guidance,2024). Children with CP are also affected by other developmental disabilities such as epilepsy, linguistic, hearing and vision impairments, behavioural issues and intellectual disabilities. Studies based on demographics reported the percentage of intellectual disability varies from 31-65 percent and 20-46 per cent of children with CP have epilepsy issues (Ferluga, 2013; Pakula *et al.*, 2009). Based on the severity of neurological impairments and lower intelligence quotient, the prevalence of under nutrition also increases with advancing age (Trivic & Hojsak, 2019). Majority of the children diagnosed with cerebral palsy have an early and continuous history of eating problems (Gellert-Jones, 2020)

2. **Oral Motor Dysfunction:** Allina Health (2015) defines oral motor dysfunction as inefficiency in using the mouth for various activities such as speaking, eating, chewing, and swallowing and for producing specific sounds.



Fig. 2. Feeding difficulties due to oral motor dysfunction

Impairments in oral motor functioning can be linked with one another, such as swallowing can be related to drooling and excessive drooling may result in dysarthria (Parkes *et al.*, 2010). Dysarthria is a motor speech disorder (Wang *et al.*, 2020) and children with speech difficulties often have oral-motor problems that make it tough to align lips, tongue and jaws to make effective sounds. These children will also come across feeding problems (NEMOURS. Kids Health., 2022). Children suffering from severe motor impairment such as those with spastic quadriplegia are likely to have more difficulty in swallowing but even in children with mild cerebral palsy oropharyngeal dysphagia is commonly seen. (Arvedson, 2013)

Involuntary movements such as chewing and swallowing food are found to be difficult in the case of children with spastic CP. This occurs due to the decreased functioning of oral muscles which are also affected by sensory impairment due to drooling (Ahmed *et al.*, 2021). Nur *et al.* (2019), conducted a cross-sectional study investigating the prevalence and risk factors associated with feeding difficulties among children with cerebral palsy. Swallowing difficulty was reported by 42 per cent of the sample. The other prevalent issues encountered by children with CP were longer feeding times, choking or coughing, drinking difficulty and vomiting.

Ahmad *et al.* (2020), also indicated some of the issues related to oral motor dysfunction, such as difficulties in consuming solid foods by 34.1 per cent of the samples, choking during meals, difficulties with spooned purees and use of nasogastric feeds were also examined. These feeding difficulties may be the causative factors for prolonged meal times reported by 41.5 per cent of the samples studied and irritability during meal times. (Sakhaei *et al.*, 2019) revealed that swallowing disorders were common across oral, pharyngeal, and oesophageal stages and the severity of swallowing disorders varied based on the type of cerebral palsy. Speyer *et al.* (2019), mentioned that prevalence of drooling and

swallowing problems were identified among 44 percent and 50.4 percent of the samples, respectively. A review article written by Aggarwal *et al.* (2015), also showed similar patterns of feeding difficulties. A study by Rajikan *et al.* (2017), also expressed feeding problems among 61 percent of the samples and the contributing factors such as chewing difficulty, swallowing, sucking, choking, regurgitation, and sensitivity around the feeding mouth.

### **1. Severity of Gross Motor Impairment:**

Motor skills are essential aspects of human behaviour and development (Wang *et al.*, 2022). Gross motor skills are the abilities that are used for movement with the support of large muscles in the torso, legs and arms (Belsky, n.d). Gross motor function and its different degrees of severity have adversely affected children with cerebral palsy. The Gross Motor Function Classification System (GMFCS) is extensively used globally to categorize children with CP based on the functional severity/degrees of gross motor levels (Ogoke & Illoeje, 2017). The Gross Motor Function Classification System, was introduced in 1997 (Physiopedia, 2024) and this system is classified based on daily functional performance, such as sitting and movement. The classification is primarily centered on four age groups: less than 2 years, 2–4 years, 4–6 years, and 6–12 years. In the year 2007, the expanded and revised GMFCS (GMFCS-E&R) was put forth to evaluate children and adolescents between the age of 12 and 18 years (Piscitelli *et al.*, 2021 & Palisano *et al.*, 2008).

