

A Study to Assess the Frequency and Severity of Drooling Among Cerebral Palsy Children in Selected Special Schools of Pune

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ABSTRACT

Aim: The study aims to assess the frequency and severity of drooling among cerebral palsy children.

Objective:

To determine the frequency of drooling using the Thomas-Stonell and Greenberg – Drooling Rating Scale.

To determine the severity of drooling using the Thomas-Stonell and Greenberg – Drooling Rating Scale.

Methodology: The purpose of the study was to assess the frequency and severity of drooling among children with CP in the Pune region. A convenient sample of 182 children aged 4-11 years with CP was recruited. The Thomas-Stonell and Greenberg Drooling Rating Scale was used to measure drooling severity and frequency.

Results and Conclusion: In this study we found that the frequency of drooling varied across different subtypes of spastic CP, with quadriplegic CP exhibiting the highest frequency of drooling, followed by diplegia and hemiplegia. Similarly, the severity of drooling was most pronounced in children with quadriplegic CP, with a significant proportion experiencing moderate to profuse drooling. These findings emphasize the need for comprehensive management strategies tailored to the specific needs of children with CP to improve their quality of life and overall well-being.

Clinical Implication: Understanding the frequency and severity of drooling among children with CP can inform healthcare professionals' treatment decisions, leading to improved patient outcomes and quality of life. Interventions such as medication, oral motor therapy, and surgical procedures may be recommended based on individual patient needs.

Keywords: Cerebral palsy, drooling, severity, frequency, assessment, children

INTRODUCTION

According to non-progressive problems that happened in the developing fetus and infant brain, cerebral palsy refers to a range of lifelong disorders of mobility and posture that result in activity limits. It affects 2–3 infants per 1000 live births, making it the

most prevalent chronic motor disability in children. The etiology of cerebral palsy can be hereditary, prenatal, perinatal, or postnatal due to hypoxia, trauma, or CNS infection. Prenatal causes include birth asphyxia, preterm birth, birth trauma, etc. Spastic, dyskinetic ataxic, hypotonic, and

mixed CP are the most prevalent classifications for the type of motor impairment associated with CP. The topographical pattern of spasticity can also be defined as quadriplegic, hemiplegic, or diplegic. Seizures, cognitive impairment, and impairment of sensory modalities like hearing, vision, pain, and touch are all common in children with cerebral palsy. Children with CP are also frequently noted to have oromotor dysfunction, communication difficulties, and excessive drooling.^[1]

Drooling is the unintentional loss of saliva and other oral contents from the mouth.^[9] It is frequently observed in healthy infants and typically goes away by the time the child is 15 to 18 months old as a result of the orofacial motor function reaching physiological maturity. Although drooling may, in rare circumstances, continue in a healthy child, it is regarded as abnormal after the age of four.^[2] Due to its immunoglobulin content and pH, saliva helps with the digestion of carbohydrates, speech, and swallowing. However, runny mouth is a serious medical and social issue that is frequently seen in children with neurological disorders (mental retardation and cerebral palsy), which can be stressful for them and alter various aspects of their personal and family lives. Increased ingestion times are typically used to compensate for increased salivation; if this is not done effectively, drooling may result.^[3] Drooling is a common symptom in children with cerebral palsy (CP) and may be brought on by neuromuscular deficits as well as a lack of oral and perioral sensory reception.^[4] ; however, other causes may also be at play. For instance, the impact of mouth closure on drooling, poor oral stage of swallowing, muscle control in the face and mouth, increased secretion, compromised teeth occlusion, position of the head and neck, inability to detect salivary flow (sensory problems), poor coordination and muscle strength in the lips, inability to effectively close the mouth, or

insufficient frequency of swallowing and aspiration.^[3]

The frequency of drooling and its effects on children's and their carers' quality of life must be quantified, even if the intensity of drooling might change daily, occasionally hourly, or depending on daily life conditions. Drooling severity and frequency scale, 5-minute drooling quotients, visual analogue scales, Thomas-Stonell, and Greenberg drooling rating scales are used to evaluate the severity and frequency of drooling and can also be used to evaluate changes after treatment.^[5]

