International Journal of Research and Review
Vol. 10; Issue: 11; November 2023
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

An Examination of Improvement in Swallowing and Speech Production on the Quality of Life Among Children with Cerebral Palsy in Mombasa County, Kenya

Michelle Akinyi Alwala[1], Dr. Mathew Kinyua Karia[2], Dr. Joyce Ogogo[3]

[1]Master's Student Department of Early Childhood and Special Needs Education
[2,3]Lecturer Department of Early Childhood and Special Needs Education, Kenyatta University, Nairobi, Kenya

Corresponding Author: Dr. Mathew Kinyua Karia

DOI: https://doi.org/10.52403/ijrr.20231150

ABSTRACT

The purpose of this research was to examine if an improvement in swallowing and speech production can increase the quality of life among children with Cerebral Palsy (CP). Dynamic Systems Theory by Smith and Thelen (1995) was adopted. Case study design was adopted for the study which allowed a researcher to look into a single subject in depth. Piloting was done at the Association for the Physically Disabled of Kenya (APDK), Mombasa County. Purposive sampling was employed to sample children between 3-8 years of age with Cerebral Palsy. Modified speech assessment tools and a list of the evidence-based swallowing exercises were used to collect data. Data analysis was carried out using both qualitative and quantitative methods. Data was analyzed using Statistical Package for Social Sciences (SPSS, version 24.0) and descriptive statistics of frequencies and percentages were used to summarize the demographic information. Analysis of Covariance (ANCOVA) for the pre-treatment and post treatment engaging swallowing exercises was computed at .05 alpha level. Tables and graphs were used to present the data. A p-value < 0.05 was considered statistically significant if there were differences in the mean ranks of the responses. Findings revealed that before treatment through swallowing exercises, an average of one child with CP could communicate through speech and was able to feed variety of food without problems. However, after the administration of swallowing exercise during the eighth week, an average of children with CP across all the groups were able to communicate through speech and feed a variety of food without help The use of tongue extension, tongue retraction , tongue tip up, elevating tongue towards palate, opening of the jaw, circular movement of the jaw and lip press on tongue depressor had the highest mean rank implying that they had better effects on speech and vocal quality among children with CP under the study. The study concludes that apart from enhancing speech production, swallowing exercises positively impacted on quality of life among children with CP. The study recommends the government should create awareness regarding the need to promote speech therapy courses and medical education to increase the number of available speech therapists.

Key words: *improvement in swallowing exercise; speech production; quality of life; children with Cerebral Palsy*

1.0 INTRODUCTION

There are four stages that are involved in the swallowing process. These are the oral preparatory stage, the oral propulsion stage, the pharyngeal stage and the esophageal stage (Balou, Herzberg, Kamelhar & Molfenter, 2019). Challenges in either of these stages leads to swallowing disorders also known as dysphagia. Swallowing

disorders varies depending on the causes of the disorder, its severity and how it affects the daily life of the individual (Arvedson, Clark, Lazarus, Scholing & Frymark, 2010). In children, swallowing disorders may be as a result of either developmental issues, chronic diseases or progressive weakness of the muscles (Arvedson et al, 2010).

Cerebral Palsy (CP) is a neurological condition that affects the development and posture leading to activity limitation that is linked to non-progressive disturbances. The condition is made up of two terms which are 'cerebral', meaning that the brain is involved and 'palsy' which depicts problems with body movements (Lights & Nelson, 2018). Studies have shown that this condition affects about 1-4 out of 1000 children worldwide (Lights & Nelson, 2018), which is rather a huge percentage. The causes of cerebral palsy can be classified as pre-natal, peri-natal or postnatal. Some of the causes that leads to this condition include: insufficient oxygen to the child's brain during delivery, gene mutations, traumatic brain injuries (TBI), jaundice, infections such as German measles from the mother, herpes simplex, and internal bleeding of the brain (Lights & Nelson, 2018). Children with cerebral palsy usually manifest different characteristics in regards to the level of brain damage and the muscle strength (Cerebral Palsy Alliance, 2018). When a child suffers from one or more of these conditions, their quality of life is usually affected hence intervention strategies should be applied as soon as possible.