Though GMFCS has been exclusively developed for children with CP, many investigators have adopted this system to categorize children with other health conditions and clinical prescriptions also (Townsend *et al.*, 2017). The levels of GMFCS are categorized from Level I to Level V and the general aspects of these levels are: Level I- walks without limitation, Level II -walks with limitation, Level III- walks using a hand-held mobility device, Level IV-



self-mobility with limitations; may use powered mobility and Level V- transported in a manual wheelchair (Palisano *et al.*, 2007).

Studies have shown that there is a significant association between GMFCS levels and feeding difficulties (Ahmad *et al.*, 2020). Children affected with spastic paralysis of their legs and arms find it challenging to consume food by themselves as they are unable to move their hands and feet to take up food with a spoon (Ahmed *et al.*, 2021). Around 90 percent of children with CP are affected by oropharyngeal dysphagia and it is more seen in younger children and those with poor gross motor function levels of GMFCS III to V (Trivic & Hojsak, 2019). Motor and postural impairments are the most common problems faced by children with cerebral palsy, which occurs due to an injury to the developing brain, and children who suffer from severe motor impairments are prone to face issues with feeding, which in turn will result in an insufficient consumption of calories, ultimately leading to malnutrition (Nur *et al.*, 2019). Children with CP exhibit increased behaviour problems related to feeding due to poor gross motor skills, especially in the age group of 2–15 years (Cemali *et al.*, 2023).

## **2. Gastrointestinal (GI) Problems:**

Conditions like undernutrition, impaired growth and gastrointestinal problems have been associated with CP. Feeding issues are mostly reported among CP children due to the impact of their anatomical and functional structures, which can result in malnutrition. Gastroesophageal reflux in cerebral palsy is interconnected to other severe complications like esophagitis and esophageal dysphagia, which decreases food consumption (Caramico-Favero *et al.*, 2018). Many societies have become more conscious of the significance of malnutrition and nutritional management. Guidelines for the evaluation and treatment of gastrointestinal and nutritional complications among children with neurological impairment have

been published by the European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) (Romano *et al.*, 2017). According to ESPGHAN (n.d), 92 per cent of children with CP suffer from serious GI issues as they are vulnerable to oral motor function which are difficult to manage, resulting in less calorie intake, a broad spectrum of GI, nutritional impediments and coexisting clinical conditions such as respiratory infections and chronic aspiration which impacts the quality of life of patients and caregivers.

**3. Sensory Issues:** Sensory impairments among CP children are widely discussed in literature (Pavao & Rocha, 2017). A sensory impairment is also known as a sensory disability in which one or more senses are affected, which includes auditory, tactile, taste, smell, or spatial awareness. A full loss or even a minor impairment can be considered sensory impairment (Buckinghamshire Council, 2024). According to Nicklaus Childrens Hospital (2024), sensory deficit is a medical term that consists of a diverse range of symptoms which includes difficulties in using one of the main senses or multiple senses like touch or taste.

Poitras *et al.* (2021), explained sensory integration and how it could affect the feeding process. For drinking a glass of water or consuming food, it is necessary to bring it to the mouth first, which requires the integration of various sensory information such as sensation of touch, sense of balance and vision. For e.g., vision is needed to get an idea about the features of an object like shape and texture or, the distance between the hand and the object to be held. Sensory deficits can have an adverse effect on activity levels of the child, communication abilities, interacting with the environment and behaviours. According to Flint Rehab (2019), out of 96 children, 41.7 per cent of the CP children had sensory deficit issues. Investigators concluded that the severity of motor impairment was associated with severe sensory dysfunction.

