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Oral Health Conditions and Challenges to Dental Treatment in Patients with Cerebral Palsy in Odisha, India

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ABSTRACT

Background: The prevalence of dental disease, the types and quality of dental care, and the provision of services were assessed for 100 cerebral palsy children in a special hospital for cp patients.

Aim: To access the challenges during dental procedures and awareness and knowledge of parents towards dental treatment.

Objective: To perform a descriptive cross-sectional study with a sample determined by spontaneous demand for treatment consisting of 100 patients with CP aged 6-12 years.

Results: 75% of children suffered from type I-III level of CP and 25% from type IV-V level in our study. The oral health index (OHI) of CP children was poor (65 %), only 7 % had good OHI while 28% had moderate OHI. 57% of CP children had grade II gingival hyperplasia, 25% had grade III and a minimum of 18% had grade I gingival hyperplasia. 81% of children had malocclusion while tongue thrusting was experienced by 79% of children. 69% of children crowding was observed. 61% and 39% had an open bite and deep bite. The mean number of Dental treatments performed on CP children was 14.2 teeth which include extraction of permanent teeth (11.1%), extraction of primary teeth (37%), filling (35%), fluoridation (6%), a pulpotomy (4%), sealants of primary teeth (6%) and space maintainers (1%).

Conclusion: CP child requires special attention and care during dental treatment and knowledge, awareness and perception of parents also should be good towards dental treatment. It is a challenge to dental practitioners also for the management of these children.

Keywords: Cerebral Palsy Child, Oral health, Treatment challenge, DMF Index, DFT, OH Index

INTRODUCTION

Oral health is a necessity for individual growth and development which is often overlooked in children suffering from cerebral palsy (CP).¹ CP is a bunch of disorders damaging the brain which generally happens before, during, or within hours after birth. Cerebral means brain and palsy refers to disorders of movement or posture. It is a disease of movement, coordination, and posture which is neither communicable nor progressive.² CP shows asymmetric gross motor function or unusual muscle stiffness or floppiness. It is a disease of intellect, attention, memory, difficulty in communication, specific motor skill problems, physical limitation

such as abnormal muscle tone, and persistent infant reflex.³ They also present with challenges to nutritional intake such as swallowing disorder, constipation, hunger, satiety, risk of aspiration, and risk of malnutrition.⁴ Its occurrence is approximately 2-2.5/1000 worldwide and 3.3/1000 in India.⁵

CP can be categorized into motor type and topographical distribution. Motor type covers spastic cerebral palsy, dyskinetic or athetoid cerebral palsy, ataxic cerebral palsy, hypotonic cerebral palsy. Topographic distribution involves hemiplegic cerebral palsy, diplegic cerebral palsy, and quadriplegic cerebral palsy. Gross motor function classification comprises level I (mobility without limitation) level II (mobility with

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limitation) level III (mobility with handheld mobility device) level IV (self-movement with limitation use powered mobility) level V (transport in a manual wheelchair).⁶

CP has a direct and indirect impact on the oral health status of the individual. Neuromuscular problems inherited in CP affect oral health which are gingival hyperplasia, malocclusion, crowding, tongue thrusting, open bite, deep bite, periodontal alteration, DMF status (decay, missing, filled status) is poor due to difficulty in maintaining oral hygiene.^{3,7} Previous studies have shown that decay, missing, and filled teeth status of children with CP is 12.47 which is very high as compared to a normal child with 2.87¹. In contrast, a study conducted by De Camargo and Antunes which took place in a health care unit in Sao Paulo, Brazil reported that 49.5% of children with CP had one untreated carious tooth which shows they had severe oral health situation than other children of similar age.⁸ In contrast, a study conducted in Denmark revealed that children with CP have lower DMF status and higher caries-free rate than a normal child which shows that the dental health condition of children with CP is better than children not suffering from cerebral palsy by the influence of preventive norms of dental health education.⁹ Moreover, a study in 2015, Sinha et al., showed that Indian children with CP had higher caries, poor oral hygiene, and malocclusion which is because of limited health conditions and lack of dental knowledge⁵. A similar survey conducted in Leeds England among CP children attending special school reported dental caries were similar to normal children although they had less fluoridation, more extraction, limited access to dental treatment, and poor oral hygiene.¹⁰

