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A Cross-Sectional Study on Association of Drooling Severity and Frequency with Speech and Head Control in Patients with Cerebral Palsy

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ABSTRACT

BACKGROUND: Cerebral Palsy (CP) is the commonest cause of physical impairment in children. Drooling, speech disorders and poor head control are frequently associated with cerebral palsy.
OBJECTIVE: The aim of the study was to investigate the association of drooling severity and frequency with speech and head control in patients with Cerebral Palsy.
METHODOLOGY: This cross-sectional study included 44 Cerebral Palsy patients between the age group of 5-15 years, selected based upon the inclusion and exclusion criteria from various clinics in Surat. After taking consent, outcome measures: Drooling severity and frequency by Thomas Stonell and Greenburg Drooling Severity and Frequency Scale, Speech by Viking Speech Scale and Head control in supported sitting were measured. Statistical analysis of the data was carried out using SPSS 26.0 software. All the Qualitative data were described as frequency and percentages and analyzed by using Chi Square test.
RESULTS: The findings demonstrated a significant association between drooling severity and frequency with both speech impairment and head control. Increased drooling severity and frequency were associated with greater speech impairment, while better head control was associated with reduced drooling severity and frequency. All associations were statistically significant ($p < 0.05$).
CONCLUSION: The study concludes that higher drooling severity and frequency are linked to increased speech impairment, whereas improved head control is associated with reduced drooling severity and frequency.

Keywords: Cerebral Palsy, Drooling, Speech, Head Control

INTRODUCTION

The term Cerebral Palsy (CP) refers to a collection of movement and postural impairments that limit activities and are caused by non-progressive abnormalities in the developing foetal or infant brain. Disturbances of sensation, cognition, communication, perception, and/or behaviour, as well as a seizure disorder, are frequently associated with the motor impairments of cerebral palsy.[1] Globally the prevalence range of cerebral palsy is 1.5 to 4 per 1000 live births and for Indian

population the prevalence range is 2.95 per 1000 live birth.[2]

Saliva plays a crucial role in maintaining oral hygiene by moistening the mouth.[3] Drooling can lead to social rejection, persistently damp clothing, an unpleasant odor, chapped or softened facial skin, oral and perioral mouth infections, usually caused by Candida albicans, dehydration, impaired chewing function, talking dependence, book damage, poor communication skills and social isolation. Aspiration pneumonia may result from an inability to swallow saliva. [4]

Cerebral palsy is the most prevalent physical condition in children and is often associated with speech difficulties. Due to severe neuromuscular involvement, between 33% and 63% of patients with cerebral palsy experience speech problems.[5] Respiration, phonation, resonance, articulation and prosody are all frequently impacted by dysarthria in children with cerebral palsy.[6]

Bobath (1980) describes head control as the ability to maintain head in space, face vertical and mouth horizontal. [7] The level of head control changes between two and three months old. At this age muscle power of neck increases leading to better control of the head against gravity. [8]

The aim of this study is to investigate the relationship of Drooling severity and frequency with Speech and Head control in individuals with Cerebral Palsy. The present study aimed to contribute a new perspective to focus on the treatment of drooling, head control exercises and speech therapy.

Objectives of the study:

(1) To study the association of Drooling severity and frequency with Speech in individuals with Cerebral Palsy.

(2) To study the association of Drooling severity and frequency with Head control in individuals with Cerebral Palsy.

MATERIALS & METHODS

After taking Ethical clearance, subjects for this study were Cerebral Palsy patients conveniently selected from various clinics in Surat city. The sample size was 44 and it was calculated by using OpenEpi Version 3 software at 95% confidence level with the prevalence rate of 2.95 per 1000 live births in India.[2] Purposive sampling technique was used. The caregivers of the participants were provided with complete information in a language understood by them and their accent was obtained. The Inclusion criteria were individuals with age group between 5 to 15 years, both gender male and female were included. Individuals with confirmed diagnosis of Cerebral Palsy and Children whose parents will willingly give informed consent for participation. The Exclusion criteria were patients who had undergone the procedures like relocation of submandibular duct, who have taken salivary gland botulinum toxin injections and who were talking anticholinergic medications. The Outcome measures were Drooling severity and frequency by Thomas Stonell and Greenburg Drooling Severity and Frequency Scale, Speech by Viking Speech Scale and Head control in supported sitting.