**Table 1**  
**Feeding Problems and Malnutrition in Children with Cerebral Palsy**

Sl. No.	Sample size	Age Range	FINDINGS	REFERENCE
1	65	24 months - 17 years	<b>Feeding problems</b> <ul style="list-style-type: none"> <li>• Bad teeth- 80 per cent</li> <li>• Labial gripping impossible-80 per cent</li> <li>• Orofacial malformation -74 per cent</li> <li>• Need third person to feed- 72.3 per cent</li> <li>• False road while drinking-64.6 per cent</li> <li>• Drooling -40 per cent</li> <li>• False road while eating-20 per cent</li> <li>• Installed lying for meals-7 per cent</li> </ul>	Mouilly <i>et al.</i> (2016).
2	153	2- 15 years	<b>Feeding problems</b> <ul style="list-style-type: none"> <li>• Feeding difficulties – 60.8 per cent</li> <li>• Chewing-29 percent</li> <li>• Swallowing-20.2 per cent</li> <li>• Sucking-19.3 per cent</li> <li>• Choking /spluttering-15.5 per cent</li> <li>• Regurgitation-12.2 percent</li> <li>• Sensitivity around mouth-3.8 per cent</li> </ul> <b>Prevalence of malnutrition</b> <ul style="list-style-type: none"> <li>• Poor nutritional status- 60 per cent</li> <li>• 1/3<sup>rd</sup> of the samples found to be under weight.</li> <li>• Feeding issues significantly affected their growth</li> </ul>	Rajikan <i>et al.</i> (2017).
3	30	1-9 years	<b>Feeding problems</b> <ul style="list-style-type: none"> <li>• Drooling of saliva -66.7 per cent</li> <li>• Absent tongue lateralization-63.3 per cent</li> <li>• Hypertonic tongue-60 per cent</li> <li>• Inability to self-feed -56.7 per cent</li> <li>• Restricted temporomandibular joint movement -43.3 per cent</li> <li>• Chewing problem - 40 per cent</li> <li>• Swallowing problem -40 per cent</li> <li>• Inability to take solid foods -40 per cent</li> <li>• No closure of lips around spoon-40 per cent</li> <li>• Sucking problem-36.7 per cent</li> </ul> <b>Complications arise due to feeding problems</b> <ul style="list-style-type: none"> <li>• Recurrent chest infection-53.3 per cent</li> <li>• Constipation-43.3 per cent</li> <li>• Choking during feeding -30 per cent</li> <li>• Vomiting – 30 per cent</li> <li>• Cry during feeding- 20 per cent</li> </ul>	Usman & Asghar (2017)
4	40	4 -10 years	<b>Feeding problems</b> <ul style="list-style-type: none"> <li>• Dysphagia- 82.5 per cent</li> <li>• Gastroesophageal reflux- 40 per cent</li> <li>• Constipation – 60 per cent</li> </ul> <b>Prevalence of malnutrition</b> <ul style="list-style-type: none"> <li>• Mild amenia-7.5 per cent</li> <li>• Patients with dysphagia showed lower energy daily .</li> <li>• Carbohydrate and protein intake was above RDA in 92.5 percent and 85 percent of respondents.</li> </ul>	Caramico-Favero <i>et al.</i> (2018)

