Dental Care Evaluation Among Children with Cerebral Palsy: A Special School Survey in Karachi

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ABSTRACT

Background: Children with Cerebral Palsy (CP) face malfunctioning in the motor system and go through difficulties in hearing, eating, sight, and musculoskeletal systems and are also mentally impaired. This may render them unable to maintain proper oral hygiene. The objective of this study was to evaluate oral hygiene in children with cerebral palsy in Karachi's special schools.

Methods: A cross-sectional study with a total of 80 CP children was conducted in special schools in Karachi using a purposive sampling technique. CP children aged 12-15, who consented via guardians/school and were able to comply with the procedure were included. CP children on medications or systemic diseases were excluded. Proforma containing demographic details, and dental history questions were asked. Oral examination was done using the Plaque index, Gingival index, and Oral hygiene index simplified was observed.

Results: In this study, there were 48 (60%) males and 32 (40%) females. The mean ± SD of age was 14.4 ±1.4. Independent t-test showed that there was a significant association of gingival index means with the institutes selected (p=0.004). The other parameters PI and OHIS did not show any association. Mean PI (mean 1.99, SD 0.62) and GI (mean 1.9, SD 0.60) showed moderate plaque and gingival inflammation and poor oral hygiene index (mean 3.31, SD 1.3). ANOVA showed associations of PI, GI & and OHIS with dental habits.

Conclusion: CP children have poor oral hygiene status and therefore need early diagnosis and prompt treatment to prevent complications.

Keywords: Cerebral Palsy, Periodontitis, Oral Hygiene Index.

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INTRODUCTION

Children with CP suffer from a group of movement and posture disorders. They also have problems with sensing the stimulus and its comprehension and communication[1]. The global prevalence of CP is 2 to 2.5 per 1000 live births[2]. Children with CP may have uncontrolled salivation, difficulty chewing and swallowing, respiratory issues, and poor oral hygiene. The studies reveal that oral health is one of the most common underlying factors for most of the complications[3]. Throughout their lifetime, people with Special HealthCare Needs (SHCN) can be at more risk for oral diseases [4]. Different studies show that the major cause of bad oral health in CP children is either deficient or complete lack of body and brain harmony. Due to the lack of this harmony, these children cannot perform their oral hygiene practices normally and their oral health is affected[2,5,6]. Among other oral diseases, dental caries and periodontal diseases are more common and the risk of these diseases is directly proportional to the severity of neuromuscular disorders[7].

Research shows that children affected by CP depict a higher frequency of gingival hyperplasia & and related bleeding[8,9]. This can be due to the simple reason that children with CP are not able to maintain their oral hygiene daily due to hypersensitive oral mucosa and lack of manual dexterity to clean oral cavities[10,11]. Medicines that are used to prevent seizures such as DPH, sodium valproate, and phenobarbital, are also cause of gingival overgrowth and other diseases of periodontium[9-11].

All these factors can be involved in biofilm formation in teeth. In addition, spastic quadriplegic CP & choro athetoid CP make patients handicapped because of involuntary, constant head movements & maintenance of a good oral environment becomes next to impossible. There is little data available in Pakistan that investigates the association between Cerebral Palsy and oral hygiene status. Evaluation of the correlation between changes in body composition and periodontal disease progression is essential to control the disease in the initial stages. Therefore, the objective of this study was to evaluate oral hygiene in children with cerebral palsy in Karachi's special schools using indices of plaque, gingival health, and oral hygiene.

METHODS

This cross-sectional study was conducted in special schools in Karachi using a purposive sampling technique. The sample size was calculated using the mean and SD difference of significant outcome variable age, Probing pocket depth (PPD), Clinical Attachment Level (CAL), and Oral Hygiene Index Simplified (OHI-S) in the Cerebral palsy group (6 ± 1.871) keeping the Confidence interval 95% and power 80%, the sample size was calculated as 58 which we raised it to 80 as per convenience[12].

The study population was children with CP which included the age range 12-15, who were mentally stable, able to comply with the examination, and had written informed consent from the parents and caregivers. Excluded were children who had vision & and hearing impairments, were on antibiotics, antiepileptics, or other medications used within 3 months, underlying systemic diseases, and underwent dental treatment within the last 6 months. The study instrument used was a self-designed proforma which consisted of demographic details, medical and dental history, and lastly examination i.e., Plaque index, gingival index, and oral hygiene index. For examination of the oral cavity the use of dental mirrors and CPI probe after seating the patient on a normal chair with appropriate light. The examination of all the CP children was done by a senior dentist from the Department of Community Dentistry.