After obtaining clearance from Ethical Committee,
patients were taken with confirm diagnosis of Cerebral Palsy

⇩

They were screened to determine their eligibility for the study,
according to the inclusion and exclusion criteria

⇩

Those who fulfilled the criterion were asked for written consent by parents and those who agreed to it were enrolled in the study

⇩

Instructions related to all tests were given prior to administration with proper demonstration

⇩

Drooling severity and frequency by Thomas Stonell and Greenburg Drooling Severity and frequency scale [9,10], Speech by Viking Speech Scale [11,12] and Head control in supported sitting [13] were assessed

⇩

Statistical Analysis was done by using SPSS version 26.0

Data were entered in Microsoft excel sheet and analyzed using SPSS software version 26. All the qualitative data were described as frequency and percentages and analyzed by using Chi Square test. p-value less than 0.05 considered as a statistically significant.

RESULT

Table 1. Age group wise distribution of patients with Cerebral Palsy

Age group (in years)	Frequency	Percentages
5-10	39	88.7
11-15	5	11.3

Among the patients, 39 (88.7%) cases were aged 5 to 10 years, while 5 (11.3%) cases were aged between 11-15 years. The mean age of patients with Cerebral Palsy was 7.7 ± 2.4 years. (Table 1)

Table 2. Gender wise distribution of patients with Cerebral

Gender	Frequency	Percentages
Male	24	55
Female	20	45

Out of total, 55% were Males and 45% were Females in the study. (Table 2)

Table 3. Distribution of Type of Cerebral Palsy among patients

Type of Cerebral Palsy (CP)	Frequency	Percentages
Dyskinetic CP	6	13.6
Spastic Hemiplegic CP	10	23
Spastic Diplegic CP	12	27.2
Spastic Quadriplegic CP	16	36.2

Total 16 patients had Spastic Quadriplegic CP, 12 patients had Spastic Diplegic CP and 10 patients had Spastic Hemiplegic CP. Only 6 patients had Dyskinetic CP. (Table 3 & Graph 3)

Table 4. Distribution of Drooling Severity & Frequency in patients with Cerebral Palsy

Variables		Frequency	Percentages
Drooling Severity	1	14	31.8
	2	14	31.8
	3	6	13.6
	4	9	20.5
	5	1	2.3
Drooling Frequency	1	14	31.8
	2	17	38.6
	3	9	20.5
	4	4	9.1

Total 31.8% study participants had level 1 drooling severity. While 2.3% cases had level 5 drooling severity. Total 38.6% cases had more than 2 times of drooling frequency. (Table 4)

Table 5. Distribution of Viking Speech Scale in patients with Cerebral Palsy

Viking Speech Scale	Frequency	Percentages
1	9	20.5
2	15	34.1
3	7	15.9
4	13	29.5

Among the study participants, 34.1% cases had Level 2 Viking speech scale. While 15.9% cases had grade 3 Viking speech scale. (Table 5)

Table 6. Association between Drooling Severity and Frequency and Viking Speech Scale in patients with Cerebral Palsy

Variables		Viking speech scale				p-value
		1	2	3	4	
Drooling severity	1	9	4	1	0	0.000
	2	0	11	2	1	
	3	0	0	3	3	
	4	0	0	1	8	
	5	0	0	0	1	
Drooling frequency	1	9	4	1	0	0.000
	2	0	11	3	3	
	3	0	0	3	6	
	4	0	0	0	4	

There was a statistically significant association found between Drooling severity and frequency and Viking Speech Scale among patients. (Table 6)

Table 7. Association between Drooling Severity and Frequency and Head Control in patients with cerebral palsy

Variables		Head control		p-value
		Yes	No	
Drooling severity	1	14	0	0.000
	2	13	1	
	3	1	5	
	4	0	9	
	5	0	1	
Drooling frequency	1	14	0	0.000
	2	13	4	
	3	1	8	
	4	0	4	

There was a statistically significant association found between Drooling severity and frequency and head control by patients. (Table 7)

DISCUSSION

The aim of present study is to find out association between Drooling severity as well as frequency with Speech and Head control in patients with Cerebral Palsy.