5	76	18 months – 12 years	<p><b>Feeding problems</b> coughing or choking while eating and drinking, needing assistance with feeding, and showing unhappiness during meal times</p> <p><b>Reported feeding problems by the caregivers.</b></p> <ul style="list-style-type: none"> <li>• 75 per cent of caregivers indicated their child always needed assistance with feeding</li> <li>• Two-thirds of caregivers always worried about their child's feeding</li> <li>• 50 per cent of caregivers always worried that their child was not eating enough.</li> </ul> <p><b>Prevalence of malnutrition</b> <i>Children below 5years</i></p> <ul style="list-style-type: none"> <li>• Underweight : 65 per cent</li> <li>• Stunted- 54 per cent</li> <li>• Wasted-58 per cent</li> </ul> <p><b>Including the older children</b></p> <ul style="list-style-type: none"> <li>• Underweight -63 per cent (less than 10 years)</li> <li>• Stunted -56 per cent</li> </ul> <p><b>Implication</b></p> <ul style="list-style-type: none"> <li>• Malnutrition is prevalent among children with cerebral palsy in this rural Ghanaian population.</li> <li>• Feeding difficulties were closely linked to being underweight.</li> <li>• Feeding difficulties were linked to a decrease in the caregiver's quality of life (QoL)</li> <li>• The child's nutritional status was not associated with the caregiver's quality of life.</li> </ul>	Polack <i>et al.</i> (2018)
6	80	:13 months to 9 years	<p><b>Feeding problems</b></p> <ul style="list-style-type: none"> <li>• Feeding difficulties -78 per cent</li> <li>• Swallowing difficulty -42 per cent</li> <li>• Longer time of feeding- 33 per cent</li> <li>• Choking/coughing-15 per cent</li> <li>• Difficulty in drinking- 28 per cent</li> <li>• Vomiting -18 per cent</li> </ul> <p><b>Prevalence of malnutrition</b></p> <ul style="list-style-type: none"> <li>• Undernourished- 68 per cent</li> <li>• Severe malnutrition -10 per cent</li> </ul>	Nur <i>et al.</i> (2019).
7	60	17 months and 7 years	<p><b>Feeding problems</b></p> <ul style="list-style-type: none"> <li>• Swallowing disorders were common across oral, pharyngeal, and oesophageal stages</li> <li>• severity of swallowing disorders varied based on the type of cerebral palsy</li> <li>• Aspiration</li> </ul>	Sakhaei <i>et al.</i> (2019)
8	41	2-8 years	<p><b>Feeding problems</b></p> <ul style="list-style-type: none"> <li>• Feeding difficulties- 89 per cent</li> <li>• Oral motor dysfunction- 70 per cent</li> <li>• Takes more than 20 minutes for meal-41.5 per cent</li> <li>• Irritabilities at meal time-39 per cent</li> <li>• Poor appetite-34.1 percent</li> <li>• Difficulties with solid foods-34.1 per cent</li> <li>• Chewing difficulty-26.8 per cent</li> <li>• Choking during meal -26.8 per cent</li> <li>• Difficulties in spooned purees-26.8 per cent</li> <li>• Nasal Gastric (NG) feeds-4.9 per cent</li> </ul> <p><b>Prevalence of malnutrition</b></p> <ul style="list-style-type: none"> <li>• Nutritional deficiencies – present</li> </ul>	Ahmad <i>et al.</i> (2020)

9	45	3-12 years	<b>Feeding problems</b> <u>Pre-test</u> <ul style="list-style-type: none"> <li>• Prevalence of difficulties in spoon feeding: 80 percent</li> <li>• Biting- 82.2 per cent</li> <li>• Chewing- 100 per cent</li> <li>• Cup drinking-51.1 per cent</li> <li>• Swallowing- 53.3 per cent</li> <li>• Wet chin to overt drooling-100 per cent</li> </ul> <b>Prevalence of malnutrition</b> <ul style="list-style-type: none"> <li>• Underweight – 93.3 per cent</li> </ul>	Wafeek <i>et al.</i> (2023).
10	75	Mean age 3.6 years	<b>Feeding problems</b> <ul style="list-style-type: none"> <li>• Gastrointestinal issues- 88 per cent</li> <li>• Inappropriate feeding positions-39.2 per cent</li> <li>• More than 30 minutes per meal: 28 per cent</li> <li>• Feeding difficulties - 12.0% of children</li> </ul> <b>Prevalence of malnutrition</b> <ul style="list-style-type: none"> <li>• Under weight- 53.6 per cent</li> <li>• Stunted – 46.4 per cent</li> <li>• Two third of the children consumed less than 4 out of 8 food groups.</li> </ul>	Jahan <i>et al.</i> (2023).

The findings across various studies highlight significant feeding difficulties and a high prevalence of malnutrition among children with cerebral palsy (CP). Common feeding problems include issues with swallowing, chewing, choking, and drooling, with the severity varying depending on the type of CP. These challenges often require assistance from care givers, impacting the child's nutritional intake and overall growth. Feeding difficulties are linked to multiple causes, including oral motor dysfunction, impaired gross motor function, and the severity of CP. These issues contribute to malnutrition, with a substantial proportion of children being underweight, stunted, or undernourished, particularly in younger age groups. The prevalence of feeding difficulties is also associated with other health complications, such as recurrent chest infections, constipation, and gastroesophageal reflux. The findings emphasize the need for early intervention and a multi disciplinary approach, involving medical professionals, nutritionists, feeding therapists, and care giver support. Addressing these challenges effectively can improve feeding outcomes, mitigate malnutrition, and enhance both the health of children with CP and the quality of life for their care givers.

