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Parental Oral Health Knowledge, Attitude, Practice and Caries
Status of Sudanese Children with Cerebral Palsy

By

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Declaration

I undersigned, hereby declare that "Parental Oral Health Knowledge, Attitude and Practice among Sudanese Cerebral Palsy children "is my original work which has not been submitted before for any degree in other university."
Dedication

I dedicated this research to the soul of my mother

And all cerebral palsy children

Allah protect all them
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### Abbreviations

<table>
<thead>
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AAPD</td>
<td>American Academy of Paediatric Dentistry</td>
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<tr>
<td>CP</td>
<td>Cerebral Palsy</td>
</tr>
<tr>
<td>DMFS</td>
<td>Decayed, missing and filled surfaces</td>
</tr>
<tr>
<td>DS</td>
<td>Decayed surface</td>
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<tr>
<td>MS</td>
<td>Missed surface</td>
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<tr>
<td>FS</td>
<td>Filled surface</td>
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<tr>
<td>dmft</td>
<td>Decayed, missed and filled primary teeth</td>
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<tr>
<td>DMFT</td>
<td>Decayed, missed and filled permanent teeth</td>
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<tr>
<td>ND</td>
<td>Non-disabled</td>
</tr>
<tr>
<td>SHCN</td>
<td>Special health care need</td>
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<tr>
<td>WHO</td>
<td>World health organization</td>
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Abstract

**Background:** Cerebral palsy (CP) is a set of non-progressive neuromuscular disorders due to defects in the developing fetal brain. This group of children is at risk of dental caries and gingival diseases due to dietary factors, poor oral hygiene, lack of parental knowledge regarding oral hygiene and problems related to dental management. Maintaining good oral hygiene is obligatory to those children. This study was conducted to assess the parental knowledge, attitude and practices of the oral health and caries status of the Sudanese Cerebral Palsy children.

**Material and Method:** A cross sectional hospital based study including 123 cerebral palsy children their mean age was 6.58 years attending Jaafer Ibn Ouf pediatric teaching hospital in Khartoum state were included. Data regarding the parent oral health knowledge, attitude and practice were collected by a face to face interview questionnaires and the caries status was assessed using (DMFT/dmft).

**Results:** Most of parents (90.2%) thought that good dental health was important for optimum general health. Eighty one point three percent of the cerebral palsy children they never visited a dentist, and whose visited dentist (n=23); (95.7%) go when there was a problem. More than half of the parents (60.2%) heard about fluoride. Regarding cariogenic food (43.9%) they thought that (chocolate, backer products and soft drink) causes of tooth decay. 40.7% said that media is main source for oral health information. 50.4% of them responded that they can maintain good oral health to their children. A statistically highly significant association (p-value = 0.002) was found between education and hearing about fluoride. The dmft ,MFT for primary and permanent teeth was 3.6 ± 4.64, 2.0 ± 2.90 respectively. There was significant association between age and DMFT (P-value = 0.000). The caries prevalence in primary and permanent teeth was (57.4 %) and (46.3 %) respectively. There was significant association between knowledge level and DMFT in permanent teeth (p= 0.037)
**Conclusion:** Parents of children with cerebral palsy had satisfactory knowledge about oral health, concerned; supervision of teeth brushing and the role of oral health to the general health of their children, although it was not applies to their daily practices. The caries prevalence in cerebral palsy children was high.
المستخلص:

خلفية:

الشلل الدماغي عبارة عن مجموعة من الاضطرابات العصبية العضليّة الناجمة عن عيب في دماغ الجنين. هذه المجموعة من الأطفال لها أكثر عرضة للإصابة بسبب الإسلام وأمراض القلب نتيجة للعوامل الغذائية وسوء الصحة الفموية وعدم معرفة الوالدين بصحة الفم لدى هؤلاء المجموعة من أبنائهم والتداوي الفموي اللازمة. وعدم مقدرة هؤلاء الأطفال على التعاون للفتي العلاج لابد من الإشراف الغذائي المستمر والمساعدة في الحفاظ على نطاق الفم الجيدة لتجنب هؤلاء الأطفال من الإصابة. وقد أجريت هذه الدراسة لتقديم مدى معرفة الوالدين المواقف والممارسات الصحية الفموية للاطفال السودانيين المصابين بالشلل الدماغي وجرى تقييم حالة نخر الأسنان.

المواد وطريقة البحث:

دراسة مقطوعة نوعية في مستشفى. تجري 123 طفلاً مصاب بإصابة بالشلل الدماغي، متوسط اعمرهم 6.5 سنة، في مستشفى جعفر بن عوف التعليمي للأطفال في ولاية الخرطوم وقد تم جمع البيانات المتعلقة بمفاهيم الأم والاباء عن طريق استبيان ذاكرة خاص وجرى تقييم حالة نخر الأسنان باستعمال (dmft / DMF).

النتائج:

معظم الأباء والأمهات (90.2%) يعتقدون أن صحة الأسنان الجيدة مهمة للصحة العامة، (%81.3) لم يزوروا طبيب الأسنان، والذين زاروا طبيب الأسنان معظمهم (95.7%) ذهب عندما كانت هناك مشكلة ومعظم العلاج الذي يتلقنه الخلع وبعض الأدوي. أكثر من نصف الأباء (60.2%) يعانون الفلورايد. فيما يتعلق بمسببات التسوس من المواد الغذائية أقرب من نصفهم (43.9%) ذكر أن المخبيزات، الشوكولاتة والشاي الغازية هي مسببات التسوس. أقل من نصفهم (40.7%) قال أن مصدر معلوماته عن صحة الفم من وسائل الإعلام.