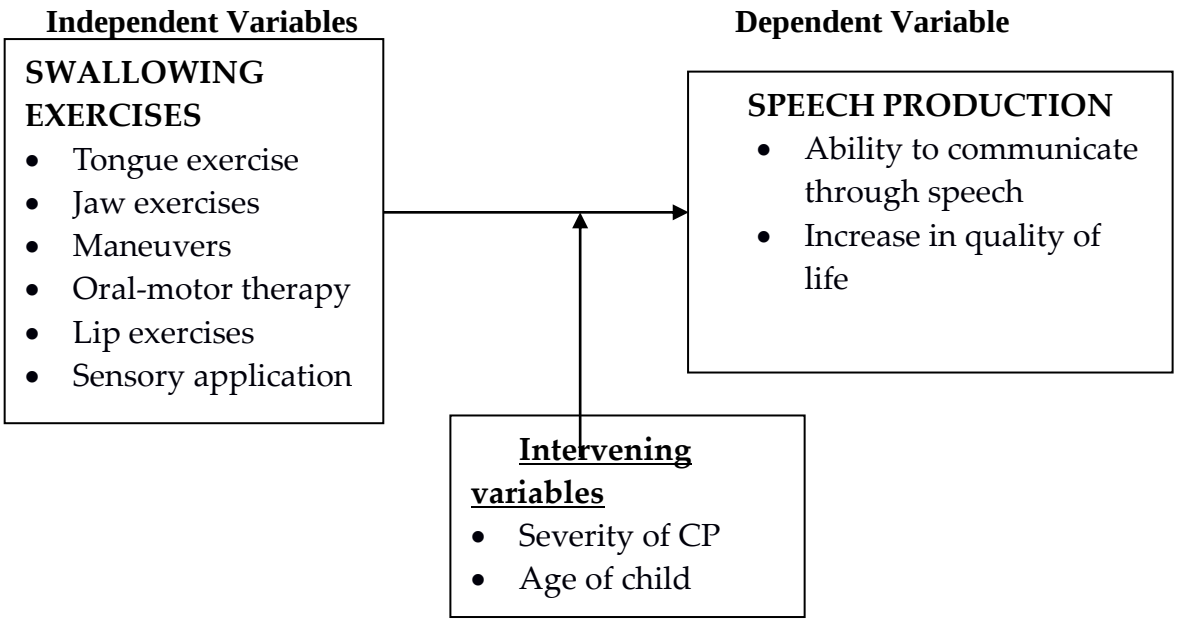
Ward, Leitao and Strauss (2014), discuss several ways children with CP in the United States get interventions including speech therapy to improve on their quality of life. Some of the methods they discuss tackle on swallowing exercises and how they help in feeding for the children, but do not highlight how crucial they are in speech development which was discussed in this research. In Africa, there are very few countries that have speech and language pathologists. South Africa is one of the few countries that offer intervention strategies for dysphagia. Pierpoint and Pillay (2020) in their research talk of the use of swallowing exercises in treating dysphagia but to patients who have suffered from stroke. They however fail to mention whether these exercises can be efficient in speech development for patients with weak oral motor muscles. This study was therefore set to establish the gap on whether the exercises can also be used for speech development.

In Kenya, the only studies that have been carried out on swallowing disorders are majorly intervention strategies for patients who have suffered from stroke. The primary focus when using the exercises are usually just to help the patients with their feeding challenges and not speech. This study however will look into tackling both issues and for children with CP. Statistics show that in Kenya, 3 in every 100 children suffer from cerebral palsy, and families of children with this condition go through a lot of stigmatizations (Kirui, 2018). Swallowing exercises are some of the methods that have been known to aid in the strengthening of muscles to help with feeding. However, the association on how these same exercises can aid in speech production among children with CP is yet to be tackled considering the association between these two variables. As a result, this research sought to establish how various swallowing exercises can be used to assist in speech production among children with CP and the impact it has in their quality of life.

1.3 Purpose of the Study

The purpose of this study was to examine if an improvement in swallowing and speech production can increase the quality of life among children with Cerebral Palsy

Figure 1: Conceptual Framework



2.0 LITERATURE REVIEW

This section discusses the theoretical framework and the literature related to the study topic.