Since very limited studies are conducted related to oral and health status of children type equation here suffering from cerebral palsy. The study aims to assess the dental health status and dental treatments received among the group of children with CP under the gross motor skill function classification system and type of CP conducted at SYNIRTAR Olathpur Cuttack. The study is concerned about decay missing filling-tooth (DMFT) index (decayed, missing, and filled permanent teeth), decay filling-tooth (DFT) index (decayed and filled primary teeth), oral hygiene status of CP children was measured by simplified oral hygiene index (OHI-S), gingival hyperplasia, crowding, tongue thrust, deep bite, open bite, periodontal alteration, dental visits for the treatment, frequency of dental cleaning, teeth cleaning tools, challenges during dental visits, anxiety level and dental treatment is done on CP children.

MATERIAL AND METHODOLOGY

A descriptive cross-sectional study (DMR/IMS/SH/ SOA/1592) was carried out with a sample determined by spontaneous demand for treatment consisting of 99 patients

with CP aged 6-12 years. The study was carried out for 3 months. The study following authorization by parents/guardians through a signed statement of informed consent. The data were collected using a self-administered questionnaire and managed to obtain the required information. The study was conducted at SVNIRTAR, Olatpur, India. We recorded the data of the child (age, gender, schooling, and access to dental treatment) and caregivers (schooling, relationship to the child, marital status, profession, and approximate monthly household income). Ethical clearance was obtained from the institute's ethical clearance committee. The type of study was explained to parents or caretakers of CP children. A total of 100 samples was collected which had 19 questionnaires.

STATISTICAL ANALYSIS

Data were entered in a Microsoft Excel sheet and analyzed with IBM SPSS software. Analysis was done using descriptive statistics such as mean and standard deviation. Comparison between proportions was done using the chi-square test. $P < 0.05$ was considered significant.

RESULT

A total of 100 children suffering from cerebral palsy was examined from which 75 % were male and 25 % were female with an average age 25% age range was 6-10 years with 48% participants, 11-15 years with 26 %, 1-5 with 10 % and 16 % above 15 years (as shown in table-1). It was found that 74% of children suffered from type I-III level of CP and 26 % from type IV-V level of CP (gross motor function classification system). The oral health index (OHI) of CP children was poor (65%), only 7% had good OHI while 28 had moderate OHI. 57% of CP children had grade II gingival hyperplasia, 25% had grade III and a minimum of 18% had grade I gingival hyperplasia. 79% of children had malocclusion while tongue thrusting was experienced by 79% of children. 69% of children crowding was observed. 61% and 39% had an open bite and deep bite. The mean standard deviation DMF (decay, missing, filled) index of CP child was 33+33.4 from which decayed teeth were 57%, missing (22%), and filled (21%). 83% of children's periodontal alteration was observed. We also recorded the anxiety level of the CP child: mild (29%), moderate (12%), and severe (59%) (as shown in Table-2). (Table-3) Summarizes the distribution of dental treatment of CP children. We recorded that 47% of CP children do not visit a dentist for dental treatment while 21% visited for routine dental checkups regularly and only 32% visited only once. Frequency of cleaning teeth once a day was 69% while 31% cleaned teeth more than once a day. 78% used toothbrushes as teeth cleaning tools while 27% used fingers and 5% used electric brushes. We also observed the challenges faced by

CP children during dental treatment which are 61% had communication difficulty, 37% had learning difficulty and 11% faced difficulty during mouth opening. The mean number of Dental treatments performed on CP children was 14.28 teeth which include extraction of permanent teeth (11%), extraction of primary teeth (37%), filling (35%), fluoridation (6%), a pulpotomy (4%), sealants of primary teeth (6%) and space maintainers (1%). Table-4 and Table-5 show the observed and expected values of the effect of oral health on condition CP child. The expected values was found to be $9.68 (56 \times 27 / 100 = 15.12, 56 \times 29 / 100 = 16.4, 44 \times 22 / 100 = 9.68, 44 \times 22 / 100 = 9.68)$. In Table-6 statistical analysis was done using Chi-square test was done

DISCUSSION

Many studies related to dental disease in CP had been done but very few studies are conducted to assess the dental problem in CP children in eastern India particularly Odisha. The main objective of the study was to assess dental health status and dental treatments received among the group of children with CP under GMFCS (gross motor skill function classification system) and type of CP conducted at SYNIRTAR Olathpur Cuttack.

