Effect of Nursing Interventions on Feeding Difficulties of Children with Cerebral Palsy

Areeg, A. Wafeek[1], Sabah, S. El-Sharkawy [2], Iman, I. Abd Al-Moniem[3], Madiha A. Morsy[4]

[1]Pediatric Nursing Department, Ain Shams University, Cairo, Egypt.
e-mail: dr.areeg.wafeek@nursing.asu.edu.eg
[2]Pediatric Nursing Department, Ain Shams University, Cairo, Egypt.
e-mail: dr.sabah.sharkawy@nursing.asu.edu.eg
[3]Pediatric Nursing Department, Ain Shams University, Cairo, Egypt.
e-mail: eman_abdelmoniem@nursing.asu.edu.eg
[4]Pediatric Nursing Department, Ain Shams University, Cairo, Egypt.
e-mail: dr.madiha.amin@nursing.asu.edu.eg

Received October 11, 2020, accepted May 3, 2022, Published July 1, 2023.

ABSTRACT

Context: Cerebral Palsy (CP) is a static non-progressive brain disorder defined as a group of motor disorders resulting from brain damage before, during, or after birth. Children with CP frequently have feeding problems, growth disorders, feeding complications, communication disorders, mental obstruction, seizure disorders, auditory problems, and visual deficiency, which may significantly impact their health.
Aim: The study aimed to evaluate the effect of nursing interventions on feeding difficulties of children with cerebral palsy.
Methods: A quasi-experimental (pre/post-test) research design was utilized in this study that was conducted at the Neurologic Specialized Clinic at Children's Hospital affiliated to Ain Shams University Hospitals. A convenient sample of forty-five children with CP having feeding difficulties and their mothers was selected from the previously mentioned setting. Data were collected by using three tools, a structured interview questionnaire and a Children Observation Assessment Record to assess the child's ability and feeding difficulties of the studied children before and after the intervention.
Results: The study reveals a mother's mean age of 31.33±4.46 and a child's mean age of 6.28±2.91. The children's assessment reveals that 84.4% of cerebral palsy children were hypotonic. Pre and post-test comparisons of children's BMI revealed a statistically significant difference at p=0.018, and feeding difficulties revealed a statistically significant difference in spoon feeding p= 0.007, biting p=0.002, chewing p=0.003, cup drinking p= 0.005, swallowing p=0.001, and drooling during eating p=0.009.
***Conclusion*:** The study concluded that the supportive nursing intervention program was successful in improving the feeding difficulties as regards spoon feeding, biting, chewing, cup drinking, swallowing, and drooling during eating after the intervention compared to the children's pre-intervention level. The study recommended applying supportive nursing interventions for children with CP having feeding difficulties as a main supportive nursing intervention to overcome feeding difficulties.

Keywords: Cerebral palsy, feeding difficulties, nursing interventions

Citation: *Wafeek, A. A., El-Sharkawy, S. S., Abd Al-Moniem, I. I., & Morsy, M. A. (2022).* Effect of nursing interventions on feeding difficulties of children with cerebral palsy. *Evidence-Based Nursing Research*, 5*(3)*, 14-21. http://doi.org/10.47104/ebnrojs3.v5i3.297 .

1. Introduction

Cerebral palsy (CP) is the most common motor disability in childhood. It is primarily a neuromotor disorder that affects the development of movement, muscle tone, and posture. Children with CP may develop a range of secondary conditions over time that variably affect their functional abilities *(Graham et al., 2016).*

Despite the improvement in perinatal care in developed countries, the prevalence of CP for all live births ranges from 1.5 to 3/1000 live births, morbidity, and mortality rate with variation between high-income and low to middle-income countries and geographic regions *(Colver et al., 2014; Stavsky et al., 2017; Himmelmann, 2019; Kliegman & St. Geme, 2020).*

Children with CP frequently have feeding problems, growth disorders, feeding complications, communication disorders, mental obstruction, seizure disorders, and auditory problems, as well as visual deficiency, which may have a significant impact on their health *(Silva et al., 2017; Kakooza-Mwesige et al., 2015).*