2.1 Theoretical Framework.

This research was guided by the Dynamic Systems Theory (DST), which was developed in 1995 by Smith and Thelen. DST is a theory that has been commonly used in the treatment of children with CP. This is because according to Smith and Thelen (1995), the theory assists in explaining the development of motor skills in an individual and how these skills can be changed (Sauve & Bartlett, 2010). The theory explains the willingness of a child to acquire new motor skills, and this willingness stems from the need to perform a certain task. This theory was extremely relevant to this study, first, because the study was limited to children with cerebral palsy and second, since the variables of the study were related to motor abilities. Swallowing exercises commonly deal with the strengthening of the oral-motor muscles, which with proper guidance, can assist children with CP to achieve the goal once they are put to task.

2.2 Swallowing exercises and speech production on the quality of life of children with Cerebral Palsy

Numerous researches have pointed out the fact that a huge percentage of children with CP are prone to suffer from mobility and communication challenges (Sigan, Uzunhan, Aydnli, Eraslan Ekisi & Caliskan, 2013; Cerebral Palsy Guide, 2018). These children often develop challenges with achieving normal motor-skill milestones such as sitting, rolling and crawling. Their muscles may also both be too floppy or too stiff, and therefore experience involuntary movements and common tremors. Other symptoms that manifest in children with CP include communication problems, pain due to contractures, feeding disorders, excessive drooling, intellectual disability, learning difficulties, hearing and visual impairment, spinal abnormalities and challenges with bowel control (Cerebral Palsy Alliance, 2018). These symptoms manifest mainly in cases where a child suffers from moderate to severe CP which increases their dependency levels.

Quality of Life (QOL) in an individual refers to how one perceives their position in life, in line with the culture, value systems,

lifestyle, goals and expectations within the society (Vardi & Merrick, 2008). The stigma that comes about when a person with Cerebral Palsy who has challenges in feeding and communication is usually immense, especially when in public as it lowers one's self esteem. Tyerman (2014) explains that the inability to communicate effectively can lead to depression as one may lack the inability to freely interact socially. As for children, very few learning institutions can accommodate them due to the high level of dependency and hence a huge percentage end up not accessing formal education. The quality of life of an individual is highly dependent on their ability to fit in the society yet communication challenges can lower a person's quality of life as they are forced to be dependent on others to get their needs met. However, an improvement in feeding and the ability to communicate through speech can go a long way in increasing the quality of life of a person as it enables them to achieve some level of independence, which will be examined in the research once the results from the exercises are achieved.

3.0 METHODOLOGY

3.1 Research Design and Target Population

This study adopted case study research design. Case study designs are majorly used in social, educational, clinical or business fields as they aid in obtaining concrete and in-depth information on particular issues (McCombes, 2020). Swallowing disorders and an increase in the quality of life are fields that have not been explored much in Kenya and hence this design can aid in creating further gaps for future research on the same. The target population in this study were children with cerebral palsy who are between the ages of 3-8 years and had challenges in swallowing and speech production due to weaknesses in the oral-motor muscles. The age bracket also gave room for early intervention of the children. Aside from the learners who were the primary target population, parents, teachers and caregivers of these children were also involved for the purposes of getting case histories and consent of the chosen population.

3.2 Sampling Techniques and Sample size

There are different types of Cerebral Palsy cases, and not all CP related cases suffer from the same ailments. Since this research was limited to those with a weakness in the oral motor muscles hence developing challenges in swallowing and speech, the sampling technique that was used in this study was purposive sampling. This means that the sample population that was used in this study was picked based on the expectations of this study's results. Since the research was done in learning institutions, sending direct mails or phone calls was not used as a means of getting the desired sample population. Instead, the researcher coordinated with the administration of the institutions to obtain the case histories and medical reports of the target population. Through the assistance of the administration, the researcher went on to pick the most suitable subjects for the research. A total of 15 children who have oral-motor problems were picked for the research and this catered for about 15% of the entire population within the institution, which was statistically significant given the nature of this study.