In this study percentage of the male child suffering from CP is 75% that is greater than that of the female child suffering from CP (25%) which is similar to the study conducted previously.¹¹⁻¹⁵ In our study, the severity of CP under GMFCS at level I-III (74%) was higher than the IV-V level (26%) which is compared to the results of the study carried out in China by Du RY *et al.*, and a study conducted at Egypt by Sedky NA.^{7,11} In this study, we found 65% of CP children had poor OHI (oral health index) which is similar to previous studies^{3,5}. In the present study, 57% of CP children had grade II gingival hyperplasia followed by 25% in grade III and 18% in grade I which is significantly higher than the result of previously conducted studies as a majority of them had seizure disorders in the long haul consumed anti-seizure drug causing DIGH (drug-induced gingival hyperplasia).¹⁶⁻¹⁸ DIGH is a periodontal side effect of drugs giving rise to complications such as chewing, aesthetics, pronunciation leading to a deterioration of patients quality of life¹⁶. In the current study mean DMFT (decay, missing, filled teeth) index of CP children was found to be 33 and 19.9 (decay: 57%, missing: 22%, and filled: 21%) which is higher than previously conducted studies.^{17,18} GMFC at level IV-V and OHI is influenced by the higher DMFT index in this study. Malocclusion was found to be 80.8% which include tongue thrusting (79%), crowding (69%), open bite (61%) and deep bite (39%). The results are significantly higher as compared with the study conducted by Chen *et al.*, and Sedky NA in which reported 37% and 6.5% respectively.^{1,11} In addition the study conducted by Sinha N *et al.*, Chandna *et al.*, and Miamoto CB *et al.*, reported 58%, 60%, and 46.8% class II malocclusion. In a

study, it was observed that the prevalence of class II malocclusion is significantly higher in CP children as compared to normal child^{5,18-21}. The previous study conducted by Du RY *et al.* had 26% open bite which is lower than the present study (61%) but higher by the study conducted by Prats MJ *et al.*, (62%) and Chávez MM *et al.*, (80%). The severity of malocclusion can be judged in CP patients by mouth breathing, lip incompetency, and long face.^{22,19,21} Dental visits for treatment of CP child was only 32% which is similar to the previous studies⁵. The major cause of this can be lack of awareness of oral hygiene, lower socioeconomic background, and giving less priority to oral health as compared to other care needs. To overcome such problems dental camps and awareness programs should be conducted in rural areas related to oral health hygiene to prevent oral health disease among CP children. The frequency of teeth cleaning more than once a day was only 31% while 69% cleaned their teeth once a day 78% used toothbrushes while 17 and 5% used fingers and electrical brushes as their teeth cleaning tool. The results are similar to past studies.^{5,17} Very few caretakers of CP children were aware of brushing methods, oral hygiene practices, and use of the electrical brush. Studies have shown that brushes with rotation oscillation action, use of an electrical toothbrush, and altering the size and length of the toothbrush have shown progressive results in gingival health, OHI, reduced DMFT index and malocclusion.²³⁻²⁷

Dental treatment performed on the CP child was done under general anaesthesia. The mean number of dental treatment performed was 14.2 teeth (extraction of permanent teeth: 11%, extraction of primary teeth: 37%, filling: 35%, fluoridation: 6%, pulpotomy: 4%, sealants of primary teeth 6%, space maintainance: 1%). Another study conducted by Chen *et al.* had the average number of treated teeth as 6.1 (pulp therapy: 1.2, filling: 3.6, extraction: 1.3) the results are significantly low as compared to the present study as the oral health condition of children was very poor.¹⁴

Most of the findings of our study were found in concurrence with the study conducted in other parts of India and abroad. This is the first study on CP Child relating to dental health problems to the best of our knowledge in coastal eastern India in one of the major Government centres. This study remarkably identified the dental health problem in the CP child. We also analyzed the parent's awareness of oral health by CP child and the approach of parents and doctors towards dental diseases. Further improvement in the awareness and knowledge regarding the dental treatment of CP children should be taken as a priority for their mental and physical wellbeing so that they can lead healthy lives.

