



Effects of Spider Cage Therapy in Combination with Conventional Speech Therapy on Speech and Language Function in Children with Cerebral Palsy of Age between 05 and 15 Years

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Objective: The objective of study was to determine the effects of spider cage therapy in combination with conventional speech therapy on speech and language function in children with cerebral palsy of age between 05 And 15 Years.

Materials and Methods: A total of 20 children from a special institute with cerebral palsy who were provided with spider cage therapy in combination with conventional speech therapy were evaluated from January 2017 to June 2017. Effect of spider cage therapy in combination with conventional speech therapy was determined by applying dysarthric profile revised before and after the treatment.

Results: Baseline score on dysarthric profile was 34.76±2.67 and post intervention score was 69.93±8.14. Result indicated that out of 20 children with cerebral palsy, there was a statistically significant difference in total score.

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Conclusion: The findings suggested that the Mean score of spider cage therapy in combination with conventional speech therapy post treatment in children with cerebral palsy was improved. On the basis of this study it is concluded that speech therapy in combination with conventional speech therapy is more effective in children with cerebral palsy.

Keywords: Cerebral palsy; spider cage therapy; speech therapy; physiotherapy.

1. INTRODUCTION

Cerebral palsy is the combination of two words. The former “Cerebral” means “Cerebrum” whereas the “Palsy” described disorder of movements or being a weakness [1]. So mingling these two terms simply described that this disorder (CP) is related to moving and posture resulted from a problem in cerebrum or the brain part which controls the movements of body [2]. Therefore, during this disorder a person can neither perform different actions and activities nor move his muscles properly. Such a disorder has a broad sense with reference to many other problems associated with brain that are present in CP other than the movement and posture. This problem is not only caused by a brain injury but also by a poor development of the brain during initial development stages [3]. However, there no specific treatment available currently to restore the patient to complete recovery of health once suffered by cerebral palsy but there different management alternatives to survive with his best . These management plans include support, therapy, education, medication and surgery [4]. The use of these options, function and quality of life can be boosted up [4]. In accordance with a reliable estimation it is believed that in each 1000 live births, even 7 will develop cerebral palsy among that 35% will fall in most severe cases [5]. Now every year 10,000 infants and babies as well show a record with this disorder and this disorder (CP) is, among the children, a very common disease [5]. There are multiple factors responsible due to which brain damage is caused resulting in CP before, after and during the course of birth. Along with other brain-related disabilities in CP like sitting, walking, speaking and writing etc., they also have dysphagia that is difficulty faced while swallowing during feeding [6]. Dysphagia is a medical state during which a person is unable to swallow food or different consistencies. It may be caused by the nerve damage or any other physical and structural abnormality. Dysphagia is 99% prevalent in severe cases of cerebral palsy but over 40% of cases of cerebral palsy may have Dysphagia during initial stages of their life [6]. A brain of a premature neonate is at risk

because of two main pathologies for example periventricular leukomalacia (PVL) and intraventricular hemorrhage (IHV) [7]. In the persistence of the pathologies of brain and specially periventricular leukomalacia, the neonate is at more risk of suffering from cerebral palsy PVL express white matter is damaged in the periventricular region. Corticospinal paths are created by the descending motor axons as they flow through the path of periventricular region [8]. As per this term, there is a bleeding into the brain’s ventricles from the subependynal matrix being the basis of brain cells in the fetus [9]. The formation of blood vessels starts in the late third trimester of gestation period, therefore, the periventricular vessels in preterm infant are underdeveloped which affect these infants to increase the risk of intraventricular hemorrhage and at last causing greater risk of cerebral palsy [10]. Intraventricular hemorrhage is a predisposing cause for periventricular leukomalacia (PVL) but still it is another separate pathological procedure [10]. There exist two main factors which are involved in its pathogenesis, ischemia/Hypoxia and infection and inflammation [10]. Distal segments of neighboring cerebral arteries of periventricular region supplies the white matter of that region in neonatal brain [11]. The blood flows from two arterial sources protects this are in case one artery is blocked (e.g. Thromboembolic stroke) and neonates have less cerebral blood flow, it can cause ischemia to periventricular white matter [11]. Under this process, the brain macrophages known as microglia, activates release cytokine. The cytokine damages the oligodendrocytes being the specific cell type in the developing brain [12]. They are extremely essential for the development of white matter [12]. Excitotoxicity being a process in which calcium influx is increased by the stimulation of oligodendrocytes when extracellular glutamate levels develops and influences the release of reactive oxidative species [12]. White matter cells reduce we update off glutamate due to hypoxia and, therefore, glutamate increases [13]. When inflammatory response occurs, Microglial cells also release glutamate. We have there four significant types of this disorder (CP) [13] That

contains Spastic disorder of (CP) ; athetoid cerebral palsy; Ataxic disorder of (CP) and amalgamated disorder of (CP) [13]. General signs and symptoms among the minors suffering from this disorder (CP) are Stiffness in certain part of the body, contractures (permanently tightened muscles or joints), and reflexes are awkward, abnormal gait, feeding problems, posture issue, floppiness in limbs, rigidity and stiffness of body [13].

