

A STUDY TO COMPARE THE EFFECTIVENESS OF ORO MOTOR REHABILITATION AND CRANIAL NERVE MANIPULATION IN DECREASING DROOLING AMONG CHILDREN WITH SPASTIC CEREBRAL PALSY

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ABSTRACT

Effectiveness of Oro Motor Rehabilitation versus Cranial Nerve Manipulation in Management of Drooling among Children with Cerebral Palsy.

BACKGROUND: Drooling is a major issue among children suffering from cerebral palsy which can also affect the quality of life of the children and their parents. There are different therapeutic interventions for drooling management. The current study was conducted to make out the effectiveness of oro motor rehabilitation and cranial nerve manipulation in management of drooling among children with cerebral palsy. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, behavior, epilepsy and secondary musculoskeletal problems.

METHOD: The study analyzed 30 children and they were separated into 2 groups. Each group with 15 children Group A (Oro Motor Rehabilitation) and B (Cranial Nerve Manipulation). Both the group A and B treated for the duration of 6 months. After the treatment session both groups were assessed with drooling quotient assessment (DQ).

RESULT: Both the group had a significant improvement. But more comparatively cranial nerve manipulation (group B) was found effective than oral motor rehabilitation (group A)

CONCLUSION: Cranial nerve manipulation was found effective when compared to oral motor rehabilitation in decreasing drooling in children with cerebral palsy

INTRODUCTION:

Cerebral Palsy is a group of chronic disorders of the development of movement and posture, causing activity limitation that attributes to non-progressive disturbances⁽¹⁻⁴⁾.

It is the most common causes of severe physical disability in childhood with an estimated prevalence of 2.4 per 1000 children⁽⁵⁻⁷⁾.

The motor disorders of cerebral Palsy are often accompanied with disturbances of sensation, perception, cognition, and communication, behavior by epilepsy and by secondary musculoskeletal problems⁽¹¹⁻¹⁴⁾.

Cerebral Palsy is classified in relation to predominate motor characteristics such as spastic, hypotonic, athletic, dystonic and ataxic as well as topographical pattern of limb involvement. Such as monoplegia, diplegia, triplegia, hemiplegia or quadriplegia ⁽¹⁵⁻²⁰⁾.

Saliva is the watery and usually frothy substance produced in and secreted from the three paired of major salivary (parotid, submandibular and sublingual) glands ⁽⁵⁾ and several hundred minor salivary glands, composed mostly of water, but also includes electrolytes, mucus, antibacterial compounds and various enzymes ⁽²⁶⁻³²⁾.

Healthy persons are estimated to produce 0.75 to 1.5 liters of saliva per day. At least 90% of the daily salivary production comes from the major salivary glands while the minor salivary glands produce about 10% ⁽⁴⁰⁻⁴⁴⁾.

Drooling is the unintentional, involuntary loss of saliva from the mouth due to a lack of control secretions (LalL&Hotalin, 2006, p . 381)⁽²³⁻²⁴⁾ It is a normal phenomenon of infancy that subside usually by 15-18 months as a consequence of physiological maturity of oro motor function⁽²³⁻²⁵⁾.

Drooling children frequently have irritated facial skin, foulodour and in cold weather, the dampness from saliva in chilling. Dehydration experience can be recurrent problem due to chronic fluid loss. They may also damage belonging books, toys, computer and other communication aids ⁽²³⁻²⁹⁾.

Other factors contributing to drooling are the child emotional state, head position, sitting posture, concentration, decreased oral sensory awareness and ability to breathe through the nose. A number of these factors have been investigated in relation to drooling and in all instances a positive correlation was found with the severity of drooling (Bushan2010) ⁽³⁰⁻³⁴⁾.

Drooling is rarely caused by an increase in the production of saliva, commonly known as hyper salivation or primary sialorrhea (Mathur et al, 2006; Senner, Logemann, Zecke, Gaebler-Spira, 2004).