3.3 Research Instruments and Data Collection

The instruments that were used to carry out this study included a list of evidence-based swallowing or oral motor exercises, an adapted articulation assessment tool and an assessment tool commonly used for patients with dysphagia that aided in obtaining the required information for proper analysis of the study. This list of swallowing exercises assisted the researcher in discovering the most efficient exercises that aid in both swallowing and speech production for target population as per the objectives of the study. The other instrument that was used in the study is an adapted articulation assessment

tool. The tool was adapted by the researcher since the target population may not have the ability to produce the target sound as per the ages highlighted in the tool due to the oral-motor challenges. The researcher continuously administered the tools for the study during each session and all results were recorded on the checklist. The research took place twice a week for a period of 8 weeks, and the participants were divided in groups of 3 per session.

3.4 Pilot study

A piloting study was done to ensure that the research instruments used for the actual study were valid and relevant. This was done to a different and smaller population which have similar characteristics to that of the main study. The piloting study was carried out at The Association for the Physically Disabled of Kenya (APDK), Mombasa Branch. APDK Mombasa was started in 1971 for the sole purpose of offering therapy services to persons who are physically handicap within the Coast Province (APDK, n.d). For the validation of the research's hypothesis validity refers to measuring what is intended to be measured (Taherdoost, 2016). The validity of the two research instruments that were used during this research was done by two supervisors from the Department of Early Childhood and Special Needs Education within the school. Professional lecturers from the School of Education in Kenyatta University will also verify the validity of the instruments. Reliability was performed using Cronbach's Alpha to establish internal consistency of the items on the questionnaire. The Cronbach's Alpha reliability coefficient value for this instrument was 0.85, thus was considered reliable and the instruments were accepted.

3.5 Data Analysis

The researcher incorporated both the qualitative and quantitative methods of data analysis for this research to explain the objectives of the study. The qualitative descriptive analysis of this research was obtained through the results that were obtained from the research tools. The data was then organized and categorized in line with the similarities and differences that were recorded, after which coding of the same was done for an easier analysis. Data was then entered into the computer program Statistical Package for Social Sciences (SPSS) version 24 for data analysis. Demographic characteristics of the participants were analyzed and summarized with the use of frequencies and percentages. Analysis of Covariance (ANCOVA) for the pre-treatment and post treatment engaging swallowing exercises was computed at .05 alpha level. Tables and graphs were used to present the data. A p-value < 0.05 was considered statistically significant if there were differences in the mean ranks of the responses.

4.0 RESULTS AND DISCUSSIONS

4.1 Demographic Information

The demographic characteristics of the respondents constituting gender, and age are presented in the following sub-sections.

Figure 2: ***Respondents by Gender***

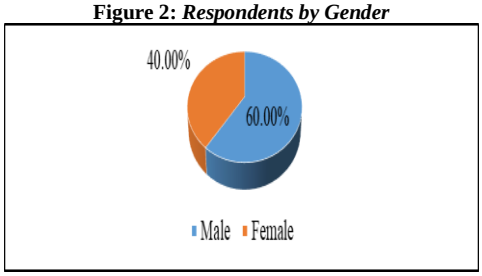
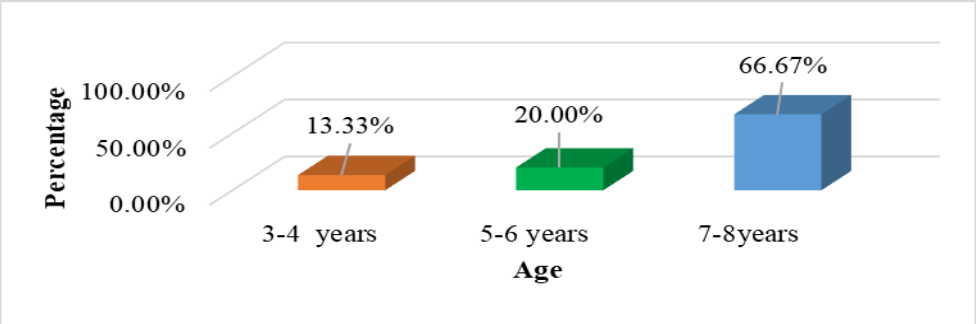


Figure 2 indicates there were more male (60.0%) than female (40.0%) respondents. This finding imply that cases of cerebral palsy were comparatively more in male children than those in female children. This finding agrees with that of Jarvis et al. (2015) on case gender and severity in cerebral palsy which indicated that as growth deviates, there is higher rate of cerebral palsy and more severity in functional disability among male as compared to the female children. Among singleton children with cerebral palsy, abnormal intrauterine size, either small or large, is linked to more severe disability and male sex. This is attributed to the fact that

male babies are less mature for their gestational age both in skeletal ossification and also in cerebral maturity as determined by stimulus habituation (Jarvis et al., 2015).