Supportive nursing interventions and managing the multisystem problems in the child with CP having feeding difficulties require a careful and thorough review of systems. The overall goals for managing CP are to increase the child's and family's quality of life through supportive interventions that increase independence in daily activities, mobility, and nutrition. Despite guidelines on the use of pharmacologic management of spasticity in children with CP, there is a limited evidence base for most interventions in CP, including those that address feeding/nutrition, growth, and development (*Sellers et al., 2014*; *El-Tallawy et al., 2014).*

Evidence for behavioral interventions for feeding disorders in CP consists of mostly small, short-term, pre-post

[1]*Correspondence author: Areeg Ahmed Wafeek*

studies, with the strength of evidence ranging from insufficient to moderate. Some studies suggest that interventions such as oral appliances may enhance oral sensorimotor skills, but there is a clear need for rigorous, comparative studies. Evidence for surgical interventions needs to be more robust to high. All studies to date demonstrate significant weight gain with gastrostomy. Results for other growth measures are mixed, and substantial numbers of children remained underweight. However, given a lack of appropriate reference standards for the CP population, these results should be interpreted cautiously. Longer-term, comprehensive case series are needed, as are prospective cohort studies. More research is needed to understand potential harms in the context of benefits and potential risks of not treating *(Ferluga et al., 2013).*

2. Significance of the study

In Egypt, the incidence of CP constitutes about 2.04 per 1000 live births. As reported by the study " Epidemiology of cerebral palsy in El-Kharga District-New Valley (Egypt)," the prevalence of CP in Egypt is 2.04/1000 live births (95% confidence interval 1.48-2.59) *(El-Tallawy et al., 2014).*

Nurses play a crucial role in the care of children with cerebral palsy. They are involved in various aspects of feeding, including assessment, planning, and implementing interventions. This study highlights the significance of nursing interventions and their potential impact on improving feeding difficulties, thereby enhancing the quality of life for children with cerebral palsy. The current study explores the impact of supportive nursing interventions on addressing feeding difficulties in children with cerebral palsy.

3. Aim of the study

The study aimed to evaluate the effect of nursing interventions on the feeding difficulties of children with cerebral palsy.

3.1. Operational definition

Nursing interventions are meant in this study as supportive nursing interventions for mothers and children with cerebral palsy to improve feeding difficulties. The supportive intervention includes training on spoon feeding, biting, chewing, cup drinking, swallowing, and drooling during eating.

3.2. Research Hypothesis

The knowledge of mothers of children with cerebral palsy will be significantly improved after the implementation of supportive nursing intervention compared to their preintervention level.

Feeding difficulties of children with cerebral palsy will be significantly improved after implementing a supportive nursing intervention program compared to their pre-intervention.

4. Subjects & Methods

4.1. Research Design

A quasi-experimental (pre/post-test) design was utilized for this study. The quasi-experimental research design is a type of research design that shares similarities with experimental designs but lacks random assignment of participants to treatment groups. In quasi-experimental studies, researchers cannot randomly assign participants to different groups due to practical, ethical, or other constraints. Instead, they select pre-existing groups or naturally occurring conditions and compare their outcomes.

4.2. Study setting

This study was conducted at the Neurologic Specialized Clinic at Children's Hospital, affiliated to Ain Shams University Hospitals. This place was selected because it is a specialized, well-established place that provides care for children with CP who have feeding difficulties due to its high flow rate of patients.

4.3. Subjects

A convenient sample of 45 children with cerebral palsy was recruited from the previously mentioned clinical setting with their mothers according to the following inclusion criteria

- Age from 3-12 years old.
- Having CP with feeding difficulties.
- Free from congenital anomalies.

4.4. Tools of data collection

Data were collected by using the following tools:

4.4.1. A Structured Interviewing Questionnaire

The researcher designed it after reviewing the relevant literature *Stavsky et al. (2017); Marret et al. (2013).* It was written in simple Arabic language. It consisted of the following parts:

Part 1 included the characteristics of the studied children as age, gender, birth order, ranking of the child, age during diagnosis, and type of cerebral palsy. It also includes mothers' demographic characteristics such as age, educational level, occupation, and residence.