50.4% أجاب يمكن الحفاظ على صحة الأسنان الجيدة عند الأطفال من خلال الإشراف على السوكل، والحد من تتراوح الأغذية السكرية والزيارة الروتينية لطبيب الأسنان وقد تم الحصول على علاقة ذات دلالة إحصائية بين التعليم واستخدام الفلورايد كما وجد أن معدل حالات نخر الأسنان اللبنية والمدامة هو 2.90 ± 2.0، 4.64 ± 3.6 و توجد علاقة ذات دلالة إحصائية بين معدل حالات نخر الأسنان والعمر (dmft and DMFT) حالات نخر الأسنان والعمر (p- value =0.002)
الخلاصة:

إن معرفة الوالدين بصحة الفم والاستماع مرضية في معظم المناطق ومع ذلك هناك نقص في تطبيقها على الأطفال المصابين بالشلل الدماغي وكانت لديهم نسبة تحسس عالية.
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Chapter one

INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

Special health care refers to “any physical, developmental, mental, sensory, behavioural, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs”. The condition may be congenital, developmental, or acquired through disease, trauma, or an environmental cause and may impose limitations on performing daily self-maintenance activities or cause substantial limitations in a major life activity.\(^{(1)}\)

Cerebral palsy (CP) describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, and by epilepsy and secondary musculoskeletal problems.\(^{(2)}\)

The etiology and pathogenesis of cerebral palsy are still not clearly understood. They suggest that lesions originating from brain injury occurs during the prenatal, perinatal or postnatal period. The diagnosis is usually made based on clinical symptoms.\(^{(3-5)}\)

A number of classifications of cerebral palsy are available depending on the predominant motor alteration, and encompass four main types: spastic, athetoid, ataxic and mixed, differentiated by their symptoms, and which generally reflect the region of the brain that has suffered the injury. Spastic cerebral palsy is the most common type (70-80%), and is characterized by a lesion in the cerebral cortex. Athetoid cerebral palsy (10-20%) is characterized by involuntary movements. In the ataxic form (5-10%), patients have impaired
balance and coordination, and in the mixed type the characteristics of more than one type of cerebral palsy are found at the same time.\textsuperscript{(4, 5)} Cerebral palsy is also classified according to severity into mild, moderate and severe, and according to the involved area of the body into monoplegic (one limb only), hemiplegic (one side of the body), paraplegic (both legs), quadriplegic (all limbs equally) and diplagic (both legs and arms (minimal)). Cerebral palsy also has several manifestations, including intellectual disability, seizure disorders, sensory impairment, speech problems – usually dysarthria – and joint contractions due to spasticity and rigidity leading to abnormal limb posture.\textsuperscript{(6, 7)}

Children with cerebral palsy have motor dysfunction, so normal functioning of the orofacial muscles is disturbed. Depending on the severity of the disease, individuals with CP may suffer from choking, coughing, drooling, inability to consume solid food, and difficulties in swallowing, chewing and drinking. Consequently, oral health is a significant challenge, as individuals with CP are more prone to developing caries and periodontal disease, mouth-breathers and suffer from malocclusion (skeletal class II and anterior open bite). No intraoral anomalies are unique to persons with cerebral palsy but oral conditions are more severe than the general population.\textsuperscript{(3, 6, 7)}

In 1960, McDonald discussed how pediatric medicine had changed in the previous 30 years from 90% treatment and 10% prevention to just the reverse.\textsuperscript{(7)} Preventive dentistry is now the foundation on which all oral health care is built; which is depend mainly on home oral hygiene. Hence, parents with good oral health knowledge play a better role in maintaining optimal oral health for their children with CP through supervising oral hygiene and dietary habits.\textsuperscript{(8)}

Overall CP prevalence for the past 40 years is stable, but a modest increase in prevalence probably occurred in the last decades of the twentieth century. This increase in prevalence can be attributed to the substantial increase in the prevalence of CP per 1000 very low birth weight infants, this due to increased
survival that results from newborn intensive care.\(^9\) prevalence in children weight 1000 to 1499 g at birth was (59.18 per 1000 live births), and prevalence of CP by gestation age; before 28 weeks gestation was (111.80 per 1000 live births).\(^{10}\)

The estimated prevalence of cerebral palsy worldwide ranges from 0.74 to 3.6 per 1000 live births.\(^{11}\) In Nigeria the incidence was 13.1 children per year.\(^{12}\) In Sudan there were many studies concerning CP children, however, no data available on the prevalence.

The aim of this study is to assess the parental knowledge, attitude and practice and caries status of Sudanese CP children.
1.2 Literature review:

1.2.1 Parental oral health knowledge, attitude and practice

There is strong evidence between oral health knowledge and better oral health practice by giving adequate information, motivation, and practice of oral health measures to individuals. People with more positive attitudes towards their oral health are influenced by better knowledge in taking care of their teeth. Nouri Sumaya M et al in 2014 found in their study that the number of children who reported never going to the dentist was higher in the group with CP. Regarding the brushing supervision, the results showed a significant difference between the 2 groups. In the CP group, (66%) of the parents brushed the teeth for their children.\(^{(13)}\)

Amjad H.’s study in Saudi Arabia (2007) reviewed 106 parents aged 21 to 70 years old. All the parents thought that good oral health was important. Most of the parents (95.3%) believed that they can maintain good dental health in their children with CP by supervising their children’s tooth brushing, reducing sugary food intake and making regular visits to a dentist. The vast majority of parents with higher education (96.8%) had heard of fluoride as compared with parents with low education (79.5%).\(^{(8)}\)

In 2006 Dana AL-Bader et al looked at parents of disabled children in Saudi Arabia and found that slightly more than two-thirds (68.0%) of the parents thought that one must visit a dentist at least once every six months. Almost all the parents (99.7%) thought that cleaning teeth was important; mainly to prevent tooth decay (89.3%). About 92.7% of parents had heard about fluoride. Regarding parents’ awareness about their child's oral health, 86.7% of the parents claimed to observe their child's oral health. Almost all of them (98.7%) responded that they can maintain good dental health in their children by supervising their tooth brushing, reducing sugary food intake and making regular visits to a dentist. A great majority (94.7%) of the parents believed that their child needed assistance in maintaining good oral hygiene.
In about half (47.5%) of the children, the last dental visit was the first visit to a dentist, and 20.5% of the last visits were due to dental pain.\(^{(14)}\)

Magoo et al (2015) found that about 76.9% of the parents of a group of autistic children in India had the knowledge that oral health affects the overall health of the child. Forty point four percent thought that they should consult a pediatric dentist when the child had dental problems. (71.2%) of parents felt the importance of maintaining primary teeth. However, 61.5% did not want any treatment for decay in primary teeth. 82.7% of parents brushed their child’s teeth once daily and 94.2% of the parents used conventional toothbrushes for their children.\(^{(15)}\)

### 1.2.2 Caries prevalence in CP patients:

Dental caries is an infectious and communicable disease defined as localized destruction of susceptible dental hard tissues by acidic byproducts from bacterial fermentation of dietary carbohydrates, it is a dynamic process of demineralization and remineralization of enamel depending on salivary PH.\(^{(16)}\) It is the most common chronic disease among children and adolescents.\(^{(7)}\)

