

A Dental Evaluation of Cerebral Palsy Patients at a Regional Hospital in South Eastern Nigeria

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Abstract

Background: Children with cerebral palsy (CP) present a higher susceptibility to severe dental diseases due to abnormal neuromuscular co-ordination of the tongue, lips and cheeks. The purpose of this study was to evaluate the oral health status and determine the prevalence of the oral findings of the CP patients who attended the Physiotherapy clinic of the University of Nigeria Teaching Hospital, Enugu, South-Eastern Nigeria.

Methods: A questionnaire was filled by volunteer parents/guardians. Demographic data for each participating CP patient was obtained. Dental examination was carried out for the participants; oral hygiene and caries status and malocclusion were assessed. Descriptive analysis was done using the Statistical Package for Social Sciences (version 18SPSS Inc. Chicago. IL).

Results: A total of 42 children aged 7months to 10years with an average age of 2 years 9 months were included in this study. There were 16(38.1%) females and 26(61.9%) males. Oral hygiene was good in only 2(5.3%), fair in 30(78.9%) participants while it was poor in 6(15.8%). There was a low caries incidence with mean DMFT and dmft of 0.048 and 0.45 respectively.

About 14.3% of participants had incompetent lips; 5(11.9%) had anterior open bite; 6(14.3%) had increased overjet. Lower labial segment crowding was seen in 2(4.8%) participants while one participant (2.4%) had lower labial spacing. Other findings were hypoplasia present in 3(7.1%) participants, parafunctional habits 14(33.3%) children. Only 8(19.0%) participants had drooling saliva.

Conclusion: In this study, parafunctional habits were the most prevalent oral finding in this group of cerebral palsy patients. A significant percentage, 78.9% of participants had a fair oral hygiene while caries incidence was found to be low.

Key words: Cerebral palsy, Caries, Oral hygiene, malocclusion.

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Introduction

The term Cerebral palsy (CP) was originally coined more than a century ago and loosely translates as brain paralysis. However, a precise definition has remained elusive because cerebral palsy is not a single diagnosis but an umbrella term describing non progressive brain lesions involving motor or postural abnormalities that are noted during early development.¹ Racadanu et al, 2008² noted that CP is a term that describes a

constellation of neuromuscular, non-contagious and non-evolutionary disturbances, caused by a brain lesion in the first 5 years of life. It was further stated that CP is the most common handicapping disorder in United States and approximately half of all the children with cerebral palsy at their first birthday outgrow signs of the disorder by their 7th birthday.² The prevalence of CP ranges from 1 to 4 children /1000 live new born.^{3,4} In Nigeria, the prevalence of CP reported from two Paediatric neurologic clinics was 36.9% - 50.3%.^{5,6} Every case of CP is unique to the individual.⁷

Several studies have shown that the aetiology of CP is multifactorial and these include prenatal causes (genetic disease, embryonic anomalies), perinatal causes (hypoxia, rhesus incompatibility, premature birth, underweight at birth), and postnatal causes (infections, trauma).² Severe birth asphyxia (SBA) with hypoxic ischaemic encephalopathy (HIE) are major causes of CP in Nigeria.⁸

CP may be classified according to associated motor disability into spastic, dyskinetic, ataxic and combined palsy reflects a combination of these types.⁹

Children with CP display the same oral pathology as healthy persons.^{4,9} However, they present a higher susceptibility to severe dental disease (dental caries, periodontal disease, dental trauma, malocclusion, bruxism, temporomandibular joint disorders,

enamel hypoplasia, abnormal oral habits, tongue thrust, mouth breathing, drooling of saliva) due to abnormal neuromuscular co-ordination of the tongue, lips and cheeks and to the low level and reduced quality of oral care.^{4,10}

Other oral findings are self injurious behaviour including tongue, cheek and lip biting, finger, arm and hand chewing, gastro oesophageal reflux leading to dental erosion, loss of tooth structure, gingival growth and oral habits including bruxism, rumination, pouching and pica¹¹ These oral conditions would expectedly affect negatively the quality of life of these group of individuals. It had been noted that generally the health related quality of life of Nigerian children with CP is low.¹²

The Department of Child Dental Health of the University of Nigeria Teaching Hospital, is a referral centre for Paediatric dental care offering care in both Orthodontics and Paediatric dentistry. Our clinical experience showed that most of the cerebral palsy patients that attended our clinic presented because of pain from advanced carious lesions that necessitated multiple extractions. These procedures were traumatic for both the parents and the dentist. In addition, these patients also had features of malocclusion that were untreated. This is consistent with the findings of the study of Tella et al¹², which showed that generally the health related quality of life of Nigerian children with CP is low.