## NUTRITIONAL STATUS OF CHILDREN WITH CEREBRAL PALSY

Feeding problems, impact both the quality and amount of food consumed, thereby affecting the individual's nutritional status (Maithily & Kowshalya, 2018) .Nutritional status refers to an individual's state of health that is influence by their nutrient intake and its utilization. It indicates the balance between the intake of nutrients and the body's nutritional demands (Fernandez-Lazaro & Seco-Calvo, 2023).It has a significant role in determining the overall health and quality of life of children with neuro developmental disabilities (Penagini *et al.*, 2015).Nutrition plays a crucial role in sustaining a healthy weight and preventing diseases. Moreover, proper nutrition is essential for effective healing and recovery from illnesses and injuries (World Health Organization, 2024). It is necessary to analyse and record a person's nutritional status. A complete nutritional assessment involves a thorough clinical examination which includes medical history and physical examination, anthropometric measurements, diagnostic tests and evaluation of dietary intake (Kesari and Noel, 2023).

Malnutrition is a serious health issue that includes both under nutrition and being



overweight, especially in low and middle income nations. Malnutrition comes in various forms, such as under nutrition (wasting or stunting), lack of essential vitamins or minerals, overweight, obesity, and non-communicable diseases caused by poor diet (Cleveland Clinic, 2022). Under and over nutrition leads to excessive use of healthcare systems, decreases the participation in educational and social activities (Penagini *et al.*, 2015).

The dietary problems that impact neurologically impaired children include under nutrition, growth failure, obesity, deficiencies in certain micronutrients and osteopenia (March and, Motil & NASPGHAN Committee on Nutrition, 2006). Many scientific studies on nutrition status among neurologically impaired children focused on the population with cerebral palsy and it has been reported 46-90 per cent of the cases with malnutrition (Penagini *et al.*, 2015) especially among those with severe gross motor impairments and oropharyngeal dysfunction. Nutritional problems in children with cerebral palsy (CP) are widely recognized (Bell & Samson-Fang, 2013)

Underweight in CP cases heightens the risk of poor quality of life, premature mortality, poor bone mineralization, and increased infection rates. Identifying nutritional problems is therefore crucial to prevent such conditions (Sorensen *et al.*, 2021). ESPGHAN (n.d.) highlights that undernourished children with neurological impairment can be identified through anthropometric data and micronutrient status assessment. The organisation also recommends estimating calorie requirements using dietary reference standards (DRI).

Medico Experts (2024) suggested providing a nutrient dense diet for children with cerebral palsy which should include foods rich in high calories, vitamin C, vitamin D, calcium, zinc and omega 3 fatty acids. Also, with the support of a feeding therapist, consistency and texture of the food could be modified to ensure maximise eating, and by encouraging small and frequent meals. Depending on the child's nutritional status, tailored nutritional support can be provided, with

consideration of their ability to consume food or liquids orally and the risks of pulmonary aspiration. Assistive feeding devices, such as modified cutlery and non-slip mats, can also support self-feeding and improve mealtime experiences, provided they are customized to meet the child's specific needs (Bell & Samson-Fang, 2013).

Addressing the nutritional needs of children with cerebral palsy is essential to enhancing their health and quality of life. A nutrient-dense diet, combined with proper feeding strategies and professional support, is critical in managing their feeding challenges. Care givers, with the guidance of healthcare professionals, play a pivotal role in ensuring these children receive adequate nutrition, contributing to their physical and cognitive well-being. Early identification of nutritional problems and interventions can significantly reduce the risks associated with malnutrition, promoting better health outcomes for children with neurological impairments.

## **REHABILITATION AND MANAGEMENT APPROACHES**

Rehabilitation is a series of interventions to maximize functioning and minimize disability in individuals with health conditions within their environment (World Health Organisation, 2024). For managing children with cerebral palsy (CP), a variety of therapies play a significant role, including physical therapy, speech and language therapy, occupational therapy, and recreational therapy (Mayo Clinic, 2023).