Previous studies have reported caries status among CP children and different results were reported.\(^{(17-31)}\)

In India, Nidihi et al (2015) found that in a case control study of children aged 7 to 17 years, the mean dmft/DMFT of the group with CP was 4.11 ± 2.62, while that of the control group was 2.95 ± 2.75, which showed a higher caries prevalence in the group with CP.\(^{(17)}\)

Al-Allaq et al., New York (2015) carried out a study in a sample of 478 CP patients. With a wide age range of 3 to 78 years old, the 36-55 year old age group displayed significantly more caries and periodontitis than the other age groups. Individuals aged 3 to 20 years showed a significantly lower rate of periodontitis and caries. There was no difference in oral health between people with CP from different age groups and living conditions, and there was no significant association with gender or race.\(^{(3)}\)
A cross sectional study by Cardoso et al., Brazil (2015) found that the prevalence of dental caries was 59.3% with a DMFT and mean dmft of 1.71 ± 2.42 and 2.22 ± 3.23, respectively. The mean GBI was 22.44%. The caregiver’s educational level of less than eight years was associated with dental caries experience (PR = 1.439; 95%, CI = 1.09–1.89).\(^{(18)}\)

In Mohamed A Jaber and Taha Allouch’s case-control study of children with CP aged 4 to 17 years in United Arab Emirates (2014), the prevalence of dental caries among children with CP was 90.0%, \((47/52)\) whereas for the healthy controls the prevalence was 54.0% \((28/52)\). The overall mean DMFT/dmft was 6.5. The restorative index (RI) and Met Need Index (MNI) for the children with CP were 0.03 and 0.08, respectively. Children aged 4-12 years old with CP had a higher percentage of untreated caries and a lower percentage of filled teeth.\(^{(19)}\)

Ana Carolina Oliveira Lemos et al.in Pernambuco Brazil in 2012, found that the majority of children in their study \((70.7\%)\) had spastic cerebral palsy. In terms of health services accessibility, 46.1% of caregivers had difficulties and 34.1% reported a lack of trained professionals. Caries prevalence in deciduous dentition was 61.1% and 26.3% in the permanent dentition. Approximately 60% of the surveyed patients required some type of treatment for dental caries. Children with cerebral palsy in the state of Pernambuco have a more than those in other regions of Brazil.\(^{(20)}\)

Nouri Sumaya M et al (2014) conducted a case-control study in Jeddah, Saudi Arabia in which more than half of the children in the CP group had caries and the mean DMFT+dmft score was high. There was no significant difference in oral health status between children with cerebral palsy and children in the control group. A significant association was found between the ‘reason for dental visits’ and dental health in the CP group \((p = 0.000)\).\(^{(13)}\)

Roberto LLM presented their study (2012) in which they found that the patients in the 4 to 5 year old age group had a lower dmft index than the overall mean reported for Brazilian children.\(^{(21)}\)
Ferreira de their colleagues in Brazil (2011) examined 118 Children and adolescents found that more than half (52.5%) of the subjects had at least one permanent or deciduous tooth affected by new caries during the longitudinal assessment. Participants whose family care-givers had more education had a significantly lower incidence (IR = 0.68).\(^{(22)}\)

Chun–hung’s done study in China (2009) in age group 12 Years and more, with sample size 65 CP patients, the majority of them (74%) had spastic cerebral palsy. Caries experience as the mean DMFT score (±SD) was 1.2±1.9, and 43% of caries remained untreated. 62% of participants had no caries experience. None of the participants had healthy gums, while 57% had calculus and 66% snacked between meals. They all practiced daily tooth brushing, with or without their caregiver’s assistance. About one third (33%) also used mouthwash. There were no significant difference in caries experience between the participants who brushed their teeth with caregiver assistance and those who brushed without assistance.\(^{(6)}\)

In 2011, Folakemi A Oredugba conducted their study in Nigeria in 139 subjects aged 4 to 19 years (mean 11.38 ± 4.36), comprising 69 (49.6%) subjects with CP and 70 (50.4%) controls. Of these, 52 (37.4%) were females and 87 (62.6%) were males. He found that the mean dmft and DMFT of the CP group was 1.03 ± 2.5 and 1.3 ± 2.94, respectively, whilst that of the control group was 0.21 ±0.65 and 0.13 ±0.47, respectively.\(^{(23)}\)

Nouf Alhammad and Amjad H Wyne (2010) studied 140 children for decayed, missing and filled surfaces (DMFS) and divided them into three age groups; the first from 3 to 6 years old (41 children), the second 7 to 9 years old (52 children) and the third group 10 to 12 years old (47 children). They found that the mean DMFS score for the first group was 18.8 (±16.3), with a DS component of 10.9 (±7.5), MS component of 3.7 (±10.4) and FS component of 4.1 (±8.9). For the second group the mean DMFS was 23.4 (±17.7) with a DS component of 15.4 (±12.1), MS component of 4.1 (±9.0) and FS component of 3.8 (±8.5). The corresponding values for the third group were 20.5 (±14.0),
12.4 (±9.7), 5.1 (±12.4) and 2.9 (±5.5), respectively. There was no statistically significant difference (p>0.05) in caries experience between the three age groups.\(^{(24)}\)

In a study of 65 non-institutionalized individuals presenting with CP aged 2–21 years old evaluated for caries by M. T. B. Rodrigues dos Santos in Brazil (2009), the CP group presented significantly higher values for the (DMF-T) index than the non-disabled ND\(^{(25)}\).

A report from Miriam et al’s cross sectional study in Germany, 2008, showed that the median DMF/T index was 13.4 lower than published values concerning disabled persons.\(^{(26)}\)

De Camargo et al’s study in Brazil (2008) in 200 children aged 2 to 17 years old with CP showed that the proportion of children with at least one tooth affected by untreated caries was 49.5%. The prevalence of untreated caries was higher than reference values assessed for the overall population of the same age range.\(^{(27)}\)

In 2005, Dos Santos et al’s study in Brazil in patients aged 3 to 17 years old (n=124) compared DMF with the severity of the cerebral palsy. He reported that patients with hemiplegia presented with a significantly lower DMF index, and the more severe the neurological damage the stronger the biting reflex, resulting in a high risk of oral disease gingivitis and caries experience, mainly in the primary dentition.\(^{(28)}\)

Maria Teresa B et al, 2003, compared the DMFS index for children with CP with healthy children, and reported that the DMFS of permanent dentition of both sexes of the first group was higher when compared to healthy children\(^{(29)}\).