CONCLUSION

From the present study, it is cleared that CP child requires special attention and care during dental treatment. Knowl-

edge, awareness, and perception of CP child parents also should be good towards dental treatment. It is a challenge to dental practitioners also for the managing these children. A dentist should be skilled to handle a CP child. A pediatric dentist has a significant role as they should suggest, encourage and skill the parents or the caregivers for a good home oral health practice. All these combined improvements in the awareness and knowledge regarding the dental treatment of CP children should be taken as a priority for their mental and physical wellbeing so that they can lead healthy lives.

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Authors Contribution:

Bhuyan Sanat Kumar, Bhuyan Ruchi, and Das Sakti Prasad conceived, planned, designed, prepared the questionnaire, and guided the study. Bhuyan Sidhant drafted the manuscript. Nayak Gaytree and Sahu Akankhsya collected the data and performed data analysis. Kar Dattatreya and Kuanar Anyana edited and revised the manuscript for the final version.

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Table 1: Socio-demographic status of the patients

VARIABLES		Frequency (%)
SEVERITY OF CEREBRAL PALSY	I-III LEVEL	74
	IV-V LEVEL	26
ORAL HEALTH INDEX (OHI)	GOOD	7
	MODERATE	28
	POOR	65
GINGIVAL HYPERPLASIA	GRADE I	18
	GRADE II	57
	GRADE III	25
MALOCCLUSION	YES	81
	NO	19
TONGUE THRUSTING	YES	79
	NO	21
CROWDING	YES	69
	NO	31
OPEN BITE	YES	61
	NO	39
DEEP BITE	YES	39
	NO	61
DECAYED,MISSING,FILLED(DMF) INDEX	DECAYED	57
	MISSING	22
	FILLED	21
PERIODONTAL ALTERATION	PRESENT	83
	ABSENT	17
ANXIETY	SEVER	59
	MODERATE	12
	MILD	29

Table 2: Different types of oral problems and challenges faced

FACTORS		FREQUENCY (%) (n=100)
GENDER	MALE	75
	FEMALE	25
AGE GROUP	1-5 YEARS	10
	6-10 YEARS	48
	11-15 YEARS	26
	ABOVE 15 YEARS	16

Table 3: Dental care and type of treatments

DENTAL CARE AND TYPE OF TREATMENTS		FREQUENCY (%)
DENTAL VISITS FOR TREATMENT	ONCE	32
	MANY	21
	NO	47
FREQUENCY OF TEETH CLEANING	ONCE A DAY	69
	MORE THAN ONCE A DAY	31
TEETH CLEANING TOOLS	FINGERS	17
	ELECTRICAL BRUSH	5
	TOOTH BRUSH	78

Table 3: (Continued)

DENTAL CARE AND TYPE OF TREATMENTS		FREQUENCY (%)
CHALLENGES DURING DENTAL TREATMENT	MOUTH OPENING	12
	LEARNING DIFFICULTY	27
	COMMUNICATION DIFFICULTY	61
	EXTRACTION OF PERMANENT TEETH	11
	EXTRACTION OF PRIMARY TEETH	37
DENTAL TREATMENTS DONE	FILLING	35
	FLORIDATION	6
	PULPOTOMY	4
	SEALENTS OF PRIMARY TEETH	6
	SPACE MAINTAINCE	1

Table 4: Oral health condition and Observed value

	Effect on health condition	No effect on health condition	Total
Treatment	27	29	56
No Treatment	24	20	44
Total	51	49	100

Table 5: Expected Value

	Effect on the health condition	No effect on health condition	Total
Treatment	29	27	56
No Treatment	22	22	44
Total	52	48	100

Table 6: Chi-Square (χ^2) Calculation

Oij	Eij	Oij - Eij	(Oij - Eij) ²	(Oij - Eij) ² /Eij
27	29	-2	4	0.137
29	27	2	4	0.148
24	22	2	4	0.181
22	24	-2	4	0.166