As is well known, patients who drool may experience physical and psychological effects that significantly lower their quality of life. Drooling is still an underrecognized sign in children with neurological diseases, despite these serious effects. The Thomas-Stonell and Greenberg scale, which has a five-grade score for severity and a four-grade score for frequency, can be used to evaluate the severity and frequency of drooling to provide an intervention.^[3] Determine the best course of action for each drooling score by using the Thomas-Stonell and Greenberg scales to categorize the intensity and frequency of drooling. Surgery, medicine, injections, and therapy are all used as treatments. Functional independence levels may benefit from integrating oral motor therapy with physiotherapy and rehabilitation, according to some research. To stop anterior saliva loss from the oral cavity, these interventions involve correcting general body alignment and head posture. They also include behavioral therapy, therapy to increase tongue control and decrease tongue thrust, therapy to improve lip and jaw closure, normalize tone, and normalize facial and oral sensations.^{[6][7]}

This study this study is carried out to understand the severity and frequency of drooling among cerebral palsy children which will in turn help to find out effective treatments, improving the quality of life of children with cerebral palsy.

NEED OF STUDY: The need of study is to find out the frequency and severity of drooling. Despite the high prevalence of drooling it is still an under-recognized sign in children with cerebral palsy. Determination of the frequency and severity of drooling in this population and the factors associated with it can help to identify the possible physio-therapeutic and developmental interventions. An effective treatment will enhance independence and quality of life in children. By conducting this study there will be a contribution to the knowledge base on cerebral palsy and make a meaningful impact on the lives of affected children.

AIM AND OBJECTIVES:

AIM: The study aims to assess the frequency and severity of drooling among cerebral palsy children.

OBJECTIVES:

- (A) To determine the frequency of drooling using the Thomas-Stonell and Greenberg – Drooling Rating Scale.
- (B) To determine the severity of drooling using Thomas-Stonell and Greenberg – Drooling Rating Scale.

MATERIALS & METHODS

This study, which included children with cerebral palsy, was descriptive. The trial lasted six months, and the sample size consisted of 182 children with CP who were diagnosed between the ages of 4 and 11. The investigation was carried out in a few Pune special schools. A systematic questionnaire and the Greenberg-Drooling and Thomas-Stonell Rating Scale were used to gather data. The child's name, age, gender, type of cerebral palsy, month of delivery (full term or preterm), and mode of delivery were among the demographic data gathered by the questionnaire. The intensity and frequency of drooling were evaluated using the Greenberg-Drooling Rating Scale and the Thomas-Stonell Scale. This scale classifies the frequency of drooling from never to frequently, as well as the severity

of drooling, ranging from dry (never drools) to profuse (wet hands, trays, clothing, and things within reach). Children with cerebral palsy, both male and female, between the ages of 4 and 11 were the inclusion criteria. Children with additional congenital problems, such as cleft lip and palate, and parents who declined to participate in the study were the exclusion criteria.

By the inclusion and exclusion criteria, 182 subjects were chosen. Parental or guardian approval was obtained in writing and with full knowledge. The parents or guardians of the subjects were informed about the study's methodology. Using a standardized questionnaire, demographic data such as age, gender, type of cerebral palsy, and pertinent medical history were gathered. Then the Thomas-Stonell and Greenberg-Drooling Rating Scale, a validated instrument for assessing drooling in children with CP, was used to determine the frequency and severity of drooling. The scale uses a scoring system that goes from 1 to 4 for frequency and from 1 to 5 for severity to determine how often someone drools. The scale shows that the lower the score worse the outcome.

STATISTICAL ANALYSIS: Data from all 182 participants was taken and the severity and frequency of drooling were calculated using the Thomas and Greenberg- Drooling rating scale. Data analysis was done using Advanced Microsoft Excel 2021.

RESULT

TABLE NO. 1: AGE DISTRIBUTION

AGE	FREQUENCY	PERCENTAGE
4 YEARS	12	7%
5 YEARS	20	11%
6 YEARS	24	13%
7 YEARS	32	18%
8 YEARS	27	15%
9 YEARS	26	14%
10 YEARS	27	15%
11 YEARS	14	8%

INTERPRETATION: The number of children with cerebral palsy (CP) in each age group, ranging from 4 to 11 years old, is shown in the above table.