Jancy E.C. Pope in 1991 conducted a case control study in which he found that similar dental caries experience existed in the two groups, but the case children had more extracted and unrestored teeth, and fewer and poorer quality restorations than control children.\(^{(30)}\)
Nielsen’s study in Denmark in 1990 looked at the relationship between caries among children with CP and CP diagnosis, mental and motor handicap. He found that the caries rate of the combined CP group was significantly lower than the control group.\(^{(31)}\)

In a cross sectional, school-based survey by Azza Tagelsir, Ahmed Eltigani Khogli and Nazik Mostafa Nurelhuda in a group of visually impaired children in Sudan, it was found that caries experience was 46.8%. The mean DMFT (age $\geq$ 12, n = 33) was 0.4 ± 0.7 (SiC 1.6), while the mean dmft (age < 12, n = 46) was 1.9 ±2.8 (SiC 3.4), and the mean OHIS 1.3 ± 0.9. Care Index was zero. A quarter of the school children (25.3%) required urgent treatment. Analysis showed that children with partial visual impairment (PVI) were 6.3 times (adjusted) more likely to be diagnosed with caries compared to children with complete visual impairment (CVI).\(^{(32)}\)

Nazik Mostafa Nurelhuda et al., 2009, carried out a school based survey in Khartoum state Sudan they found that the mean DMFT for 12 year olds was 0.42 with a significant caries index (SiC) of 1.4. Private school attendees had significantly higher DMFT (0.57) when compared to public school attendees (0.4). The untreated caries prevalence was 30.5%. In the multivariate analysis, caries experience (DMFT > 0) was found to be significantly and directly associated with socioeconomic status. The mean GI for the six index teeth was found to be 1.05 (CI 1.03 – 1.07) and the mean PI was 1.30 (CI 1.22 – 1.38).\(^{(33)}\)
1.3 Justification

Children with cerebral palsy are at risk of dental caries and gingival diseases due to dietary factors, poor oral hygiene, lack of parental knowledge regarding oral hygiene and problems related to dental management (involuntary movement and lack of cooperation). Therefore, continuous dietary supervision and assistance in maintaining good oral hygiene are obligatory because these children are partially or totally reliant on their caregivers to perform daily activities.\(^{(4)}\)

This study was designed to assess the carious status and evaluate parent’s oral health knowledge of children with cerebral palsy as a response to the recent increase noted in the number children with CP seeking dental care in the pediatric clinic at the faculty of Dentistry, University of Khartoum, in order to establish a proper interceptive and preventive oral health program for those individuals and improve their quality of life. To the best of our knowledge, there is no such study in Sudan.
1.4 Objectives:

1.4.1 General objectives:

To assess parental oral health knowledge, attitude and practice and caries status among Sudanese cerebral palsy children Jaafer Ibn Ouf pediatric teaching hospital in Khartoum state.

1.4.2 Specific objectives:

1. To evaluate parent oral health knowledge, attitude and practice toward the CP children.
2. To determine the incidence of dental caries in CP children
Chapter two

MATERIALS AND METHODS

2.1 Study design:

Cross sectional hospital based study

2.2 Study area

Jaafer Ibn Ouf Pediatric Teaching Hospital, Neurology Unit, Khartoum Sudan.

2.3 Study population

Sudanese CP children 2-15 years old and parents attending Jaafer Ibn Ouf hospital.

2.4 Sample size

The sample size was determined through the following formula:

\[ n^* = \frac{z^2 pq}{d^2} \]

Where:

\( n^* \) = the initial sample size

\( z \) = the critical value for achieving (1-\( \alpha \)) % confidence level, here we use \( z = 1.96 \).

\( p \) = the anticipated population proportion which is chosen from previous studies, here we use Amjad H Wyne 2007 in Saudi Arabia found that Most
(95.3%) of the parents believed that they can maintain good dental health in their CP children

\[ q = 1 - p \]

\[ d = \text{the desired margin of error.} \]

Applying this to the above formula with error of 5% we get sample size of 255 patients.

Since the total cases with cerebral palsy during four months attending Jaafer Ibn Ouf hospital are about 128 cases.

The sample would be adjusted by:

\[ \text{Ultimate } n = \frac{n}{1+n/N} \]

\[ \text{Ultimate } n = \frac{69}{1+69/128} = 70 \]

So the ultimate sample size would be 70 cases.

### 2.5 Selection criteria:

#### 2.5.1 Inclusion criteria:

- Children diagnosed from medical records as cerebral Palsy.
- CP children 2-15 years old attending Jaafer Ibn Ouf Hospital
- Parents or relatives of CP children attending Jaafer Ibn Ouf Hospital.
- Sudanese CP children

#### 2.5.2 Exclusion criteria:

- Children with neurological defects other than cerebral palsy.
- CP children with severe disabilities
- Uncooperative CP children


2.6 Data collection

Instruments

- Disposable examination gloves
- Disposable masks
- Sterile cotton rolls
- Mouth props
- Sterile kidney dishes.
- Rulers
- Sterilization pouches.
- Stationary
- Clinical examination sheets
- Questionnaire sheets
- Consent papers

2.7 Methodology

This was a hospital based survey conducted at Jaafer Ibn Ouf Teaching Hospital in Khartoum, Sudan between December 2015 – March 2016. A premission letter explaining the purposes of the study was given to the Jaafer Ibn Ouf authorities to carry out the research. (Appendix I)

A total of 123 children aged 2 to 15 years old with a confirmed diagnosis of cerebral palsy from their medical records were included in the study. Parents’ consent was first obtained (appendix II), then face to face interviews were conducted to collect personal data and information on the knowledge, attitude and practice of the parents (Appendix III), followed by clinical examination (appendix IV) in the doctor’s office on the day of the referral clinic.
2.7.1 Parental oral health knowledge attitude and practices questionnaire

The parents’ oral health knowledge, attitude and practice was measured using a modified KAP questionnaire.\(^{(34)}\) The questionnaire was designed in English, translated into Arabic and back into English. It consisted of two parts: the first for general information such as name, age, gender of the child, and the caregiver’s age and education. The second part consisted of 17 closed end questions related to knowledge (four questions), attitude (four questions) and practice (nine questions).