The first step in the treatment of CP is physical therapy, which focuses on improving motor abilities and preventing mobility-related issues from worsening over time. This therapy involves exercises, massages, flexibility treatments, and assistive devices to enhance freedom of movement. The type and extent of physical therapy depend on the severity of CP. Children with mild CP may only require basic physical therapy, while severe cases may involve additional medications or treatments alongside therapy (Cerebral Palsy Guide, 2023).

Occupational therapy (OT) is a vital component of comprehensive treatment for individuals with CP. It aims to improve a child's ability to perform daily activities, enhancing overall well-being and fostering greater independence (My Child at Cerebral Palsy.org, 2024). This therapy strengthens physical attributes such as coordination, flexibility, and strength, while also supporting intellectual skills like perception, memory, reasoning, decision-making, and problem-solving (PLEXUS, n.d.).

Speech therapy helps to improve a child's ability to communicate and develop language skills. This includes enhancing early language abilities, language comprehension, voice use, fluency, problem-solving, memory, clarity, and expression (Cleveland Clinic, 2024). Recreational therapy uses leisure activities to enhance skills, general health, and emotional well-being in individuals with certain health conditions (Healthline, 2024).

Nutritional assessment for children with CP is most effective when conducted by a multi disciplinary team. This team typically includes doctors, nurses, dietitians, psychologists, speech and language therapists, physical therapists, and occupational therapists. Early integration of such teams helps identify children at risk of malnutrition, allowing timely nutritional care. Assessments should include clinical history, nutritional evaluations, anthropometric measurements, and other methods (Trivic *et al.*, 2019). Community health workers, general practitioners, surgeons, and other health professionals also play indispensable roles in rehabilitation (World Health Organisation, 2024).

### **Role of Care givers**

Care givers play a pivotal role in the feeding and overall rehabilitation of children with cerebral palsy (CP). Feeding a child with CP is often a time-intensive process that can induce significant stress and fatigue, potentially impacting the quality of the feeding process (Ferluga *et al.*, 2013). Rehabilitation for children with CP requires a holistic approach,

where the roles of the family, social support, and environment are indispensable. Family members, especially parents and siblings, often act as primary care givers, providing essential emotional and physical support in daily care routines. Interventions focusing on education, caregiving, and improvisation are critical to addressing these challenges effectively (Trabacca *et al.*, 2016).

Chronic illnesses like CP affect not only the child but the entire family. Parents often face heightened care giving demands, increased medical expenses, and limited job opportunities (Fairfax *et al.*, 2019). Empowering parents through education and training is a key aspect of family-centered interventions, helping them provide more effective support for their child's development (Kalleson *et al.*, 2019). However, despite their crucial role, families often lack sufficient support. Klein *et al.* (2023) suggest four recommendations to address this gap: strengthening evidence-based interventions to support children with CP and their families, expanding access to feeding services and improving healthcare systems, providing direct assistance to address nutritional challenges, and raising awareness about the needs of children with disabilities.

Active family support, especially from parents and siblings, plays a vital role in enhancing feeding interventions for children with cerebral palsy. Nutritional rehabilitation, when paired with consistent family involvement, can effectively address feeding challenges, improve the child's nutritional status, and contribute to better overall health outcomes.

### **CONCLUSION**

Feeding problems in children with cerebral palsy (CP) are influenced by factors like the type of CP, oral motor issues, severity of gross motor impairment, and gastrointestinal or sensory issues. These challenges can impact growth, development, and overall nutrition, leading to a diminished quality of life. To address this, multi disciplinary support from healthcare professionals and care

givers is vital. Early detection and multi-level interventions like health, nutrition, and education are crucial. The reviews stresses the need for more location and culture-specific research on nutrition, feeding difficulties, mealtime practices, and care giver knowledge assessment of children with CP in India. Also, innovations in assistive devices and adaptive utensils and making them available to children with CP in remote places at an affordable

cost are urgent needs. Evolving training packages to build the capacity of care givers to provide better nutritional and custodial care to children with CP will improve their quality of life. At the policy level, convergence between the programs of the health, education, and rehabilitation departments will enhance the overall well being of the unnoticed population.

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