Primary sialorrhea is usually caused by inflammation, such as during teething; dental caries; mouth infections; rabies; certain medications; as a side effect from the use of tranquilizers or anti-convulsants; toxin exposure (mercury vapor); gastro esophageal reflux (Hockstein et al, 2004; Winstock, 2005).

Swallowing studies of Cerebral Palsy children point to three areas of difficulty: incomplete lip closure; low suction force; and a prolonged delay between suction and the backwards propelling of food stages (Lespargot, Langevin, Muller & Guillemont 1993).

Excessive pooling of saliva from the anterior portion of the mouth and the unintentional loss of saliva from the mouth are the result (Brodsky, 1999; Meningaude et al, 2006). This is known as secondary, anterior drooling.

Drooling occurs in about one in two children affected with motor neuron disease and one in five needs continuous saliva elimination its prevalence is about 70% in Parkinson disease, and between 10 to 80% in patients with cerebral palsy.

It can be broadly divided into surgical and non-surgical approach. Surgical technique involves either the transplantation of parotid duct, the removal of salivary gland, sectioning of chorda tympanic and tympanic nerve or combination of these procedures (54-57).

Non-surgical includes pharmacological therapy, radiotherapy, oral motor therapy and behavior therapy; pharmacological therapy includes anticholinergics, scopolamine, benztropine and glycopyrrolate. Botulinum toxin an injection to salivary gland has been found to reduce drooling (Robert, 2013) (59-62).

Oro motor rehabilitation: It refers to stimulation of muscles of the face for strength and coordination. For chewing and swallowing children need to have the right amount of strength, range of motion and coordination (1-4).

Oral motor therapy facilitates normal oral motor patterns. It uses different ways like pressure, tapping the cheeks, stretching the mouth and stroking of the cheeks which are intended to improve jaw stability, mouth closure, and increase in tongue mobility, strength, sensory awareness and decrease in hypersensitivity (64-67).

The exercises are targeted to decrease drooling or loss of saliva out of oral cavity. Exercises should be repeated several. Child must exert as much effect as possible to gain the maximum result from these exercises (Becker 2002)(70-72).

Cranial Nerve Manipulation: Manipulation is the act, process, or an instance of manipulating especially a body part by manual examination and treatment especially: adjustment of faulty structural relationships by manual means (as in the reduction of fractures or dislocations or the breaking down of adhesions). There is a four major nerve they are trigeminal nerve, facial nerve, glossopharyngeal nerve, and hypoglossal nerve are involved in drooling among cerebral palsy children.

METHODOLOGY:

Aim of the study: The aim of the study is to reduce drooling difficulties. Sucking, swallowing and chewing difficulties in patients with spastic type of cerebral palsy using oro motor rehabilitation and cranial nerve manipulation. To compare the effects of oro motor rehabilitation and cranial nerve manipulation in decreasing drooling in children with spastic cerebral palsy.

Objective of the study: The objective of my study is to evaluate the effectiveness of oro motor rehabilitation and cranial nerve manipulation in decreasing drooling among children with spastic cerebral palsy.

- Study design: pre and post group study.
- Study type: comparative study.
- Study setting: Multi centered study.
- Sample size : 30 subjects
- Data collection method and instrumentation: Drooling severity and frequency scale.

Drooling quotient scale.

- Study period: 6 months.
- Inclusion Criteria:

1. Spastic cerebral palsy age 8-18 years.
2. Both male and female.
3. Understand and follow the instruction.
4. Good cooperation allowing for DQ - Drooling Quotient measurement in two periods of ten minutes session (while they are focusing and while they are distracted).
5. Scholastic ass

- Exclusion criteria:

1. Children with visual, auditory, vestibular or perceptual deficit.
2. Other neurological and cardio respiratory conditions like: Epilepsy, Mental disorder, tetralogy of fallot.
3. Other conditions like: Cold sores, gum bleeding, tooth abscess.
4. Inability to obtain the DQ score or to follow the steps required in measurement procedures.
5. Non cooperative patients.
6. Incomplete medical records or missing data on any of the measurement outcomes.

- **STUDY METHOD:** 30 Subjects satisfying the inclusion criteria and exclusion criteria were selected convenient sampling techniques.