2.7.2 Clinical examination

Clinical examination was conducted by the main investigator with the assistance of two well-trained house officer dentists. Examination was carried out in the doctor’s office under artificial lighting, with the child sitting in an up-right position in an ordinary chair or in the child’s wheelchair placed in front of examiner, using sterilized gloves and an examination set. Caries was measured using the dmft/DMFT index for primary and permanent teeth, respectively, according to WHO criteria.\(^{(35)}\)

2.7.3. Ethical considerations

Ethical clearance was obtained from the research committee at the Faculty of Dentistry, University of Khartoum (appendix V), and from the Khartoum State Ministry of Health Research Directorate, as well as from the research’s purpose and objectives were explained to the parents in clear simple words, and signed informed consent was obtained from the parents before starting the oral examination.

Participants had the right to withdraw at any time, as well as the right to benefit, no harm, right to privacy and confidentiality.

Patients who were found to need treatment were referred by the researcher to the University of Khartoum, Faculty of Dentistry to receive dental treatment.
Parents were educated by the researcher on oral health and given instructions about the oral care of their child.

2.7.4 Intra-examiner calibration:

After three weeks of starting the clinical examination 10% of the sample (N=13) were reexamined for reliability, the kappa value was 0.68, 0.74 for dmft and DMFT respectively.

2.8 Statistical analysis:

We used descriptive statistics in terms of frequency distribution tables, bar and pie charts, mean, standard deviation and histogram for were also utilized for quantitative variables.

Chi square test was applied to examine the association between categorical variables like education and hearing about fluoride, association between knowledge, attitudes and practice with caries in primary and permanent.

Analysis of Variance (ANOVA) was applied to test significant difference between age groups in dmft and DMFT.

The independent sample t-test was utilized to test if there significant difference between boys and girls in dmft and DMFT.

For all test P-value<0.05 is considered significant.
Chapter three

RESULTS

3.1 Sample profile

A total of 123 children with cerebral palsy were included in this study (78 of which boys and 45 girls). The age ranged from 2-15 years old and the mean age was 6.58 years. The majority of (n=71) children were aged 2-6 years (table 1).

<table>
<thead>
<tr>
<th>Age (Yrs)</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>2 - 6</td>
<td>47 (66.2%)</td>
<td>24 (33.8%)</td>
</tr>
<tr>
<td>7 - 11</td>
<td>22 (62.9%)</td>
<td>13 (37.1%)</td>
</tr>
<tr>
<td>12 - 15</td>
<td>9 (52.9%)</td>
<td>8 (47.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>78 (63.4%)</td>
<td>45 (36.6%)</td>
</tr>
</tbody>
</table>

The majority of the parents who participated in this study were mothers aged 21 to 82 years old. Most parents had a secondary education (n =50) (40.7%) (Table 2).
Figure 1: Age of caregivers of children with CP

Table 2: Education of caregivers of children with CP

<table>
<thead>
<tr>
<th>Education</th>
<th>Childcare</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mother</td>
<td>Father</td>
<td>relatives</td>
</tr>
<tr>
<td>Illiterate</td>
<td>13 (11.7%)</td>
<td>1 (20.0%)</td>
<td>4 (57.1%)</td>
</tr>
<tr>
<td>Basic</td>
<td>26 (23.4%)</td>
<td>1 (20.0%)</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td>Secondary</td>
<td>48 (43.2%)</td>
<td>2 (40.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>University and above</td>
<td>24 (21.6%)</td>
<td>1 (20.0%)</td>
<td>2 (28.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>111(100.0%)</td>
<td>5 (100.0%)</td>
<td>7 (100.0%)</td>
</tr>
</tbody>
</table>
3.2 Parents’ oral health knowledge, attitude, and practice

3.2.1 Oral health practice

Most children with cerebral palsy (87.8%) were found to brush their teeth. 80.5% of them brushed their teeth under supervision, while more than half (61.1%) brushed once a day, (87.0%) used manual tooth brush, Fewer used mouth wash (5.7%), 81.3%, of the children had never visited a dentist before, and of those who had visited a dentist (n=23) 110.6% within less than 12 months ago 8.1% more than 12 months. Almost all of these (95.7%) had gone when there was a problem, and the main treatment they received was extraction and medications (table 3).

<table>
<thead>
<tr>
<th>Table 3: Oral health practices of parents of children with CP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Questions</strong></td>
</tr>
<tr>
<td>Does your child brush his/ her teeth</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>If your child brush his/her teeth</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Frequency of brushing</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Type of tooth brush</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Use of mouth wash</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Does your child rinse</td>
</tr>
<tr>
<td>the mouth after eating or drinking</td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>History of visiting dental clinic</th>
<th>Never visited</th>
<th>100 (81.3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 12 months</td>
<td>13 (10.6%)</td>
</tr>
<tr>
<td></td>
<td>More than 12 months</td>
<td>10 (8.1%)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What is your reason for last dental visit</th>
<th>There is a problem</th>
<th>22 (95.7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First dental visit</td>
<td>1 (4.3%)</td>
</tr>
<tr>
<td></td>
<td>Recall appointment</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of treatment perceived</th>
<th>Only medication</th>
<th>1 (4.3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fluoride application</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Extraction</td>
<td>9 (39.3%)</td>
</tr>
<tr>
<td></td>
<td>Periodontal scaling</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Tooth filling</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Pulp therapy</td>
<td>2 (8.7%)</td>
</tr>
<tr>
<td></td>
<td>Another</td>
<td>9 (39.1%)</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>2 (8.7%)</td>
</tr>
</tbody>
</table>
3.2.2 Knowledge about oral health

More than half the parents (60.2%) had heard about fluoride. Less than half (46%) said that fluoride prevented tooth decay. Regarding cariogenic food, 42.3% answered that chocolate causes tooth decay and 43.9% said that chocolate, bakery products and soft drinks cause tooth decay (table 4). A significant association was found between parents’ educational level and hearing about fluoride (p value = 0.002) (table 5).