The cage Therapy Unit being an individual source contains a system of pulleys, straps, and splints is used executing multiple exercises [14]. This medium increases strength, passive and swift continuity in motion, and muscular elasticity. By using the medium, the therapist is in a position to separate any group of muscle & target. Under these circumstances, the muscle tone (increased often) can't affect movements. This permits the groups of muscle to counteract the spastic muscles [14]. The gait standard, balance, & movements co-ordination progresses quickly. What is the key components cage therapy Unit is equipped with? There we have "Monkey Cage" being a triangle-shaped solid metal cage wherein are fitted metal pulleys for the groups of muscle to expand and become strong. There is a leather belt with "Spider Cage", therapist wherein bungee cords are connected. Thus a victim gets support and is in a position to safely learn weight, jump, and kneel, half-kneel and puts up and over step objects. The "spider cage" being the elective gadget is used to implement neuron-Development treatment (NDT), being individually most popular and methods clinically accepted for "re (programming)" the network of the central nervous and neuromuscular along with "learning" the brain extra appropriate motor expertise [15]. It is an active orthotic containing a cap, vest, shorts, knee pads and specifically assumed shoes connected mutually to flexible bands. Primary function of Advanced Spider Suit being that it creates the source that supports in aligning the body closest to normal by setting up precise postural symmetry and load tolerance again that being a basic within normal muscle tone, sensory and vestibular activities [16].

2. METHODOLOGY

The study design was a quasi experimental. Study was conducted at Riphah International University Lahore Campus collecting data from Lahore, Pakistan. The study was completed within 6 months January 2017 to June 2017. The sample size was 20 calculated by effect size

using mean score difference and standard deviation from a study conducted by Liaqat and colleagues [17]. Sample was selected by using convenient sample technique. Dysarthric profile revised was used to collect the data [18]. Interventions were given five days in a week for 03 months, total 60 sessions. The duration of single session was 40 minutes. Interventions were universal exercise unit and conventional therapy. Universal exercise unit was used in different posture like sitting, standing, walk standing, knee standing and performing conventional speech therapy at the same time. In conventional therapy we used tongue strengthening exercises, jaw exercises, lip closure, lip rounding, lip stretching, drooling exercises and tongue protruding exercises.

3. RESULTS

We selected total 20 children. 12 children were with age between 05 to 09 years and 8 children were with age between 10 to 15 years. Maximum age was 15 years and minimum age was 05 years and mean age was 11 years. 13 children were male and 07 were female. We include two types of cerebral palsies i.e. spastic and athetoid. 15 children were with spastic cerebral palsy and 05 were with athetoid cerebral palsy. Overall scores from the dysarthria profile (revised) scoring form indicated that there is a significant relation of the spider cage therapy as compared to conventional speech therapy on speech and language function during which children with cerebral palsy of age between 05 and 15 years. The group that received spider cage therapy coupled with conventional speech therapy indicated a substantial progress after almost two months. Out of 20 children with CP 13(65.0%) were male and 7(35.0%) being female. Mean age of children was 9.35 ± 2.85 years. Baseline score on dysarthric profile was 34.76 ± 2.67 and post intervention score was 69.93 ± 8.14 . Result indicated that out of 20 children with cerebral palsy, there was a statistically significant difference in total score.

Table is showing that pre and post measurements with standard deviation. Wilcoxon signed rank test was used to compare the mean score between pre and post measurements and it is concluded that on basis of test statistics that there is significant difference between pre and post groups. Baseline score on dysarthric profile was 34.76 ± 2.67 and post intervention score was 69.93 ± 8.14 . Result indicated that out of 20 children with cerebral palsy, there was a statistically significant difference in total score.

Table 1. Baseline versus post intervention

| Dysarthric profile | Baseline | | After 02 Months with combination therapy | | Wilcoxon signed rank test statistics P<0.05 |
|--------------------|----------|------|--|-------|---|
| | Mean | SD | Mean | SD | |
| Respiration | 5.35+ | 2.32 | 12.12 | 4.44 | 0.00 |
| Phonation | 15.64+ | 4.78 | 24.32 | 9.12 | 0.00 |
| Articulation | 5.45+ | 3.2 | 6.43 | 4.67 | 0.00 |
| Intelligibility | 5.69+ | 2.89 | 10.09 | 3.23 | 0.00 |
| Facial Musculature | 2.97+ | 1.02 | 5.32 | 25.44 | 0.00 |
| Diadochokinesis | 3.21+ | 1.03 | 11.65 | 2.44 | 0.00 |
| Total Score | 34.76+ | 2.67 | 69.93 | 8.14 | 0.00 |

4. DISCUSSION

This study aims to investigate the effects of spider cage therapy in combination with conventional speech therapy on speech and language function in children with cerebral palsy of age between 05 and 15 years. This study shows the responses of CP children after spider cage therapy in combination with conventional speech therapy on speech and language function to different tasks. The present study showed that improvement of language performance in spider cage therapy in combination with conventional speech therapy was observed. Overall scores from the dysarthric profile (revised) scoring form indicated that there is a significant relation of the spider cage therapy in combination with conventional speech therapy on speech and language function in children with cerebral palsy of age between 05 and 15 years. Results of this study is similar to study conducted by Liaqat and colleges in that sense they also used universal exercise unit in their therapy and population of study was also children with cerebral palsy. The difference in this study was that they find the effects on gross motor functions and in this study we explore the effects on speech therapy [17]. Results of this study is also similar the previous study conducted by Mubashara and colleagues [19], they used universal exercise unit along with conventional physiotherapy technique to explore the effectiveness of this therapy; their results were significant pre to post measurement. The difference between this research and our study is that they used the gross motor functional measure as a outcome measurement tool and we used dysarthric profile as a outcome measurement tool.

5. CONCLUSION

The findings suggested that the Mean score of spider cage therapy in combination with

conventional speech therapy post treatment in children with cerebral palsy was improved. On the basis of this study it is concluded that speech therapy in combination with conventional speech therapy is more effective in children with cerebral palsy.

CONSENT

As per international standard, parental written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

An ethical approval was taken from university ethical review committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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