$\chi^2 = 0.632$

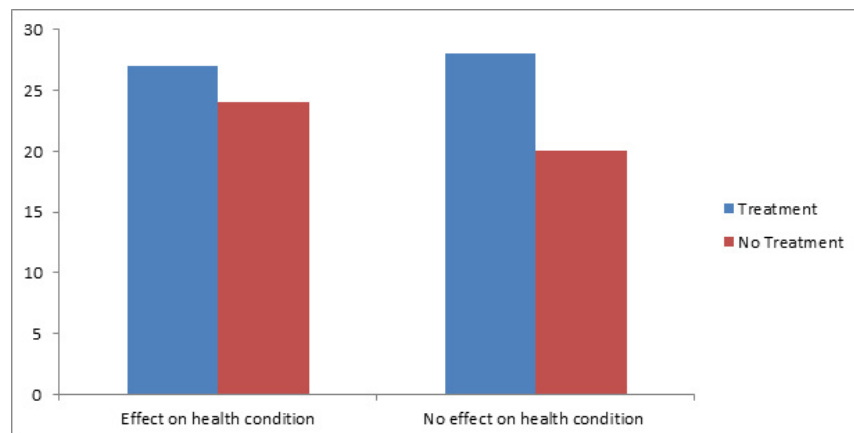


Figure 1: Graphical representation of effect on health condition during treatment.

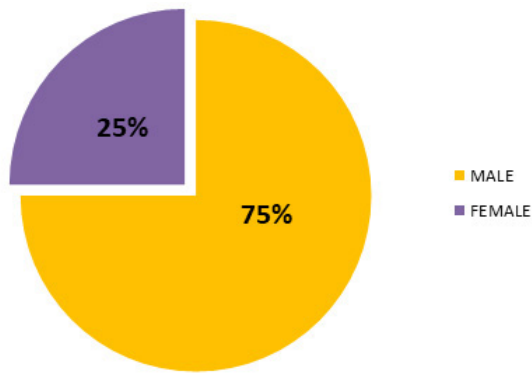


Figure 2: Graphical representation of male and female groups.

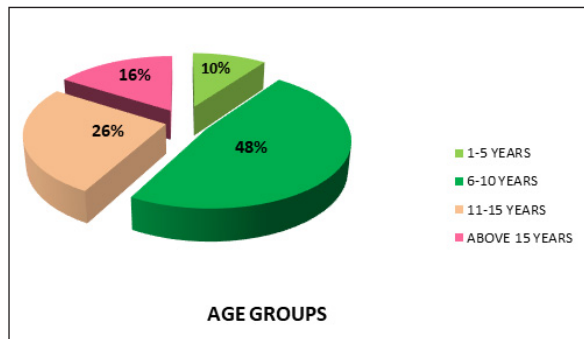


Figure 3: Graphical representation of age groups of the patients.

tients.

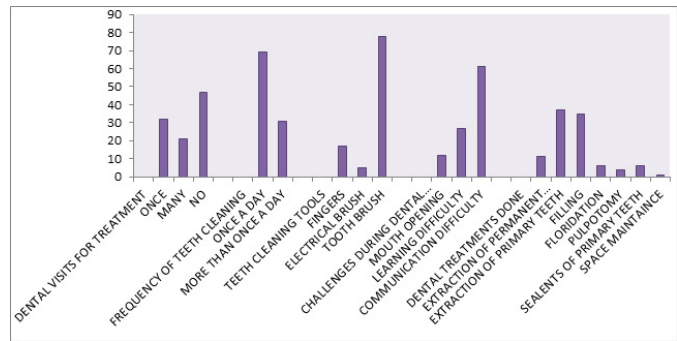


Figure 4: Different types of oral hygienic practice versus the number of patients.

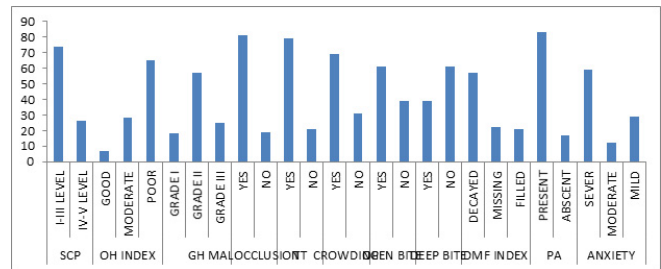


Figure 5: Different types of oral problems and challenges faced.