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
<th>Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you hear about fluoride</td>
<td>Yes</td>
<td>74 (60.2%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>49 (39.8%)</td>
</tr>
<tr>
<td>What is role of the fluoride</td>
<td>Prevent tooth decay</td>
<td>46 (62.2%)</td>
</tr>
<tr>
<td></td>
<td>Has no role</td>
<td>1 (1.4%)</td>
</tr>
<tr>
<td></td>
<td>I don't know</td>
<td>18 (24.3%)</td>
</tr>
<tr>
<td></td>
<td>Give freshness</td>
<td>9 (12.2%)</td>
</tr>
<tr>
<td></td>
<td>remove calculus</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Does the tooth paste contain fluoride</td>
<td>Yes</td>
<td>57 (77.0%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2 (2.7%)</td>
</tr>
<tr>
<td></td>
<td>Don't know</td>
<td>15 (20.3%)</td>
</tr>
<tr>
<td>Which of the following food items can cause tooth decay</td>
<td>Chocolates</td>
<td>52 (42.3%)</td>
</tr>
<tr>
<td></td>
<td>Bakery products</td>
<td>3 (2.4%)</td>
</tr>
<tr>
<td></td>
<td>Soft drink</td>
<td>6 (4.9%)</td>
</tr>
<tr>
<td></td>
<td>all of the above</td>
<td>54 (43.9%)</td>
</tr>
<tr>
<td></td>
<td>I don't know</td>
<td>8 (6.5%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>123 (100.0%)</td>
</tr>
</tbody>
</table>
Chi square 14.97, p value = 0.002

### Table 5: Association between educational level and hearing about fluoride

<table>
<thead>
<tr>
<th>Education</th>
<th>Do you hear about fluoride</th>
<th>Total (count)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (count) %</td>
<td>No (count) %</td>
</tr>
<tr>
<td>Illiterate</td>
<td>6 (33.3%)</td>
<td>12 (66.7%)</td>
</tr>
<tr>
<td>Basic</td>
<td>13 (46.4%)</td>
<td>15 (53.6%)</td>
</tr>
<tr>
<td>Secondary</td>
<td>32 (64.0%)</td>
<td>18 (36.0%)</td>
</tr>
<tr>
<td>University and above</td>
<td>23 (85.2%)</td>
<td>4 (14.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>74 (60.2%)</td>
<td>49 (39.8%)</td>
</tr>
</tbody>
</table>

3.2.3 Attitude towards oral health

80.2% of parents said that milk teeth don’t require good care. 40.7% said that the media was their main source of information about oral health. About half 50.4% responded that they can maintain good dental health in their children by supervising their tooth brushing, reducing sugary food intake and making regular visits to a dentist (table 6).
Table 6: Oral health attitude of parents of children with CP

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
<th>Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk teeth don’t require good care as they are going to fall away</td>
<td>Yes</td>
<td>97 (78.9%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>16 (13.0%)</td>
</tr>
<tr>
<td></td>
<td>I Don't know</td>
<td>10 (8.16%)</td>
</tr>
<tr>
<td>Is good dental health important for optimum general health</td>
<td>Yes</td>
<td>111 (90.2%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5 (4.1%)</td>
</tr>
<tr>
<td></td>
<td>I Don't know</td>
<td>7 (5.7%)</td>
</tr>
<tr>
<td>What is your main source of oral health information</td>
<td>Media</td>
<td>50 (40.7%)</td>
</tr>
<tr>
<td></td>
<td>Dentist</td>
<td>13 (10.6%)</td>
</tr>
<tr>
<td></td>
<td>No body</td>
<td>26 (21.1%)</td>
</tr>
<tr>
<td></td>
<td>another</td>
<td>34 (27.6%)</td>
</tr>
<tr>
<td>In your opinion how can you maintain good dental health of your child</td>
<td>Reducing sugar</td>
<td>30 (24.4%)</td>
</tr>
<tr>
<td></td>
<td>By supervising and helping in tooth brushing</td>
<td>26 (21.1%)</td>
</tr>
<tr>
<td></td>
<td>By visiting dentist</td>
<td>4 (3.3%)</td>
</tr>
<tr>
<td></td>
<td>All of the above</td>
<td>62 (50.4%)</td>
</tr>
<tr>
<td></td>
<td>I don’t know</td>
<td>1 (.8%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>123 (100.0%)</td>
</tr>
</tbody>
</table>

3.3 Caries experience in children with CP

Table 7 shows the mean dmft according to gender and age group. The total mean dmft score was \(3.6 \pm 4\), the highest mean dmft being \(6.3 \pm 10.1\) in the age group of 12-15 years old. There was no significant association between either dmft and different age groups (p-value = 0.171) or dmft and gender (p-value = 0.924).
Table 7: Mean dmft of children with CP according to gender and age group

<table>
<thead>
<tr>
<th>Age group (Yrs.)</th>
<th>Mean dmft ± SD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys (n=70)</td>
<td>Girls (n=38)</td>
</tr>
<tr>
<td>2 - 6</td>
<td>3.4 ± 5.0</td>
<td>2.7 ± 3.4</td>
</tr>
<tr>
<td>7 - 11</td>
<td>3.9 ± 3.6</td>
<td>5.5 ± 5.4</td>
</tr>
<tr>
<td>12 - 15</td>
<td>2.0 ± 2.0</td>
<td>6.3 ± 10.1</td>
</tr>
<tr>
<td>Total</td>
<td>3.14 ± 4.44</td>
<td>3.22 ± 4.63</td>
</tr>
</tbody>
</table>

P-value for gender = 0.924  P-value for age = 0.171

The most common component of dmft in primary teeth was decayed and missed teeth; 57.4% and 12.0%, respectively. The filled teeth was very little (0.9%) (Table 8).

Table 8: Decayed, missed and filled primary teeth by age group

<table>
<thead>
<tr>
<th>Age group (Yrs.)</th>
<th>Decayed Count (%)</th>
<th>Missed Count (%)</th>
<th>Filled Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 6 (n= 71)</td>
<td>36 (50.7%)</td>
<td>6 (8.5%)</td>
<td>1 (1.4%)</td>
</tr>
<tr>
<td>7 – 11 (n= 35)</td>
<td>22 (71.0%)</td>
<td>7 (22.6%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>12 – 15 (n=17)</td>
<td>4 (66.7%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>62 (57.4%)</td>
<td>13 (12.0%)</td>
<td>1 (0.9%)</td>
</tr>
</tbody>
</table>
Table 9 shows the mean DMFT according to gender and age group. The total mean DMFT was $3.41 \pm 3.0$. There was a significant association between the age group and DMFT, but no significant association between gender and DMFT.