PROCEDURE:

- The subjects were selected according to the inclusion between the age group of 8yrs to 18yrs.
- Their parents were explained about safety, simplicity of the procedure, possible risks and potential preventive measures.
- The pre and post test value was statistically analyzed using paired-t test and documented with appropriate graphical representation.
- 30 spastic cerebral palsy children randomly distributed into two groups and participating in this study. Group A and Group B , each group consists of 15 samples. Oro-motor rehabilitation was applied to Group A and Cranial Nerve Manipulation was applied to Group B.

GROUP A: (ORO MOTOR REHABILITATION)

- Group A was given oro motor rehabilitation by applying Icing, Brushing, pressure, Tapping the cheeks, Stretching the mouth, Stroking
- Of the cheeks, Oro motor sensory exercise.



GROUP B: (CRANIAL NERVE MANIPULATION)



MANIPULATION OF THE SUBOCCIPITAL NERVE



MANIPULATION OF EYELID



MANIPULATION OF THE FACIAL NERVE



GLOSSOPHARYNGEAL NERVE

HYPOGLOSSAL NERVE:



OUTCOME MEASURES:

1. Drooling severity and frequency scale
2. Drooling Quotient

DROOLING SEVERITY AND FREQUENCY SCALE:**STASTICAL ANALYSIS:**

The collected data were tabulated and analyzed using inferential statistics to assess the entire parameters mean and the standard deviation was used. To find out significant changes within the group of pre and post-test by paired t-test was used. ($p < 0.05$) was considered statistically significant.

Frequency Distribution of Drooling Quotient before Oro Motorrehabilitation

S.No	Pre test Drooling Quotient (%)	No of Participants	
		Frequency	Percentage%
1	60-70	3	20
2	70-80	10	66
3	80-90	2	14
4	90-100	0	0

This table shows the drooling quotient among cerebral palsy children before oral motor stimulation. It was assessed that drooling quotient between 80-90 % was identified in 14% of children and a majority of (66%) children had a drooling quotient between 70-80%.

Frequency Distribution of Drooling Quotient after Oro Motorrehabilitation

S.No	Post test Drooling Quotient (%)	No of Participants	
		Frequency	Percentage %
1	60-70	1	7
2	70-80	7	47
3	80-90	3	20
4	90-100	4	26

Above table shows the drooling quotient among children with cerebral palsy after oral motor stimulation. It was assessed that drooling quotient between 70-80% was identified in majority of (47%) of children and 7% of children had a drooling quotient between 60-70%.

Effect of Oral Motor rehabilitation on Drooling among Children with Cerebral Palsy

n=30

Test	Mean	Mean difference	Standard Deviation	't' Value
Before intervention	74	7	8.1	5.3***
After intervention	81		9.7	

***Significant at 0.001 level

The paired 't' test was used to assess the effect of oro-motor rehabilitation on drooling among children with cerebral palsy before and after oro-motor stimulation. It was identified that,

the mean drooling quotient before and after oro-motor rehabilitation was 81 and 74 respectively. The mean difference was 7. The calculated 't' value was compared with the table value at 0.001 level of significance. It showed that, the calculated 't' value was greater than the table value. Thus the research hypothesis, 'There is a significant difference in drooling quotient among cerebral palsy children before and after administering oro-motor stimulation is accepted.

Frequency Distribution of Drooling Quotient before facial nerve manipulation

S.No	Pre test Drooling Quotient (%)	No of Participants	
		Frequency	Percentage%
1	60-70	5	34
2	70-80	4	26
3	80-90	6	40
4	90-100	0	0

This table shows the drooling quotient among cerebral palsy children before oro-motor stimulation. It was assessed that drooling quotient between 70-80 % was identified in 26% of children and a majority of (40%) children had a drooling quotient between 80-90%.