Table 1. represents among the patients, 39 (88.7%) cases were aged 5 to 10 years, while 5 (11.3%) cases were aged between 11-15 years. The mean age of patients was 7.7± 2.4 years.

Table 2. represents among the patients, 24 (55%) cases were male and 20 (45%) cases were female.

Table 3. represents that, total 16 patients had Spastic Quadriplegic Cerebral Palsy, 12 patients had Spastic Diplegic Cerebral Palsy, 10 patients had Spastic Hemiplegic Cerebral Palsy and only 6 patients had Dyskinetic Cerebral Palsy.

Table 4 shows that, 31.8% patients had level 1 drooling severity that suggests dry- the patient never drools, 31.8% study patients had level 2 drooling severity that suggests mild drooling (wet lips only), 13.6% study patients had level 3 drooling severity that suggests moderate drooling (wet lips and chin), 20.5% patients had level 4 drooling severity that suggests severe drooling (wet clothes). While 2.3% cases had level 5 drooling severity suggesting profuse drooling (wet clothing, hands, trays, objects within reach). For drooling frequency, Total 31.8% patients had level 1 drooling frequency suggesting that the patient never drools, 38.6% patients had level 2 drooling

frequency suggesting patient occasionally drools, 20.5% patients had level 3 drooling frequency that suggests patient frequently drools and 9.1% patient had level 4 drooling frequency that suggests patient constantly drools.

Table 5 shows that 20.55% patients had level 1 Viking Speech Scale that suggests Speech is not affected by motor disorder. 34.1% patients had level 2 Viking Speech Scale that suggests Speech imprecise but usually understandable to unfamiliar listeners. While 15.9% patients had level 3 Viking Speech Scale that suggests Speech is unclear and not usually understandable to unfamiliar listeners out of context and 29.5% patients had level 4 Viking Speech Scale that suggests No understandable speech.

The research of Sjögreen L et al, [14] observed Oromotor impairment was a frequent finding (43%). Half the children in the youngest age group (3–6 years) had moderate/severely affected intelligibility or no speech compared with one-third in the other age groups. Impaired saliva control was common (31.2%) and strongly and significantly correlated with oromotor dysfunction, intellectual disability, open mouth at rest and epilepsy. There is a strong correlation between oromotor impairment and affected intelligibility and impaired saliva control in individuals with rare diseases.

In our study we concluded that there are association of drooling severity and frequency and speech in children with cerebral palsy. So, when the Drooling Severity and Frequency increase, the level of Speech impairment increases.

In the study of Taş SA et al, [4] they found that as the head control increased, drooling severity diminished in patients with Spastic Quadriplegic Cerebral Palsy. These findings were similar to our study that there is an association of Drooling Severity and Frequency and Head Control in patients with Cerebral Palsy, as head control increases, the Drooling Severity and Frequency get decrease.

In this study, we discovered a statistically significant association between the Viking Speech Scale and the intensity and frequency of drooling in patients with cerebral palsy. Among people with cerebral palsy, there was a statistically significant association between head control and the frequency and severity of drooling.

CONCLUSION

44 Cerebral palsy patients were included in the study. The subjects were assessed for drooling severity and frequency, speech and head control. The results showed that there is association of drooling severity and frequency with speech and head control. Thus, it can be concluded that as the Drooling Severity and Frequency increase the impairment of Speech increases and as the Head control increases the Drooling Severity and Frequency decreases.

Declaration by Authors

Ethical Approval: Approved

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

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