<table>
<thead>
<tr>
<th>Age group (Yrs.)</th>
<th>Mean DMFT ± SD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys (n=33)</td>
<td>Girls (n=21)</td>
</tr>
<tr>
<td>2 – 6</td>
<td>0 ± 0</td>
<td>0 ± 0</td>
</tr>
<tr>
<td>7 – 11</td>
<td>1.68 ± 2.98</td>
<td>1.18 ± 2.40</td>
</tr>
<tr>
<td>12 – 15</td>
<td>4.89 ± 2.76</td>
<td>1.75 ± 2.43</td>
</tr>
<tr>
<td>Total</td>
<td>1.04 ± 2.39</td>
<td>10.6 ± 1.67</td>
</tr>
</tbody>
</table>

$P$-value for age = 0.000  
$P$-value for gender = 0.280

In the permanent teeth, the total percentage of decayed teeth was 46.3%, missing were 13.0% and there were no filled teeth (table 10). There was significant association between knowledge level and DMFT in permanent teeth ($p= 0.037$) (table 11)

Table 10: Percentage of decayed, missed and filled permanent teeth by age group

<table>
<thead>
<tr>
<th>Age group (Yrs.)</th>
<th>Decayed Count (%)</th>
<th>Missed Count (%)</th>
<th>Filled Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 6 (n=71)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>7 – 11 (n= 35)</td>
<td>12 (36.4%)</td>
<td>3 (9.1%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>12 – 15 (N= 17)</td>
<td>13 (76.5%)</td>
<td>4 (23.5%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (46.3%)</td>
<td>7 (13.0%)</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>
Table (11): Association between knowledge level and caries in permanent (DMFT)

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Caries free</th>
<th>Caries present</th>
<th>Total</th>
<th>Chi square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>8</td>
<td>8</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>8</td>
<td>8</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>28</td>
<td>54</td>
<td>6.609</td>
<td>0.037</td>
</tr>
</tbody>
</table>
Chapter four

Discussion

This hospital-based cross-sectional study was conducted in order to assess the knowledge attitudes and practices of the parents of Sudanese children with cerebral palsy towards oral health, as well as dental caries in these children. The study was conducted among children attending Jaafer Ibn Ouf Pediatric Teaching Hospital in Khartoum, which is the only specialty pediatric teaching hospital in Sudan. The hospital receives all cases referred from different parts of the Sudan, and has many departments including the Neurology unit where this study was conducted.

This study assists in designing effective oral health educational programs for the parents of children with CP in order to improve oral health education/prevention programs, consequently resulting in better dental health for these children.

The response rate among respondents in this study was 100% (123 out of 123). Similar to previous study, the gender distribution of the children included in this study showed a high male to female ratio.\(^{(20)}\)

The most interesting finding in this study was that majority of children (81.3%) never visited dentist before. This is in line with study done in Saudi Arabia in group of CP children,\(^{(13)}\) as well as other study.\(^{(30)}\) Of those who had visited dentist half had gone only when there was a problem like study done in Saudi in disabled children\(^{(14)}\) and another study in Scotland\(^{(30)}\). The main treatment received was extraction and medication. None of the children had received prevention treatment like fluoride.

Priorities and attitudes can serve as obstacles to oral care. Parental and physician lack of awareness and knowledge may hinder an individual with CP from seeking preventive dental care. Other health conditions may seem more important than dental health, especially when the relationship between oral health and general health is not well understood.\(^{(36)}\) The AAPD guidelines
recommend making a consultation dental visit within six months or of the first tooth eruption. This should be strictly followed in children with CP.\(^{36}\)

In terms of knowledge about fluoride and factors causing tooth decay, More than half of the parents (60.2\%) heard about fluoride which was less than reported by Dana AL-Bader et al of Saudi Disabled children they found that (92.7\%) of parents had heard about fluoride.\(^{14}\) Less than half (46\%) of the parents said that fluoride prevent tooth decay. As for cariogenic food 42.3\% stated that chocolate cause tooth decay, this show that the mothers were aware that sugary item likes chocolates can lead to dental caries. However, there was low awareness about the different forms of sugary items, which are harmful to the teeth. This throws the light on inadequate knowledge about the relationship between the different forms of sugar consumption and dental caries and less than half (43.9\%) said that (chocolate, bakery products and soft drinks) cause tooth decay this showing an overall low knowledge regarding different cariogenic food items like study in normal children by Romi Jain.\(^{34}\)

A great number of parents thought that good dental health was important for optimum general health which in line with studies done by Amjad H. in Saudia \(^{37}\) and Jyoti Magoo et al in group of Autistic children.\(^{15}\) Of parents who supervised teeth brushing of their children (80.5\%) like study done in Brazil\(^{20}\) and same as study done in group of disabled children in Saudi Arabia\(^{14}\) because they are partial or total reliance on the caregiver to perform daily activities, such as feeding, mobility and general and oral hygiene Parents should be aware that, without their supervised to oral hygiene procedures in their children with cerebral palsy they can have serious dental consequences. Dental home cane reduces the child’s risk of preventable dental/oral disease.

More than half (61.1\%) brush their teeth once per day like \(^{15}\) which was opposite with study by Folakemi A Oredugba \(^{23}\) and by Ferreira and their colleagues in Brazil.\(^{22}\) these children will benefit from assistive devices such as electric toothbrushes and toothbrushes with large or modifying handles in this study (87.0\%) used manual tooth brushes for their children.\(^{15}\)

Only 16 respondents (13.0\%) said they knew the important of the milk teeth the remaining (78.9\%) stated that milk teeth does not require care because they
fall down which was fewer than result of Autistic children in which (71.2%) of parents felt important of milk teeth.

Half of the responded said that they can maintain a good dental health in their children by supervising their tooth brushing, reducing sugary food intake and making regular visits to a dentist; a finding less than less than that reported by two study done in Saudi Arabia.\(^{14, 37}\)

Parents or caregiver are responsible for establishing good oral hygiene at home. So dental education of parents/caregivers is important to ensure children with CP do not jeopardize their overall health by neglecting their oral health this education mainly by dentist and mass media like (e.g., newspapers, radio, television, and internet)

In our study main source of oral health information from media like study done in normal children in India\(^{34}\) this show that media influence people in their live and fewer from dentist this show that we need to incorporate oral health education in our daily clinic

AAPD done guidelines on management of dental patients with special health care needs\(^{36}\) and this should apply to Sudanese cerebral palsy children.