Data was analyzed using SPSS Version 20. The normality of data was determined by applying the Kolmogorov–Smirnov test and the Shapiro–Wilk test. Descriptive statistics were used. A T-test was used for continuous variables. ANOVA test was used to compare means between groups.

RESULTS

The given data is based on a sample size of 80 individuals, and the percentages for each variable have been provided. The gender distribution shows that 60% of the sample size was male, while the remaining 40% was female. In terms of age, 36.4% of the sample size fell in the age range of 12-14 years, and 63.9% fell in the age range of 15-18 years. Regarding parent education, 12.5% of the sample size had illiterate parents, while 46.3%, 38.8%, and 2.5% had parents with Matric-Intermediate, graduate, and post-graduate education, respectively. The parent occupation data shows that 6.1% of the sample size had parents in other occupations, while 30.5%, 10.9%, 22.5%, 23.7%, and 5% had parents in Skill Labor/Worker, Government, Private, Business, and Shopkeeper occupations, respectively. In terms of parent income, 20% of the sample size had a parent income of less than 20K, 62.5% had a parent income ranging from 20K to 50K, and 17.5% had a parent income greater than 50K. Finally, the data shows that 50% of the sample size was from AURA, while the remaining 50% was from Markaz e Umeed.

Table 1: Demographic details of the participants.

Characteristics n (%)					
Gender					
Male			Female		
48 (60)			32 (40)		
Age (years)					
12-13			14-15		
29 (36.4)			51 (63.9)		
Institute					
AURA			Markaz e Umeed		
40 (50)			40 (50)		
Parent Income					
< 20K		20K-50K		> 50K	
16 (20)		50 (62.5)		14 (17.5)	
Parent Education					
Illiterate		Matric	Intermediate		Graduate
10 (12.5)		37 (46.3)	31 (38.8)		2 (2.5)
Parent Occupation					
Government	Private	Business	Shopkeeper	Skill Labor/Worker	Other
5 (6.1)	25 (30.5)	9 (10.9)	18 (22.5)	19 (23.7)	4 (5)

The above data pertains to a sample population of n = 80 and presents various variables related to dental health. The brushing dependency variable indicates that 34% of individuals brush their teeth independently, while 46% do so with assistance. Brushing frequency shows that 60% brush their teeth once a day, while 20% brush twice a day. The brushing duration variable is divided into three categories, where 29% brush for less than a minute, 34% brush for 1-2 minutes, and 17% brush for more than 2 minutes. The dental visit variable indicates that 31% have never visited a dentist, while 16% visit less than every 6 months and 33% visit more than every 6 months. In terms of treatments offered, 72% have not received any treatment, while only 2%, 1%, and 5% have undergone scaling, restorative procedures, and extraction, respectively. Use of antibiotics is reported by only 2% of individuals, while 76% did not use antibiotics at all. Finally, the variable on any systemic disease indicates that 66% did not have any disease, while 10%, 3%, and 1% have CNS, urogenital, and asthma-related diseases, respectively.

Table 2: Dental and medical history of the participants.

Variables	n	%
Brushing Dependency		
Self	34	42.5
With Assistance	46	57.5
Brushing Frequency		
Once	60	75
Twice	20	25
Number of teeth Present		
One	1	1
Twice	79	99
Brushing Duration		
< 1 min	29	36.3
1-2 min	34	42.5
> 2 min	17	21.3
Dental Visit		
Never	31	38.8
< 6 months	16	20
> 6 Months	33	41.3
Treatment Offered		
None	72	90.1
Scaling	2	2.5
Restorative	1	1.3
Extraction	5	6.3
Use of Antibiotics		
None	76	95
3-6 months	2	2.5
>6 months	2	2.5

Table 3: Association of clinical dental parameters with CP.

Variables	PI	GI	OHIS
	Mean ± SD	Mean ± SD	Mean ± SD
Institute 1: AURA n= 40	1.87 ± 0.67	2.03 ± 0.45	3.34 ± 1.23
Institute 2: Markaz e Umeed n = 40	1.69 ± 0.89	1.64 ± 0.67	3.28 ± 1.39
p-value	0.305	0.004	0.83

p-value <0.05 is considered significant.

Independent t-test showed that there was a significant association of gingival index means with the institutes selected (p=0.004). The other parameters PI and OHIS did not show any association. Table 3

Table 4: Association of demographics, medical, and dental variables with PI, GI, and OHI.