Part 2 included the mothers' knowledge about CP, feeding difficulties, and choking. The knowledge of cerebral palsy included definition, causes, clinical manifestations, complications, and treatment (4 MCQ, two yes and no questions with one exploratory open end question for the yes answer). The knowledge of feeding difficulties includes questions regarding position during feeding and causes of stopping feeding (2 MCQs). The knowledge regarding choking includes a definition of choking, complication, dealing with choking, and difficulty food swallowing (8 MCQs). This tool was used before and immediately after the implementation of supportive nursing interventions.

Scoring system

A scoring system was followed to obtain the outcome of mothers' knowledge. Each item was scored (2) for a correct answer, while the incorrect answer was scored (0).

Total knowledge scores ranged from (1- 32) and were categorized as the unsatisfactory level of knowledge was less than 75%, while satisfactory knowledge was more than or equal to 75%.

4.4.2. Children's Observational Assessment Record

It was adopted from the *National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention (2017).* It includes two sections. The first section was used to obtain the studied children's weight and height to calculate their Body Mass Index (BMI) using the equation of BMI = [weight (kg) / height (cm) / height (cm)] × 10,000. These measurements are assessed pre-and post-implementation of supportive nursing interventions.

Scoring system

- BMI less than 18.5 (< 5th percentile: Underweight).
- BMI of 18.5 through 24.9 (from 5th percentile to <85th percentile: Normal weight).
- BMI of 25 to 29.9 (> 85th percentile to < 95th percentile: Overweight).
- BMI of 30.0 or greater (≥ 95th percentile: Obese).

The second part was adopted from *Kenny et al. (1989)*. It was used for children with CP having feeding difficulties in assessing the child's ability and feeding difficulties such as spoon feeding (8 items), biting ability (5 items), chewing ability (2 items), cup drinking (8 items), swallowing (2 items). Food dropping was assessed against observations (absent and wet chin to overt drooling). This tool was used pre-and post-implementation of supportive nursing interventions.

Scoring system

The scoring system was followed to determine feeding difficulties among the studied children with CP. Each of these items was scored (2) for an adequate response, scored (1) for a poor response, while the absent response was scored (0). The total score was categorized as follows:

- Adequate is > 50%
- Poor is from 0–50%
- Absent is 0%

4.5. Procedures

The content validity of the study tools was assessed by a panel of five experts in the pediatric medical and nursing fields (3 professors of pediatric nursing, and two professors of pediatric medicine, at Ain Shams University).

Preparatory Phase: The researcher reviewed the past, current local, and international related literature covering various aspects of the problem using books, articles, and periodicals to get acquainted with the research topic and to develop the study tools and the content of the supportive nursing intervention program.

The researcher designed supportive nursing interventions for mothers of children with CP. It was constructed, revised, and modified from the relevant literature to improve the nutritional status of children with CP having feeding difficulties. A booklet was designed containing educational information about CP and intervention guidelines about feeding difficulties, such as swallowing and chewing difficulties, and how to help children and their mothers overcome these difficulties during training. The contents of the interventions were prepared in simple Arabic to suit the mothers' level of understanding. It included two parts:

Part I:

- Introduction.
- Concept of cerebral palsy.
- Classification of cerebral palsy.
- Causes of cerebral palsy.
- Clinical manifestations of cerebral palsy.

Part II:

- Feeding difficulties in children with cerebral palsy.
- Interventions to help the children with CP having feeding difficulties and their mothers to improve and overcome feeding difficulties.
- Different feeding tools/utensils, child positioning during eating, swallowing, and chewing interventions, and successful cup drinking.
- Tips/advice to help mothers in feeding their CP children.

Ethical Consideration: Approval from the Scientific Research and Ethical Committee in the Faculty of Nursing, Ain Shams University, was obtained. Children's caregivers' informed consent was obtained, and confidentiality of data and results was considered.