Frequency Distribution of Drooling Quotient after facial nerve manipulation

S.No	Post test Drooling Quotient (%)	No of Participants	
		Frequency	Percentage%
1	60-70	0	0
2	70-80	2	13
3	80-90	5	33
4	90-100	8	54

Above table shows the drooling quotient among children with cerebral palsy after oral motor stimulation. It was assessed that drooling quotient between 90-100 % was identified in majority of (54%) of children and 13% of children had a drooling quotient between 70-80%

Effect of oro facial nerve manipulation on Drooling among Children with Cerebral Palsy n=30

Test	Mean	Mean difference	Standard Deviation	't' Value
Before intervention	81	6	9.8	7.1***
After intervention	87		11.2	

*** Significant at 0.001 level

The paired 't' test was used to assess the effect of oro-motor stimulation on drooling among children with cerebral palsy before and after oro-motor stimulation. It was identified that, the mean drooling quotient before and after oro-motor stimulation was 81 and 87 respectively. The mean difference was 6. The calculated 't' value was compared with the table value at 0.001 level of significance. It showed that, the calculated 't' value was greater than the table value. Thus the research hypothesis, 'There is a significant difference in drooling quotient among cerebral palsy children before and after administering oro-motor stimulation.

Result

The statistical analysis was done using children paired t test with a confidence interval of 95% based on the degree of freedom the p value seems to be less than 0.005 (actual P value) and the quantitative data revealed a statistically significant difference between Pre-test and Post-test.

The above pre-test and post-test mean value tables shows that both the group had a significant improvement. But result, cranial nerve manipulation (group B) was found effective than oral motor rehabilitation (group A). The p-value of cranial nerve manipulation was (<0.0001) and the p-value of oro- motor rehabilitation was (0.0719).

Discussion

The present study was undertaken to evaluate the effect of oro motor rehabilitation and cranial nerve manipulation in decreasing drooling among children with spastic cerebral palsy and also to assess the effectiveness in terms of Drooling severity and frequency, and Drooling Quotient.

This study is focused to control drooling in cerebral palsy children. Oral motor rehabilitation and cranial nerve manipulation are given to the cerebral palsy children to control drooling. As a result of this study, cranial nerve manipulation was effective than oral motor rehabilitation. So cranial nerve manipulation is significantly effective when compared to oral motor rehabilitation.

Drawback of the study is the cerebral palsy children's in group A cannot perform the rehabilitation like: pressure, tapping, stroking and stretching (oro motor rehabilitation group A).

Statistically results showed that drooling levels decreased in group B after therapeutic interventions cranial nerve manipulation and p value was less than 0.0001 there was no significant change in drooling levels in group A throughout the manipulation session and of oro motor rehabilitation p value was 0.0719. Hence group B 'p' value shows that cranial nerve manipulation is significantly effective. When compare to Group A 'P' value.

Duration of 6 month treatment program will be helpful in decreasing drooling in spastic cerebral palsy. When the responses were compared with in the groups, the result showed significant difference in the Post-test than Pre-test. This study was conducted to bring out the effects of cranial nerve manipulation in drooling among spastic cerebral palsy.

This study was conducted on 30 individuals with decreasing drooling among children with spastic cerebral palsy will be taken from External Physiotherapy set-up based on the inclusion and exclusion criteria.

Subjects were treated with oro motor rehabilitation vs. cranial nerve manipulation for drooling among children with spastic cerebral palsy.

Drooling severity and frequency, and Drooling Quotient was used as a tool for analysis, outcome measure were taken at the end of 6th month.

Statically results showed that drooling levels decreased in group B after therapeutic interventions cranial nerve manipulation and p value was less than 0.0001 there was no significant change in drooling levels in group A throughout the manipulation session and of oro motor rehabilitation p value was 0.0719 . Hence group B 'p' value shows that cranial nerve manipulation is significantly effective. When compare to Group A' P 'value.

CONCLUSION:

From the result, it has been concluded that cranial nerve manipulation was found effective when compared to oro-motor rehabilitation in decreasing drooling in children with cerebral palsy. Hence this study concluded that treatments combined with activities are more effective then treatment with manipulation and rehabilitation technique, cranial nerve manipulation significant decreases drooling in cerebral palsy.

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