Figure 3: ***Age of the Respondents***



The results in Figure 3 the age category indicate that majority (66.67%) of the participants were of age between 7-8 years, followed by those between 5-6 years at 20.0% while those of the age between 3-4 years were the least at 13.33%. The findings show that majority of the children with oral-motor difficulties aged above 5 years implying that there are higher chances of survival at later age than during early stages. This is attributed to the fact that severity of cerebral palsy reduces with the growth and development if early interventions are put in place. This is supported by Harrop and Mbrombley (2012) who revealed that around 18% of children with CP die in childhood as a result of respiratory illness, severe epilepsy or gastrointestinal problems.

4.2 Impact of enhanced swallowing and speech production on quality of life among children with Cerebral Palsy

To achieve this study objective, researcher introduced the swallowing exercises and recorded the findings of each participant in the checklist. The participants were divided in groups of 3 per session. McHorney (1999) talks of a Health-related quality of life concept (HRQOL) whereby the QOL is measured by either the health, mental or physical state of an individual. Table 1 presents the analysis of five groups only for the first week and the last week.

Table 1: ***Level of Attainment of Quality of Life among children with CP from the Checklist:***

Group	**Attribute**		**Wk1**		**Wk8**	
			YES	NO	YES	NO
1st group	Can communicate through speech	F	F	1	2	3
		%	%	6.67%	13.33%	20.00%
	Able to feed variety of food without problems	F	0	3	3	0
		%	0.0%	20.0%	20.0%	0.0%
2nd group	Can communicate through speech	F	0	3	3	0
		%	0.0%	20.0%	20.0%	0.0%
	Able to feed variety of food without problems	F	1	2	3	0
		%	6.67%	13.33%	20.00%	0.00%
3rd group	Can communicate through speech	F	1	2	3	0
		%	6.7%	13.3%	20.0%	0.0%
	Able to feed variety of food without problems	F	1	2	3	0
		%	6.67%	13.33%	20.00%	0.00%
4th group	Can communicate through speech	F	0	3	3	0
		%	0.0%	20.0%	20.0%	0.0%
	Able to feed variety of food without problems	F	1	2	3	0
		%	6.7%	13.3%	20.0%	0.0%
5th group	Can communicate through speech	F	0	3	3	0
		%	0.0%	20.0%	20.0%	0.0%
	Able to feed variety of food without problems	F	1	2	3	0
		%	6.7%	13.3%	20.0%	0.0%
Average			0.6		5.0	

N=15

Key: Y=Yes; N=No

Results on Table 1 show that before treatment through swallowing exercises, an average of 1 child with CP could communicate through speech and was able to feed variety of food without problems (Average mean=0.6). However, after the administration of swallowing exercise during the eighth week (week 8), an average of 5 children with CP (mean=5.2) across all the groups were able to communicate through speech and feed a variety of food without help. Mean and standard deviations for the attributes of quality of life among children with CP for pre-treatment and post treatment. Results are as presented in Table 2.

Table 2: ***Mean and standard deviations for the attributes of quality of life for pre/post treatment***

	Phase of the treatment	N	Mean	Standard deviation	t-value
Ability to communicate through speech	Pre-treatment (1st week)	15	1.34	0.10	27.897***
	Post-treatment (8th week)	15	1.80	0.07	
Ability to feed variety of food without problems	Pre-treatment (1st week)	15	4.30	0.19	41.786***
	Post-treatment (8th week)	15	5.36	0.17	

*****p < 0.001.**

Results on Table 2 show that the mean score for ability to communicate through speech increased from 1.34 before treatment through swallowing exercises to 1.80 after the treatment (post-treatment) during the 8th week and was significant at p<.001 (t=27.897). Similarly, the results indicate that show that the mean score for the ability to feed variety of food without problems for children with CP increased from 4.30 before treatment through swallowing exercises to 5.36 after the treatment (post-treatment) during the 8th week and was significant at p<.001 (t=41.786). These findings imply that apart from enhancing speech production, swallowing exercises positively impact on quality of life among children with CP. The major challenges that therefore need to be curbed include mobility and communication challenges that are manifested in a huge percentage of children with CP (Cerebral Palsy Guide, 2018).