Administrative design: An official letter was obtained from the Dean of the Faculty of Nursing, Ain Shams University, to the director of Children's Hospital affiliated to Ain Shams University Hospitals to get permission to help the researcher to conduct the study.

A pilot study was carried out on 10% of the studied sample (five children and mothers) at the previously mentioned setting to test the clarity and applicability of the study tool and time needed and assess the research process's feasibility. Based on the results of the pilot study, the necessary modifications were done. Those children were excluded from the studied sample.

The fieldwork was conducted in the second week of May 2018 up to the third week of January 2019. The researcher met the mothers in the previously mentioned study setting when they brought their children for follow-up and investigations. The researcher introduced herself to the studied children and their mothers, gave them a brief idea about the study, and explained its aim. The researcher was available two days/week (Sunday & Wednesday). Initially, the questionnaire format was filled through individual interviews of mothers and their children. Then, the researcher assessed Body Mass Index (BMI) for the studied children pre-and post-implementation of supportive nursing interventions. Each child was observed and evaluated before and after the supportive nursing interventions were implemented. The researcher assessed feeding patterns and the ability of oral motor function for each child.

Implementation of the supportive nursing interventions: The researcher taught the mothers to help them deal with

their children with CP to improve feeding difficulties. The researcher trained the studied children in spoon feeding, biting, chewing, cup drinking, and swallowing techniques. Each child took 30 to 45 minutes during training in the session. The researcher was taking two children/per day.

In the first session, the researcher taught the mothers about properly positioning their children for feeding. The researcher trained the mothers and the studied children for biting and chewing in multiple sessions using a chewing tube placed in the molar area of the child. The mother moves the tube from one side of the mouth to the other, and the child completes the biting and chewing exercises.

In other multiple sessions, the researcher trained the mothers to adjust and gradually increase food consistency. Then the mothers were trained to spoon-feed their children, followed by supporting the child's jaw and cheek through oral control and stimulating upper lip closure by firm pressure downward on the tongue for better lip closure to clear the spoon and avoid further tongue movement.

The mothers were trained for cup drinking and swallowing of their children by using a cut-out cup which makes the child's head stay at the level of the liquid. Also, they were trained to place the cup rim gently against the child's upper lip while waiting for the lower lip to lift to seal against the cup rim. The training for cup drinking took multiple repeated sessions, and the mothers practiced this technique until their children drank several ounces. Then, the researcher taught the children in other multiple sessions to be encouraged to place their hands around the cup with their mothers. These practices were practiced until there was enough control to successfully cup drinking and swallowing. The supportive nursing intervention took nine months.

The mothers cooperated with the researcher and were interested in sharing these interventions to feed their children to overcome feeding difficulties. Methods of training were small group discussion, role play, demonstration, and redemonstration guided by an Arabic booklet about CP, feeding difficulties, and its interventions.

Evaluation of the supportive nursing interventions: Immediately after the supportive nursing interventions were completed, reassessing using the same tools was done for the studied children and their mothers to evaluate the effect of the supportive nursing interventions on children with CP having feeding difficulties.

4.6. Data analysis

After data were collected, coded, and transferred into specially designed formats (Excel program) to be suitable for computer feeding, frequency analysis, and manual revision were used to detect possible errors. The data was statistically analyzed using the Statistical Package for the Social Science (SPSS) version 25. Means and standard deviations were determined for quantitative data, and frequency was determined for categorical variables. Paired t-test was used to compare the mean and standard deviation of the studied variables pre-and post-implementation of the supportive nursing intervention. The chi-square test is a statistical test used to determine if there is a significant association between two categorical variables. A significant result was considered at a p-value <0.05.

5. Results

Table 1 shows that the mean age of the studied mothers was 31.33±4.46 years, and 51.1 % and 68.9% of them had a secondary educational level and lived in a village, respectively. This table also shows that 73.3% of the studied mothers were unemployed.