DISTRIBUTION OF FREQUENCY OF DROOLING

TABLE 2: DISTRIBUTION OF FREQUENCY OF DROOLING IN QUADRIPLEGIC CP

NEVER DROOLS	8	10%
OCCASIONALLY DROOLS	13	16%
FREQUENTLY DROOLS	36	45%
CONSTANTLY DROOLS	23	29%

INTERPRETATION: Over three-quarters of children with quadriplegic cerebral palsy drool either regularly or continually, making up the majority of affected children. These results demonstrate the considerable impact quadriplegic CP has on oral motor function, as well as the difficulties drooling management, presents for impacted children and their caretaker.

TABLE 3: DISTRIBUTION OF FREQUENCY OF DROOLING IN DIPLEGIC CP

FREQUENCY	FREQUENCY	PERCENTAGE
NEVER DROOLS	19	29%
OCCASIONALLY DROOLS	35	54%
FREQUENTLY DROOLS	8	12%
CONSTANTLY DROOLS	3	5%

INTERPRETATION: The majority of children with diplegic cerebral palsy experience some level of drooling, with the most common category being occasional drooling. However, a significant portion (29%) do not drool at all, indicating variability in the severity of oral motor impairments within this subtype.

TABLE 4: DISTRIBUTION OF FREQUENCY OF DROOLING IN HEMIPLEGIC CP

FREQUENCY	COUNT	PERCENTAGE
NEVER DROOLS	21	57%
OCCASIONALLY DROOLS	14	38%
FREQUENTLY DROOLS	2	5%

INTERPRETATION: The majority of children with hemiplegic CP do not experience drooling, with over half (57%) falling into category of never drools. The next most frequent group is occasional drooling, indicating that some children may experience difficulties with saliva control, It is not pervasive issue in this subtype.

DISTRIBUTION OF SEVERITY OF DROOLING

TABLE 5: DISTRIBUTION OF SEVERITY OF DROOLING IN QUADRIPLEGIC CP

SEVERITY QUADRIPLEGIC	COUNT	PERCENTAGE
Dry (never drools)	8	10%
Mild (wet lips only)	11	14%
Moderate (wet lips and chin)	23	29%
Severe (wet clothes)	21	26%
Profuse (wet clothing, hands, trays objects within reach)	17	21%

INTERPRETATION: The majority of children with quadriplegic cerebral palsy experience some level of drooling, with the most common severity levels being moderate, severe, and profuse. While a small percentage do not drool at all or experience mild drooling, a considerable portion of children experience moderate to profuse drooling, indicating significant challenges in saliva control.

TABLE 6: DISTRIBUTION OF SEVERITY OF DROOLING IN DIAPLEGIC CP

SEVERITY	COUNT	PERCENTAGE
Dry (never drools)	19	29%
Mild (wet lips only)	29	45%
Moderate (wet lips and chin)	11	17%
Severe (wet clothes)	5	8%
Profuse (wet clothing, hands, trays objects within reach)	1	1%

INTERPRETATION: The majority of children with diplegic cerebral palsy experience some level of drooling, with the most common severity levels being mild and moderate. While a significant percentage do not drool at all or experience mild drooling, a smaller portion of children experience moderate to severe drooling, indicating challenges in saliva control.

TABLE 6: DISTRIBUTION OF SEVERITY OF DROOLING IN HEMIPLEGIC CP

SEVERITY	COUNT	PERCENTAGE
Dry (never drools)	21	57%
Mild (wet lips only)	14	38%
Moderate (wet lips and chin)	2	5%

INTERPRETATION: The results indicate that a substantial proportion of children with hemiplegic CP do not experience drooling. A significant portion of children (14 children, approximately 38% of the total) experience mild drooling, characterized by wet lips only. A small minority of children (2 children, around 5% of the total) exhibit moderate drooling, characterized by wet lips and chin

DISCUSSION

A brain injury resulting in permanent, non-progressive, and occasionally changing abnormalities of tone, movement, or posture is referred to as cerebral palsy. At two to three babies out of every thousand live births, it is the most prevalent motor impairment in childhood. Numerous things, including infections, hypoxia (a lack of oxygen), birth trauma, and preterm, or genetic abnormalities, can cause this damage. The symptoms of cerebral palsy can vary and include abnormalities in posture, balance, muscle control, coordination, reflexes, increased tone, and gait. Additional comorbidities include excessive drooling, sleep disturbance, intellectual deficiency, microcephaly, seizures, behavioral issues, speech, language, swallowing, and feeding difficulties. Topographically, cerebral palsy is divided into three categories: diplegic, hemiplegic, and quadriplegic. as well as physiologic as mixed, dyskinetic, ataxic, or spastic palsy. The predominant kind of palsy is spastic quadriplegic cerebral palsy.