The few of these CP patients that visited the clinic sought for help on their own despite the fact that they had been attending the Physiotherapy Clinic for a while and had also been at the Paediatric Neurology Clinic of the hospital. It is worthy of note that the Physiotherapy clinic adjoined the Dental Clinic, hence the motivation for this study and the need for our collaboration with the Physiotherapy Clinic.

This study therefore aimed to assess the dental findings in this group of patients with a view to recommending interdisciplinary management and early referrals of patients with cerebral palsy in the hospital to the department of Child Dental Health.

Materials and Methods

Forty-two children between the ages of 7 months and 10 years with CP attending the Physiotherapy Clinic University of Nigeria Teaching Hospital (UNTH), Enugu were included in the study. A questionnaire was filled by volunteer parents/guardians, following which oral examination was carried out on the CP patients in a secluded examination room in the Physiotherapy Clinic. Plaque index by Silness and Loe (1964)¹³ was used to score the oral hygiene status. The plaque

index describes the thickness of plaque in the cervical area of the teeth. All the teeth present in the mouth were recorded. Caries status was assessed using the World Health Organization criteria (WHO, 1997)¹⁴ for dental caries using the DMFT/deft index. It is one of the simplest and most commonly used indices in epidemiologic surveys of dental caries. It quantifies dental health status based on the number of carious, missing and filled teeth due to caries.

Malocclusion was classified using Edward Angles classification (1899)¹⁵ for the children that are in mixed dentition and have their first molar in occlusion. It is based on where the buccal groove of the mandibular first molar contacts the mesiobuccal cusp of the maxillary first molar- on the cusp is class I, distal to the cusp by at least the width of a premolar is class II, or mesial to the cusp is class III¹⁶. For children with complete primary dentition, terminal plane of occlusion using the second deciduous molars is used. Children with flush terminal plane were classified into class I; children with mesial step were classified as class II, children with distal step were classified as class III. Skeletal pattern was also assessed. Lip competence, anterior open bite (AOB), overjet, crowding, spacing were also recorded. Lip competence was recorded based on Ballard's criteria- mandible in physiological resting position and lips in juxtaposition [sealed] with no contraction of the orbicularis muscles of the mouth and the mentalis in order to seal the lips.¹⁷ Other information obtained were presence or absence of drooling of saliva, hypoplasia, para functional habits. All data generated were subjected to descriptive analysis using the Statistical Package for Social Science (version¹⁸SPSS Inc. Chicago. IL).

Results

The children included in this study were within the age range of 7 months to 10 years with an average age of 2 years and 9 months. Out of the 42 children, 16(38.1%) were females while 26(61.9%) were males as seen in Table 1.

Out of the 42 children involved in the study, 4(9.5%) were in gum pad stage, 30(71.4%) in primary dentition stage and 8(19.1%) in permanent dentition stage (Table 2). On oral hygiene, 2 (5.3%) had good oral hygiene, 30(78.9%) children had a fair oral hygiene, 6(15.8%) had poor oral hygiene as seen in Figure 1. Tooth brushing for most of the children (97.6%) was done twice a day as shown in Table 3.

The mean DMFT and dmft scores are 0.048 and 0.45 respectively. However, it was noted that decayed teeth were more in primary dentition (80.0%) than in permanent dentition (20.0%) as seen

Table 1: Age and Gender Distribution of the Participants

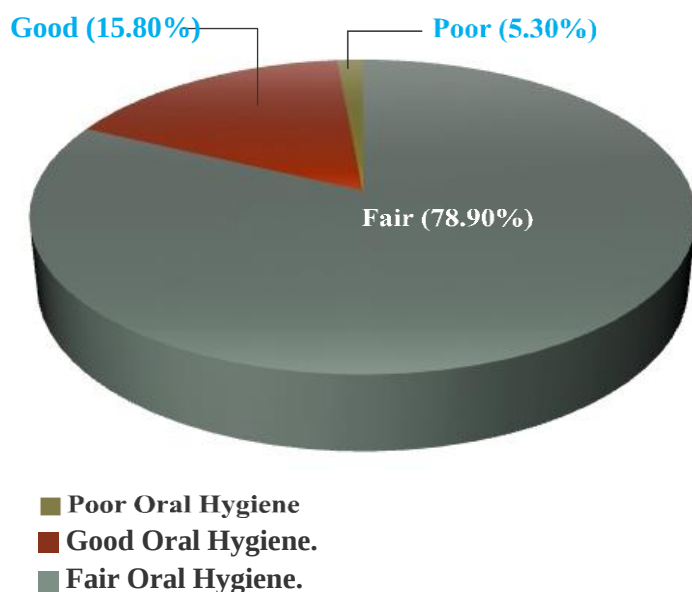
Age (months)	Frequency (n%)
<12	9(21.4)
13-24	13(31.0)
25- 36	8(19.0)
37- 48	3(7.1)
>60	9(21.4)
Total	42(100.0)
Gender	
Female	16(38.1)
Male	26(61.9)
Total	42(100.0)

in Table 4.