Table 2 shows the mean age of the studied children of 6.28±2.91 years; 62.5% were males, and 40% were the second child. All (100%) of the studied children were under three years at diagnosis, and 84.4% had hypotonic cerebral palsy.

Table 3 shows a statistically significant difference in mothers' knowledge between pre- and post-supportive nursing intervention regarding all knowledge elements and the total at p 0.000.

Table 4 demonstrates the comparison of the studied children's body mass index. The table shows that the majority (93.3%) of the children were underweight pre interventions compared to 91.1% of them post interventions. This table also clarifies a statistically significant difference in mean body mass index of 17.48±3.41 and 17.85±2.97 pre- and post-interventions, respectively (t= 2.76, p-value 0.018).

Table 5 shows that 80% and 82.2% of the studied children had poor spoon-feeding and biting pre interventions, which decreased by 55.6% and 57.8% post interventions, respectively. Also, 40% and 35.6% of the studied children had adequate spoon-feeding and biting abilities post-intervention, with a statistically significant difference between the two study phases. This table also clarifies statistically significant differences regarding all feeding difficulties among children with CP pre- and post-supportive nursing interventions (p-value < 0.01).

6. Discussion

Cerebral palsy (CP) is a static disorder of the brain, not a progressive disorder that may be defined as a collection of motor disorders resulting from damage to the brain that occurs before, during, or after birth. The damage to the child's brain affects the motor system. As a result, the child has poor coordination, poor balance or abnormal movement patterns, or a combination of these characteristics *(Nordqvist, 2017)*.

Feeding difficulties and growth disorders are common in children with CP, which may significantly impact their health status, namely the psychological and functional levels, as well as their socialization and survival *(Sullivan, 2012*). Therefore, the healthcare team should focus on helping the families to find the necessary resources and the most appropriate way to use them. Early intervention through family support programs will strengthen family functionality and promote the growth and development of the family members and the family *(Berger & Font (2015).* The study aimed to evaluate the effect of nursing interventions on the feeding difficulties of children with cerebral palsy.

Table (1): Frequency and percentage distribution of the studied mother's demographic characteristics (n=45).

Demographic Characteristics	No.	%
Age	28	62.2
25 - <30	17	37.8
≥ 30		
X ± SD	31.33±4.46	
Educational Level		
Read and write	10	22.2
Secondary level	23	51.1
University education	12	26.7
Residence		
Town	14	31.3
Village	31	68.9
Job		
Employed	12	26.7
Unemployed	33	73.3

Table (2): Distribution of the Studied children's demographic characteristics (n=45).

Demographic Characteristics	No	%
Age	27	60
3-<6	15	33.3
6-<9	3	6.7
9-12		
X ± SD	6.28±2.91	
Gender		
Male	28	62.5
Female	17	37.8
Child ranking		
First child	17	37.8
Second child	18	40
Third child	10	22.2
Child age at diagnosis		
<3 years	45	100
Types of cerebral palsy		
Hypotonic	38	84.4
Spastic	7	15.6

Tables (3): Comparison of mothers' knowledge of pre- and post-supportive nursing intervention (n=45).

Mothers' knowledge	Pre	Post	T-test	P value
Knowledge related to cerebral palsy	2.71±0.47	3.73±0.56	6.4	0.000
Knowledge related to difficulties in feeding	2.33±0.29	4.044±0.35	9.2	0.000
Knowledge related to chocking	2.57±0.28	3.71±0.33	5.59	0.000
Total	7.6 ± 1.7	11.5±1.7	20.45	0.000

Table (4): Comparison of children's body mass index pre-and post-implementation of the supportive nursing intervention (n=45).

BMI	Pre		Post		Paired- t-test	p-value
	No	%	No	%		
Underweight	42	93.3	41	91.9		
Normal	3	6.7	4	8.9		
Mean±SD	17.48±3.41		17.85±2.97		2.76	0.018

Table (5): Comparison of feeding difficulties among children with cerebral palsy pre- and post-implementation supportive nursing intervention (n=45).