Variable	PI			GI			OHI S		
	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Parent education	1.99	0.62	0.04	1.83	0.60	0.03	1.86	1.16	0.03
Parent Income	1.99	0.62	0.90	1.83	0.60	0.30	1.86	1.16	0.40
Brushing dependency	1.7	0.60	0.05	1.60	0.8	0.12	1.9	1.30	0.02
Brushing frequency	2.0	0.40	0.02	1.90	0.62	0.05	3.33	1.66	0.01
Brushing duration	1.70	0.70	0.30	1.5	0.53	0.13	3.0	1.2	0.47
No. of teeth Present	1.99	0.69	0.93	1.83	0.67	0.00	3.31	0.14	0.189
Dental visit frequency	1.94	0.75	0.04	1.60	0.79	0.08	3.20	1.4	0.44
Treatment offered	2.0	0.63	0.42	2.08	0.77	0.72	4.0	1.22	0.50

p-value <0.05 is considered significant.

ANOVA and independent t-test showed that all three clinical parameters i.e., PI, GI, and OHIS were significantly associated with parent education and brushing frequency respectively. However, only PI and OHIS were found to be significantly associated with brushing dependency (t-test). GI was significantly associated with the number of teeth present (t-test) and PI was associated with dental visit frequency (ANOVA). Table 4.

Figure 1 shows a bar graph with means of PI, GI, and OHI at different levels. Both the PI and GI means are at the moderate stage while the OHI mean shows a poor category.
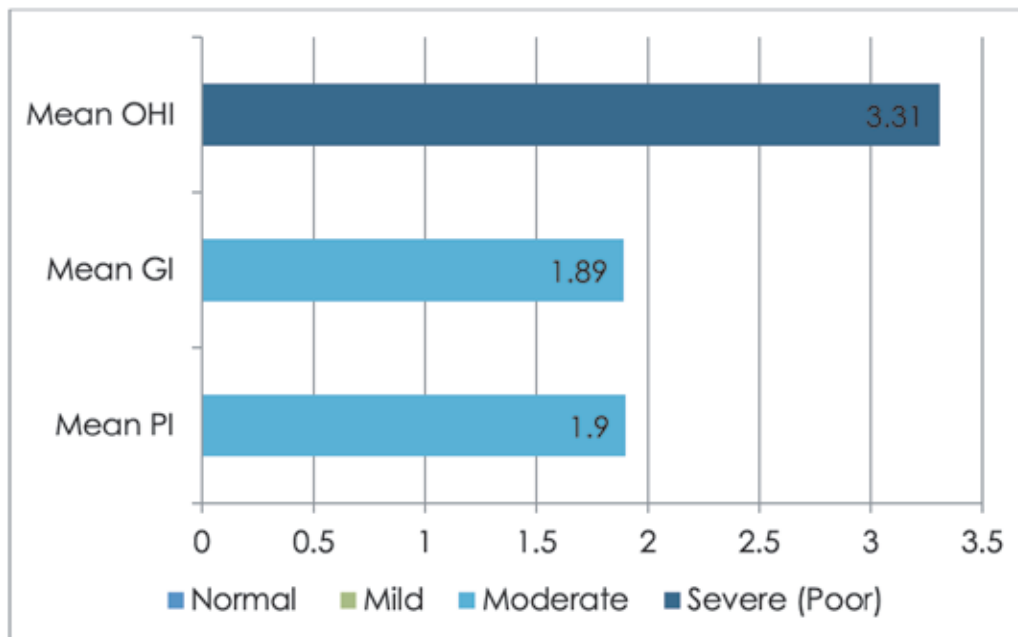
Figure 1: Clinical interpretation of the dental parameters.

DISCUSSION

This Cross-Sectional Analytical study offered a chance to evaluate the oral health issues among kids with CP in particular schools in Karachi, an area that has never been examined. A sample size of 80 individuals was identified from 2 centers of AURA and Markaz e Umeed. Although time-consuming and resource-intensive, this allowed for the collection of a sizable and representative sample. The sample size ranged from (12 to 15) years old, with 60% men and 40% women. The current study was approved by the Ethical Review Committee (ERC) of Bahria University Health Sciences and met all inclusion and exclusion criteria.