Drooling is a most common symptom in cerebral palsy due to:

impaired Swallowing that is cerebral palsy can affect the muscles involved in swallowing, leading to difficulty in controlling saliva and preventing it from drooling out of the mouth.

Reduced Muscle Control: Individuals with cerebral palsy may have reduced muscle control, including those in the face and mouth, making it challenging to manage saliva effectively.

Sensory Issues: Some individuals with cerebral palsy may have sensory processing difficulties, including decreased sensitivity

in the mouth, which can contribute to drooling

Postural Challenges: Poor posture or positioning can affect the ability to swallow effectively, leading to increased drooling.

Hypersecretion of Saliva: In some cases, there may be an over production of saliva, exacerbating the drooling.

This study makes an important contribution to the body of knowledge about drooling in children with CP by providing a population-based estimate of the severity and frequency of abnormal drooling in a cohort of children aged between 4 years to 11 years. Data were collected using the Thomas-Stonell and Greenberg-Drooling Rating Scale. The frequency of male children with CP in this study is 117, representing approximately 64% of the total sample. The frequency of female children with CP is 65, representing approximately 36% of the total sample.

The frequency of drooling in the majority of children with quadriplegic cerebral palsy experiences some level of drooling, with over three-quarters either frequently (45%) or constantly drooling (29%). these findings highlight the significant impact of quadriplegic CP on oral motor function. The severity of drooling in children with quadriplegic cerebral palsy experiences some level of drooling, with the most common severity levels being moderate (29%), severe (26%), and profuse (21%). While a small percentage do not drool at all (10%) or experience mild drooling (14%), a considerable portion of children experience moderate (29%) to profuse drooling. This result is compatible with the findings of Hegde and Pani^[2] that showed that patients with quadriplegic CP had the most severe drooling, indicating significant challenges in

saliva control. The main etiologies of drooling include impaired postural control as well as oral–motor and swallowing abnormalities.

The frequency of drooling in children with diplegic cerebral palsy experience some level of drooling, with the most common category being occasional drooling. However, a significant portion (29%) do not drool at all, indicating variability in the severity of oral motor impairments within this subtype. The severity of drooling in children with diplegic cerebral palsy experiences some level of drooling, with the most common severity levels being mild (45%) and moderate(17%). While a significant percentage do not drool at all (29%) or experience mild drooling, a smaller portion of children experience moderate to severe drooling(5%), indicating challenges in saliva control.

The frequency of majority of children with hemiplegic cerebral palsy does not experience drooling, with over half (57%) falling into the category of never drooling. Occasional drooling is the next most common category (38%), suggesting that while some children may experience difficulties with saliva control, it is not a pervasive issue in this subtype. The results of the severity of drooling indicate that a substantial proportion of children with hemiplegic CP do not experience drooling. A significant portion of children (14 children, approximately 38% of the total) experience mild drooling, characterized by wet lips only. A small minority of children (2 children, around 5% of the total) exhibit moderate drooling, characterized by wet lips and chin.

The results of this study showed that the degree of severity and frequency of drooling in quadriplegic children with CP is more due to their extensive brain dysfunction and poor oral motor and sensory function compared to diplegic and hemiplegic cerebral palsy.^[8] The prevalence of cerebral palsy in a child population is between 2 and 5 in 1000 cases, and of these about 10% of children have drooling problems severe

enough to interfere with daily social activities and functions.^[13] Despite being associated with important physical and psychological consequences, drooling is still an under-recognized and under-treated symptom in pediatric patients with neurological diseases, and the most correct approach to its management in clinical practice remains undefined.^[11] Different motor intervention strategies can be employed in conjunction with medication to minimize drooling in individuals with cerebral palsy, as no single interventional approach has been shown to consistently improve the intensity and frequency of drooling.^[14]

CONCLUSION

According to this study, over half of the children with CP suffer from a drooling issue, and the intensity and frequency of drooling are significant in these children. The severity and frequency of drooling across different subtypes of cerebral palsy highlight the major impact of the condition on oral motor function and saliva control; drooling is more common in quadriplegic CP than in diplegic and hemiplegic spastic CP.

Declaration by Authors

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

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