Feeding difficulties	Pre		Post		X^2	P value
	No	%	No	%		
Spoon feeding						
Adequate	4	8.9	18	40		
Poor	36	80	25	55.6	4.856	0.007
Absent	5	11.1	2	4.4		
Biting						
Adequate	2	4.4	16	35.6		
Poor	37	82.2	26	57.8	6.103	0.002
Absent	6	13.4	3	6.6		
Chewing						
Adequate	0	0	17	37.8		
Poor	45	100	28	62.2	5.170	0.003
Absent	0	0	0	0		
Cup drinking						
Adequate	6	13.3	17	37.8		
Poor	23	51.1	23	51.1	4.993	0.005
Absent	16	35.6	5	11.1		
Swallowing						
Adequate	17	37.8	23	51.2		
Poor	24	53.3	20	44.4	7.088	0.001
Absent	4	8.9	2	4.4		
Drooling during eating						
Absent	0	0	17	37.8	3.911	0.009
Wet chin to overt drooling	45	100	28	62.2		

As regards the mothers' characteristics, the current study's finding reveals that the mean age of mothers was 31.33±4.46 years. More than half of the studied mothers had a secondary educational level and lived in rural areas. Also, most of them were unemployed. This finding may be due to the ding residence of the mothers in the rural, which is not giving them the chance of higher education and employment, leading to more risk of having a CP child. This result follows *Forthun et al. (2018),* who found in a study titled parental socioeconomic status and risk of cerebral palsy in the child that there is a high correlation between parental education and the risk of CP.

Regarding the characteristics of the studied children, the current study's finding reveals that the mean age of the studied children was 6.28±2.91 years, more than half of them were males, and all studied children were less than three years at diagnosis. CP generally is diagnosed during the first or second year after birth. However, suppose a child's symptoms are mild. In that case, it is sometimes difficult to diagnose until the child is a few years older *(National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, 2022).*

This result follows *Omar et al. (2017),* who conducted a study about intervention programs to improve feeding, swallowing, and nutritional problems in children with cerebral palsy, they found that most studied children with CP were males, and their median age was 2.5 years. This finding is also supported by *Novak et al. (2017),* who found in their study about early, accurate diagnosis and early intervention in cerebral palsy that CP can often be accurately diagnosed under the age of six months and even as early as three months of age using a combination of assessment tools with strong predictive validity coupled with clinical reasoning.

The current study's findings reveal that most children have the hypotonic type of CP. This finding may be due to those children having delayed motor milestones. This finding is supported by *Novak et al. (2017),* who found that the motor system's neurologic impairment in children with CP is characterized by hypotonia.

Regarding the mothers' knowledge of CP and feeding difficulties, the present study's finding reveals statistically significant differences regarding the mothers' knowledge of pre- and post-supportive nursing interventions regarding cerebral palsy, feeding difficulties, and choking. This finding may be due to the mothers' low awareness and educational level, which improved by providing information and training skills during the implementation of supportive nursing interventions. This finding is supported by *Omar et al. (2017),* who found that the training program has positive consequences and beneficial effects on both children and caregivers after the training program. This finding is also similar to another study by *Joana and Luis (2016),* titled "Feeding a child with cerebral palsy: Parents' difficulties," which found that the parents' answers about the difficulties in feeding their children varied before and after the study and became more aware. These findings support the first research hypothesis.

According to children's body mass index, the present study's findings reveal that the studied children's BMI significantly increased after supportive nursing interventions. This finding could be due to frequent oral training and improving the choice of food quality and quantity. This result is confirmed by *Melunovic et al. (2017),* who found significant differences in all monitored parameters concerning anthropometric parameters of nutritional status in children with cerebral palsy and recommended regular monitoring of the nutritional status of these children to improve the anthropometric measurements. On the other hand, *Adekoje et al. (2016)* recommended that regular nutritional and growth assessment should be an integral part of the overall management of children with CP, and nutritional components should be incorporated into rehabilitation programs for children with CP to facilitate early detection of growth retardation and commencement of appropriate nutritional intervention program.