In Table 5; some children had more than one dental finding. Six (14.3%) children had lip incompetence, 5(11.9%) children had anterior open bite and 6(14.3%) had increased overjet of about 5mm. Two children had lower labial crowding (4.8%), 1(2.4%) child has lower labial spacing and 1(2.4%) had a fractured tooth. Other findings were hypoplasia which was seen in 3(7.1%) children, parafunctional habit seen in 14 (33.3%) children: { 4(28.6%) tongue thrusting, 8(57.2%) bruxism and 2 (14.3%) digit sucking} and 8(19.0%) children had saliva drooling.

Table 2: Dentition Stage of the Participants

Dentition stage	Frequency(n%)
Gum pad	4(9.5)
Primary	30(71.4)
Mixed	8(19.1)
Total	42(100.0)

**Figure 1: Distribution of Oral Hygiene Status of the Study Participants****Table 3: Frequency of Tooth Brushing amongst the Participants**

Tooth brushing	Frequency (n%)
Twice a day	41 (97.6)
Once a day	1 (2.4)
None	0 (0.0)
Total	42 (100.0)

Table 4: Decayed, Missing and Filled Teeth (DMFT) Scores of the Participants

Teeth involved	Decayed teeth (n%)	Missing teeth (n%)	Filled teeth (n%)
Primary	4(80.0)	0(0.0)	0(0.0)
Permanent	1(20.0)	0(0.0)	0(0.0)
Total	5(100.0)	0(0.0)	0(0.0)

Out of the 10 children with complete primary dentition, 8 had flush terminal plane while 2 had distal step vertical plane. Out of 8 children that had the first molars fully erupted, 2 were inaccessible because of the rigidity of the muscle and 5 out of the 6 accessible cases had class II molar relationship. In all, a total of 16 children had their malocclusion classified and skeletal pattern 1 was seen in 9 cases (56.3%) and skeletal pattern 2 was seen in 7 cases (43.7%), Table 6.

Discussion

There were more males (61.9%) than females (38.1%) with cerebral palsy in this study and the male to female ratio was 1.67: 1. This is similar to the findings of Drougia A et al¹⁸ and Surveillance of Cerebral Palsy in Europe (SCPE)¹⁹ with male-female ratio of 1.33: 1.

The caries experience which is the total DMFT and dmft of children in this study is low. This is in contrast to the findings from a study by Alhammad and Wyne et al²⁰ in Saudi Arabia in which the caries

Table 5: Frequency Distribution of Oral Findings of Participants

Dental findings	Frequency (n%)
Parafunctional habit	14(33.3)
Drooling of saliva	8(19.0)
Attrition	6(14.3)
Incompetent lips	6(14.3)
Increased overjet	6(14.3)
Caries	5(11.9)
Anterior open bite	5(11.9)
Hypoplasia	3(7.1)
Lower labial crowding	2(4.8)
Lower labial spacing	1(2.4)
Fracture	1(2.4)

experience was high and very few children had good oral hygiene. However, the study by Dury et al,²¹ reported that children with or without cerebral palsy had similar caries experience. The lower caries experience of the cerebral palsied children in this study may be because a greater percentage of the children are just erupting their teeth and are in early primary dentition. Hence the teeth have not been exposed long enough to cariogenic agents.

Table 6: Prevalence of Malocclusion among the Participants

Malocclusion	Frequency (n%)
Class I	9(56.3)
Class II	7(43.7)
Class III	0(0.0)
Total	16(100.0)

Majority of the children had fair oral hygiene and this could be attributed to the availability of care givers who cleaned the children's teeth with toothbrush and toothpaste or face towel twice a day. The care rendered to these children suggests compliance with oral health education received at the Childrens' Outpatient Clinic of the University of Nigeria Teaching Hospital, Enugu before they were referred to the Department of Physiotherapy. The children with poor oral hygiene were in their mixed dentition stage and this may be attributed to inability to brush the teeth properly because of some mobile (exfoliating) teeth. However, good oral hygiene practice needs to be emphasized to ensure a continued maintenance of good oral hygiene for the children and improvement especially for those with poor oral hygiene.