Findings of this study further show that ability to communicate through speech and to eat variety of foods without problems does not fully develop among children with CP after treatment exercise but rather improve. However, if not treated through proper interventions it may lead to depression and withdrawal among children with CP. In agreement with the findings of the current study, Tyerman (2014) explains that the inability to communicate effectively can lead to depression as one may lack the inability to freely interact socially.

The findings of the current study further imply that the ability of feeding on a variety of food further persist but at a decreasing rate amid the periodic oral motor exercise (OME). Arvedson (2013) supports this finding when he discovered that children with cerebral palsy (CP) are at risk for aspiration during oral feeding, which can have serious pulmonary effects, and they often have poor nutrition and hydration, as well as extended stressful meal times. The nature and severity of swallowing issues varies greatly among young children, whose demands fluctuate throughout time. Children with generalized severe motor impairment (such as spastic quadriplegia) are more likely to have swallowing problems than children with diplegia, however oropharyngeal dysphagia can occur even in children with mild CP.

5.0 CONCLUSIONS

Although all types of swallowing exercises have significant differences in covariance in the pre-treatment stage, there are statistical differences found after controlling for results for post-treatment in tongue exercises, jaw exercises, and lip exercises. It is evident that swallowing exercises improved the ability to feed variety of food without problems and communicate through speech among children with CP. It is therefore deemed to conclude that apart from enhancing speech production,

swallowing exercises positively impact on quality of life among children with CP.

6.0 RECOMMENDATIONS

The government should create awareness regarding the need to promote speech therapy courses and medical education to increase the number of available speech therapists.

There is need to research further on alternatives modalities such as laser therapy or currently available modalities used for treatment and match them appropriately with the needs of the conditioned children so as to enhance their oral-motor muscles that would result into successful treatment.

There is need for a comparative study on the impact interventions such as oral appliances on sensorimotor skills.

About the Author(s)

Michelle Akinyi Alwala is an Adult Instructor at the Chief's Camp Ngong Educational Centre. She is a Master's Degree holder in Special Needs Education (Speech and Language Pathology) at the Department of Early Childhood and Special Needs Education in the school of Education Kenyatta University, Kenya. Her hobby is advancing in research of learners with speech and language pathology disabilities.

Dr. Mathew Kinyua Karia (PhD) is a Lecturer in the Department of Early Childhood & Special Needs Education (Speech & Language Pathology Program)-Kenyatta University (Nairobi-Kenya). He teaches in the area of Speech and Language Pathology. He is also a consultant in the field of Speech and Language Pathology. His research interests are in the area of Speech and Language Pathology, Hearing Impairment, Inclusive Education, Neurolinguistics, Phonetics, and Phonology. He is also working in various Kenyan hospitals as a consultant speech therapist as well as a volunteer speech therapist with Operation Smile Inc., a USA based NGO as well as Starkey Hearing Foundation. Dr. Karia holds a Doctor of Philosophy (Phonetics/Speech & Language Pathology) from Cologne University (Germany), M.A (Linguistics/ Phonology) from Kenyatta University (Kenya), and B.Ed (Arts-English/Literature) from Kenyatta University.

Dr. Ogogo Joyce Achieng (PhD) is a Lecturer in the Department of Early Childhood & Special Needs Education (autism spectrum disorders)-Kenyatta University (Nairobi-Kenya). Area of Specialization: Autism and Developmental Disabilities (ADD) ; Inclusive Education; Intellectual Disabilities & Emotional and Behaviour Disorders. Research Interests: Autism Spectrum Disorders, Intellectual Disabilities, and Emotional and Behavioral Disorders; BCBA Specialist; Inclusive Education. Self-Drive: Team player; Works with minimal Supervision; Obedient and humble; Social Justice Crusader.