Regarding the feeding difficulties, there is a statistically significant difference regarding all feeding difficulties in pre and post-supportive nursing interventions among the studied children. An improvement in the feeding difficulties and CP was noticed after the interventions. These findings might be due to the component, persistent training, and focus of the intervention program that targets the different feeding difficulties, the intervention's implementation by the researcher, and the tenacious training of the mothers in caring for their children. This result is supported by *Omar et al. (2017),* who illustrated that newly gained caregiver feeding skills and child feeding skills were seen through their training. There was a highly statistically significant difference in the caregivers' feeding skills gained during feeding through supervised feeding sessions between the studied children with CP in preliminary and final evaluations. These findings support the second research hypothesis.

7. Conclusion

This study concluded that supportive nursing interventions improved the mothers' knowledge of children with cerebral palsy and improved the feeding difficulties of children with CP.

8. Recommendations

In light of the findings of the current study, the following recommendations are suggested:

- Continuous health education programs for mothers of CP children with feeding difficulties and providing them with information about how to increase the nutritional intake of their CP children and decrease the mothers' stress while feeding, as well as for nurses who work with CP children to improve and develop their skills to overcome feeding difficulties and to become a resource person for mothers.
- Periodical checkups of the efficacy of training exercises for children with CP about the sensory oral motor exercises to improve chewing and jaw condition, which are needed for effective feeding.
- Further studies should be conducted to improve the feeding difficulties of children with CP and to assist the mothers in improving their knowledge and skills to overcome feeding difficulties.

9. References

Adekoje, T. O., Ibeabuchi, M. N., Lesi, F. E. A. (2016). Anthropometry of children with cerebral palsy at the Lagos University Teaching Hospital. *Journal of Clinical Sciences. 13*(3), 96-104. https://doi.org/10.4103/2468-6859.185245.

Berger, L. M., & Font, S. A. (2015). The role of the family and family-centered programs and policies. The Future of Children, 25(1), 155–176.

Colver, A., Fairhurst, C., & Pharoah, P. O. (2014). Cerebral palsy. *Lancet, 383*(9924), 1240–1249. https://doi.org/10.1016/S0140-6736(13)61835–8.

El-Tallawy, H. N., Farghaly, W. M., Shehata, G. A., Metwally, N. A., Rageh, T. A., & Abo-Elfetoh, N. (2011). Epidemiology of cerebral palsy in El-Kharga District-New Valley (Egypt). *Brain & Development, 33*(5), 406–411. https://doi.org/10.1016/j.braindev.2010.07.011.

Ferluga, E. D., Archer, K. R., Sathe, N. A., Krishnaswami, S., Klint, A., Lindegren, M. L., & McPheeters, M. L. (2013). Interventions for feeding and nutrition in cerebral palsy [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2013 Mar. (Comparative Effectiveness Reviews, No. 94.) Available from: https://www.ncbi.nlm.nih.gov/books/NBK132442/

Forthun, I., Strandberg-Larsen, K., Wilcox, A. J., Moster, D., Petersen, T. G., Vik, T., Lie, R. T., Uldall, P., & Tollånes, M. C. (2018). Parental socioeconomic status and risk of cerebral palsy in the child: Evidence from two Nordic population-based cohorts. *International journal of epidemiology, 47*(4), 1298–1306. https://doi.org/10.1093/ije/dyy139

Graham, H. K., Rosenbaum, P., Paneth, N., Dan, B., Lin, J. P., Damiano, D. L., Becher, J. G., Gaebler-Spira, D., Colver, A., Reddihough, D. S., Crompton, K. E., & Lieber, R. L. (2016). Cerebral palsy. *Nature Reviews Disease Primers, 2*, 15082. https://doi.org/10.1038/nrdp.2015.82.

Himmelmann, K. (2019). *Children and youth with complex cerebral palsy: care and management*. Edited by Laurie J. Glader, Richard D. Stevenson. London: Mac Keith Press, 2019, pp 384. ISBN: 978-1-909962-98-9. Acta Paediatr.