Hypoplasia is another clinical finding that is of interest to both the clinician and the basic scientist because it may lead to an increase risk of caries²². In this study only 3 (7.1%) children had hypoplasia but a study in Saudi Arabia revealed that one quarter of the children with CP examined had enamel hypoplasia²³. This is also a pointer to the need for preventive dental care.

Six (14.3%) children had attrition and only 1(2.4%) had traumatic dental injuries. The most common cause of attrition is parafunctional activity such as bruxism²⁴. The aetiology of sleep bruxism has not yet been well defined. However a previous study points to different associated risk indications such as local, psychological, genetic, neurological, systemic and social factors²⁵

Parafunctional habits were high in this study and were due mainly to bruxism, tongue thrusting and digit sucking. A previous study by Ortega et al²⁶

showed that the frequency of parafunctional habit seen in patients with CP was due to pacifier sucking (13.8%), finger sucking (6.1%), habit of biting objects (18.4%), tongue interposition (41.5%) and eccentric bruxism (36.9%). There is a need to establish protocols for adequate prevention and clinical intervention for parafunctional habits in order to minimize the deleterious consequences that may result from such habits. Drooling of saliva was another common problem in these children. It is related to abnormality with swallowing and difficult in moving saliva to the back of the throat. This is due to misalignment of teeth and lack of control of the muscles within the mouth. It can also be made worse by a lack of head control, poor posture, and lack of sensation around the mouth, impaired concentration or an obstruction within the nasal cavity.²⁷ However, drooling is defined as an unintentional loss of saliva from the mouth and is considered normal in infancy up until the age of 18 months when the oral motor muscles mature. Drooling beyond this age is not normal and is associated with neurological problems such as CP or mental retardation.^{28,29} A study by Tahmassebi et al³⁰ showed that drooling in CP children is not due to hyper salivation but rather due to swallowing defect. In this study, only 8(19.0%) patients drooled saliva using the criteria for identification of drooling.³⁰

Fracture of anterior teeth, particularly the upper right central incisor occurred in 1(2.4%) patient which was complicated by dentoalveolar abscess. Predisposition to fracture of anterior teeth includes proclined incisors, uncoordinated movement usually seen in children with cerebral palsy. In this study, 6(14.3%) of the children had increased overjet of 5mm indicating that they are predisposed to traumatic dental injuries and preventive measures are needed. More than half of the children (56.2%) whose occlusion was assessed had class I malocclusion. This is similar to the studies by Rosenbaum et al (1966)³¹, Vittek et al(1994)³² and Wyne et al (1996)³³ but contrary to the findings by Roenstein(1978)³⁴ and Chanda et al, (2011)³⁵ where most of the children had class II malocclusion.. These variations may be as a result of differences in socio demographic profile of the study participants. In this present study, 6 (14.3%) children had lip incompetence but in a study by Franklin (1996)³⁶, he found that 88.2% of the children with cerebral palsy had lip incompetence.

Anterior open bite in cerebral palsy children often results from digit sucking, mouth breathing and tongue thrusting.³⁷ In this study, anterior open bite was observed in 5 children; 2 children in their primary dentition stage and in 3 children in their

mixed dentition stage. Prevalence of labial spacing and crowding was very low children in this study. This result is contrary to various other studies which showed higher prevalence of these findings in children with cerebral palsy.^{32,33}

Conclusion

This study has highlighted the existence of dental pathologies in this study group. Parafunctional habits were the most common oral finding. Appliance therapy provided by the Orthodontists is necessary to prevent the complications that may arise from these parafunctional habits. Appropriate oral hygiene practice is recommended for all CP children as this will significantly improve the oral hygiene status and reduce the incidence of dental caries, gingivitis and other associated oral pathologies.

Recommendations

There is a need to institute a collaborative approach by all cerebral palsy patient caregivers in the University of Nigeria Teaching Hospital, Enugu.

The Department of Child Dental Health should institute regular oral health education at the different units where these patients are seen in the hospital.

The non dental care givers must also advice on early dental visits as this would help in preventing periodontal diseases and dental caries.

Children should have their first dental check by the age of 12 months, or within 6 months of the eruption of the first tooth.

Contributors

Folaranmi N conceived the idea of the study, design, analysis, write up and final proof reading. Akaji E, was partly responsible for the analysis, interpretation of the result write up and proof reading. Onyejaka N, was partly responsible for collection of data, analysis and write up. Okeke A, was partly responsible for collection of data, analysis and write up.

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Conflict of Interests

Nil

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