To provide an accurate depiction of the oral wellness condition of CP children, a wide range of oral health parameters were taken into account during the oral health assessment, including periodontal index, gingival index, and oral health index. Children with CP performed similarly to other children without CP control group in terms of PI and OHIS, adverse in terms of gingival health. Children with CP frequently have periodontal conditions as a result of insufficient oral hygiene. Several investigations have shown that periodontal hyperplasia and associated bleeding are more common in children with CP. The primary contributing factors are difficulties with daily oral hygiene, intraoral sensitiveness, orofacial motor disorders, malocclusion, and physical capacities[13]. A significant additional factor is the usage of antiepileptic drugs, notably phenytoin. Children with CP have worse gingival health than children from control groups as documented in

numerous literature[14]. Furthermore, current research revealed similar variations related to gingival health.

As the present data elaborates, the (brushing dependency variable) indicates that 34% of individuals brush their teeth independently, while 46% do so with assistance. This is due to children's weak control of the neuromuscular region, which prevents them from establishing prime oral hygiene, older children in particular. Furthermore, the usage of anticonvulsive effects, which may cause periodontal hyperplasia, is most likely a contributing element to the CP group's higher prevalence of gingival hyperplasia[15].

Many investigations have shown that gum hyperplasia and associated bleeding are more common in children with CP[5]. The same causes that lead to dental caries and biofilm accumulation may be responsible for this high incidence. The main contributing factors include difficulties with performing routine, intraoral sensitivity, Orofacial motor dysfunction, and oral hygiene[16]. Gingival hyperplasia predicts that another significant cause of periodontal problems is the use of antiepileptic drugs, particularly phenytoin[17].

Another study reveals as children get older, with spastic quadriplegic CP mostly face difficulties regarding oral hygiene. Due to the difficulty of maintaining proper dental hygiene due to the uncontrollable head movements that occur continuously, choreoathetoid CP may also be linked to periodontal disease[18]. Moreover, only PI and OHIS were found to be significantly associated with brushing reliance in

the current study, while PI was connected with the frequency of dental visits.

Low income and poor dental health are connected, according to surveys[19]. Therefore, it is assumed that socioeconomic issues will likewise have an impact on the quality of life.

The present study also depicted parent income, with 20% earning less than 20K, 62.5% of parent income ranging from 20K-50K, and 17.5% of parents earning 50K and established a highly significant link between poor family income and a detrimental effect on CP children's oral health-related quality of life (OHRQoL). According to De Camargo and Antunes et al., investigations of a few socioeconomic elements in CP youngsters. They demonstrated a connection between increased levels of unidentified dental decays and the requirement for oral care and a poor family income[20]. These patients may have poorer OHRQoL and may suffer as a result of this fact. Therefore, it is crucial to evaluate these disorders as a whole when discussing oral health and OHRQoL in patients receiving special treatment.

An additional study by Akhter, Rahena, et al. showed the link between dental health and quality of life using questionnaires which concluded that children with CP had considerably lower OH-QoL than children who were normally developing[21].

The findings of the current study demonstrated that parents of children with cerebral palsy need more instruction on how to maintain their children's oral hygiene and how to effectively clean their teeth with an electric toothbrush because parental education and brushing frequency were significantly correlated with three clinical indicators, including PI, GI, and OHIS. Programs for parents having children with disabilities in oral health care have also been advocated by other studies[22-23].

The study had some limitations. Due to accessibility constraints, not all of the city's CP clinics could be included in this study. Another potential weakness of the study is that the questionnaires were filled out by parents, which may not accurately reflect the children's situations and feelings. The authors suggest that the relationship between cerebral palsy and dental decays of the deciduous teeth, periodontal condition, Angle's Class II malocclusion, and anterior open bite in CP children needs further study. To more clearly identify the relationship between tooth damage and cerebral palsy, more research is needed. From an early age, cerebral palsy patients should be continuously monitored to promptly identify and treat any oral lesions.

CONCLUSION
Periodontal disease severity, communication skills severity, and low family income are all factors that have a detrimental effect on children with CP. To better understand the effects of diseases and socioeconomic variables on patients' lives and to design appropriate therapies based on the characteristics of each population, it is crucial to evaluate oral health status of CP child with the purpose of promoting prevention of disease, early diagosis and prompt treatment of any dental disease.

CONFLICT OF INTEREST
There is no conflict of interest.

ETHICAL APPROVAL
Ethical approval of the study was obtained from the ethical review committee of the institute.

PATIENT CONSENT
Written informed consent was obtained.

AUTHORS CONTRIBUTIONS
All authors contributed equally to the manuscript.

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