Joana, M., & Luis, S. (2016). Feeding a child with cerebral palsy: Parents' difficulties, Journal of Nursing Referencia, *IV*(11), 11-19. http://dx.doi.org/10.12707/RIV16041

Kakooza-Mwesige, A., Tumwine, J. K., Eliasson, A. C., Namusoke, H. K., & Forssberg, H. (2015). Malnutrition is common in Ugandan children with cerebral palsy, particularly those over the age of five and those who had neonatal complications. *ActaPaediatrica; 104*(12), 1259–1268. https://doi.org/10.1111/apa.13089.

Kenny, D. J., Koheil, R. M., Greenberg, J., Reid, D., Milner, M., Moran, R., & Judd, P. L. (1989). Development of a multidisciplinary feeding profile for children who are

dependent feeders. *Dysphagia, 4*(1), 16-28. https://doi.org/10.1007/BF02407398.

Kliegman, R. M., & St. Geme, J. W. (2020). Cerebral palsy. Nelson textbook of pediatrics. 21st ed. Philadelphia: Elsevier, 3168-72.

Marret, S. Vanhulle, C., & Laquerriere, A. (2013). Pathophysiology of cerebral palsy, *Handbook of Clinical Neurology, 11*, 169–176. https://doi.org/10.1016/B978-0-444-52891-9.00016-6.

Melunovic, M., Hadzagic-Catibusic, F., Bilalovic, V., Rahmanovic, S., & Dizdar, S. (2017). Anthropometric Parameters of Nutritional Status in Children with Cerebral Palsy, *Mater Sociomedica journal, 29*(1), 68–72. Https://doi.org/10.5455/msm.2017.29.68-72.

National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, (2022). Screening and Diagnosis of Cerebral Palsy. Available at https://www.cdc.gov/ncbddd/cp/diagnosis.html#:~:text=CP%20generally%20is%20diagnosed%20during,is%20a%20few%20years%20older.

Nordqvist, C. (2017). "What is to know about cerebral palsy? "Medical News Today. Retrieved from https:// www.medicalnewstoday.com/articles/152712.php

Novak, I., Morgan, C., Adde, L., Blackman, J., Boyd, R. N., Brunstrom-Hernandez, J., Cioni, G., Damiano, D., Darrah, J., Eliasson, A. C., de Vries, L. S., Einspieler, C., Fahey, M., Fehlings, D., Ferriero, D. M., Fetters, L., Fiori, S., Forssberg, H., Gordon, A. M., Greaves, S., … Badawi, N. (2017). Early, accurate diagnosis and early intervention in cerebral palsy: Advances in diagnosis and treatment. *JAMA pediatrics, 171*(9), 897–907. https://doi.org/10.1001/jamapediatrics.2017.1689.

Omar, O., Khalil, M., Abd El-Ghany, H., Abdallah, A., & Omar T. (2017). Intervention program to improve feeding, swallowing, and nutritional problems in children with cerebral palsy, *Alexandria Journal of Pediatrics*, *30*(3), 85–93. https://doi.org/10.4103/AJOP.AJOP_22_17.

Sellers, D., Mandy, A., Pennington, L., Hankins, M., & Morris, C. (2014). Development and reliability of a system to classify the eating and drinking ability of people with cerebral palsy. *Developmental medicine and child neurology, 56*(3), 245–251. https://doi.org/10.1111/dmcn.12352.

Silva, B. N., Brandt, K. G., Cabral, P. C., Mota, V. V., Camara, M. M., & Antunes, M. M. (2017). Malnutrition frequency among children with cerebral palsy: Differences in onset of nutritional intervention before or after the age of five years. *Rev Nutr., 30*(6), 713–22. https://doi.org/10.1590/1678-98652017000600004.

Stavsky, M., Mor, O., Mastrolia, S. A., Greenbaum, S., Than, N. G., & Erez, O. (2017). Cerebral palsy-trends in epidemiology and recent development in prenatal mechanisms of disease, treatment, and prevention. *Frontiers in pediatrics, 5*, 21. https://doi.org/10.3389/fped.2017.00021.