Declaration by Authors

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Arvedson, J. C. (2013). Feeding children with cerebral palsy and swallowing difficulties. *European journal of clinical nutrition*, *67*(2), S9-S12.
2. Arvedson, J., Clark, H., Lazarus, C., Schholing, T. & Frymark, T. (2010). The effects of oral-motor exercises on swallowing in children: an evidence-based systematic review. *Dev Med Child Neur*, 52(11), 1000-13.
3. Balou, M., Herzberg, E.G, Kamelhar, D. & Molfenter, S.M. (2019). An intensive swallowing exercise protocol for improving swallowing physiology in older adults with radiographically confirmed dysphagia. *Clinical Intervention Aging*, vol 14, pp 283-288, doi: 10.2147/CIA.S194723
4. Cerebral Plasy Guide (2018). *Cerebral Palsy Treatment*. Retrieved from https://www.cerebralpalsyguide.com/treatment/Last modified 3rd January, 2020.

5. Harrop, E., & Brombley, K. (2012). Vulnerability factors considered for acceptance of children with cerebral palsy or other static neurological condtions to children's hospice services. *Together for Short Lives*.
6. Jarvis, S., Glinianaia, S. V., Arnaud, C., Fauconnier, J., Johnson, A., McManus, V., & Krägeloh-Mann, I. (2015). Case gender and severity in cerebral palsy varies with intrauterine growth. *Archives of disease in childhood*, *90*(5), 474-479.
7. Kirui, D. (2018). *In Kenya, Having a Child with Cerebral Palsy can mean Losing your Job*. Retrieved Feb 21, 2018, from https://www.newsdeeply.com/womensadvancement/articles/2018/02/21/in-kenya-having-a-child-with-cerebral-palsy-can-mean-losing-your-job
8. Lights,V.& Nelson, J. (2018). *Cerebral Palsy*. Retrieved Aug 17, 2018, from https://www.healthline.com/health/cerebral-palsy
9. McHorney, C. (1999). Health status assessment methods for adults: Past Accomplishments and Future Challenges1. *Annu. Rev. Public Health*, *20*(1), 309-335. http://dx.doi.org/10.1146/annurev.publhealth.20.1.309
10. Pierpoint, M. & Pillay, M. (2020). Post-stroke dysphagia: An exploration of initial identification and management performed by nurses and doctors. *South African Journal of Communication Disorders*, 67(1): 625. doi: 10.4102/sajcd.v67i1.625
11. Sigan, S. N., Uzunhan, T.A., Aydnli, N., Eraslan, E., Ekici, B.& Caliskan, M. (2013).Effects of oral motor therapy in children with cerebral palsy. *Ann Indian Academy Neurology*, 16, 342-6
12. Suave, K. & Bartlett, D. (2010). *Dynamic Systems Theory: A Framework for Exploring Readiness to change in Children with Cerebral Palsy*. Retrieved 2010, from https://www.canchild.ca/en/resources/36-dynamic-systems-theory-a-framework-for-exploring-readiness-to-change-in-children-with-cerebral-palsy
13. Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. *SSRN Electronic journal*, 5(3), 28-36.
14. Tyerman, J. A. N. E. (2014). *Registered nurses' experiences of care for individuals with mental health issues in the emergency department* (Doctoral dissertation, Queen's University).
15. Vardi, G., & Merrick, J. (2008). Neurological disorders: Public health challenges. *Journal of* Policy *and Practice in Intellectual Disabilities*, *5*(1), 75–75. doi:10.1111/j.1741-1130.2007. 00143.x
16. Ward, R., Leitao, S. & Strauss, G. An evaluation of the effectiveness of prompt therapy in improving speech production accuracy in six children with cerebral palsy. *International Journal of Speech-Language Pathology*, 16(4), https://www.tandfonline.com/doi/full/10.3109/17549507.2013.876662

How to cite this article: Michelle Akinyi Alwala, Mathew Kinyua Karia, Joyce Ogogo. An examination of improvement in swallowing and speech production on the quality of life among children with cerebral palsy in Mombasa County, Kenya. *International Journal of Research and Review*. 2023; 10(11): 427-435. DOI: *https://doi.org/10.52403/ijrr.20231150*

******