**Caries prevalence in children with CP**

The total mean dmft and DMFT in the present study was found to be 3.6 ± 4.64 and 2.0 ± 2.90 respectively. There was no significant association between dmft/DMFT and gender, contrary to findings reported by Nouf Alhammad et al.\(^ {24}\) and Maria Teresa et al.\(^ {29}\) there was significant association between DMFT and different age group (P-value = 0.000); a finding similar like study by Ana Carolina et al.\(^ {20}\) they mentioned that these may be attributed to the fact that children with CP may experience delays in the chronology of tooth eruptions due to nutritional reasons., Pope & Curzon.\(^ {30}\)

Studies conducted in Arab countries showed higher caries indices An example of these are studies done in United Arab Emirates (UAE),\(^ {19}\) and in Saudi Arabia.\(^ {24}\)

The dental caries experience in this study was found to be high, similar to results to global studies done in Brazil,\(^ {18, 25, 38}\) New York\(^ {3}\) and China\(^ {39}\), Nigeria and South Africa respectively,\(^ {23, 40}\) a recent study done in Albania
show high prevalence of caries. The mean deft and DMFT index was 3.4 ± 3.5 and 4.9±4.6, respectively.\(^{(41)}\)

Some studies found no difference in the caries index between normal children and children with CP\(^{(13, 30)}\) and study done in adults by (Miriam et al 2008 )\(^{(26)}\).

Contrary to our findings, Nelsen AL in case control study in Denmark showed that the caries rate of the CP-group was significantly lower than that of control group,\(^{(31)}\) a second study in Brazil in this study the author said that The children evaluated in this Brazilian study were not representative to all children with CP, but only of those who look for treatment in a reference center and they may possess better oral health due to enhanced parental attention and/or fewer difficulties in controlling oral conditions.\(^{(21)}\)

Comparing the dmft/DMFT of this study by other study done in Sudan in visually impaired children by Tagelsir, A et al they found that Caries experience was 46.8%. Mean DMFT (age≥12, n=33) was 0.4 ± 0.7 (SiC 1.6), mean dmft (age<12, n=46) was 1.9 ±2.8 (SiC 3.4), which is very high in the CP children.

In this study the caries proportions (DMFT ) was more than four times than the reported proportion by Nurelhuda, N et al among Sudanese non-disabled 12-year-old school children she found that The mean DMFT for 12-year-olds was 0.42 with a significant caries index (SiC) of 1.4\(^{(33)}\).

The prevalence of dental caries in children with CP was, as expected very high. Risk factors such as present of infantile reflexes (rooting, suckle-swallow, biting and gagging) would explain this,\(^{(28)}\) as well as side effects of drugs and recurrent hospitalization,\(^{(42)}\) high salivary osmolality,\(^{(43)}\) soft diet intake,\(^{(44)}\) high frequency of carbohydrate intake, auto-cleaning inability; all this factors contributing to difficulty in maintaining adequate oral hygiene.

The association of dental caries with the caregiver’s educational level approves the statement that the caregiver’s low educational level increases the probability of dental caries\(^{(18)}\) this is clarify by Caregivers with high educational level have better health knowledge and positive attitudes towards oral health.\(^{(45)}\)
The most common components of dmft/DMFT in primary and permanent teeth was decayed teeth 57.4%, 46.3% respectively, similar to study done by Oredugba (23) and (19, 20, 27) missing component in primary and permanent teeth was 12.0%, 13.0% respectively and there was fewer filled teeth, this show that there is sever unmet preventive and restorative dental treatment needs and this was mentioned in literatures. It is a unhappy fact of life that oral health care comes far down in the list of priorities where parents of CP children are concerned. This is possibly due to the fact the cerebral palsy condition itself is of major concern and oral health care is forgotten. Thus, the results of the present study draw attention to a portion of the population that requires special care regarding their oral health through treatment and orientation this preventing possible harm and complication and avoiding local, systemic, psychological and social complications stemming from inadequate oral health. Considering the previously mentioned caries risks, unmet dental treatment need and barriers to access to dental services in the CP individuals therefor there is a need for public oral health programs with multidisciplinary services for this population as well as for all individuals with disabilities.

**Strengths**

- This is first study done in parental oral health knowledge, attitude, practice and caries status in CP children in Sudan
- The main Investigators done the clinical examination
Limitations

- There was no clear records, evidence and tools to diagnosis CP
- Caries status may be under estimated in this study; probe not use and proximal caries overlook
- We use wide age range
- The study had cover time from December-March
- The questionnaire depend on parents memory
- Children enrolled in rehabilitation centres were not included in the study.
- Examinations were conducted in less than optimum conditions which may compromise the accuracy of the examination.
- The results of questionnaire surveys have possibility of a bias created by favorable responses.
Conclusion

- Parents' knowledge of oral health was satisfactory in most areas. However, there is a lack of knowledge about the oral health of their Cerebral Palsy children.
- Most of the cerebral palsy children never visited the dentist.
- Those who’s visited dentist half of them gone when there is a problem.
- A great number of parents know the important of good dental health to optimum general health.
- Main source of oral health information from media minimal from dentist.
- CP children had high caries prevalence.
- The CP children had high prevalence of decayed teeth than other component of decayed, missing and fill teeth.
Recommendations

- Anthers study with control group should be done
- We should do oral health programs to CP children in hospital and centres
- Ministry of health should planning to estimate prevalence of CP in Sudan
- Investigate un met treatment need
- Access to dental general practitioners, pedodontists showed be improved
- Greater coordinated efforts should be made by the dental, medical, and social services to serve unmet dental treatment need among SHCN as general and CP children specially.
References


22. Ferreira de Camargo MA, Frias AC, Antunes JL. The incidence of dental caries in children and adolescents who have cerebral palsy and are participating in a dental program in Brazil. Special care in dentistry : official publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry. 2011; 31(6): 210-5.


Appendices:

Appendix I: Approval from Jafer Ibn Ouf
Appendix II: Parents’ consent

جامعة الخرطوم
كلية طب الأسنان
مجلس أبحاث الكلية
قسم التقييم وطب أسنان الأطفال وطب الأسنان الوقائي
شعبة أسنان الأطفال
التاريخ / 2015

استمارة موافقة للمشاركة في البحث

السيد ولي امر الطفل:

بجرى قسم أسنان الأطفال بكلية طب الأسنان، جامعة الخرطوم، بالتعاون مع مجلس الدراسات الطبية والصحية العليا بحثًا لمدي معرفة الآباء السودانيين عن صحة الفم لدى ابناءهم، ومدى تأثير صحة الفم على نشاطهم اليومي، لك من خلال فحص طبي روتيي للاطفال في مستشفى جعفر بني عوف دون إجراء أي عملية أو أخذ أي عينة، وقد وقع الاختيار على ضمن نطاق العينة بناءً على ما تم ذكره أرجو كريم موافقتكم الشخصية للكشف على ابني/ابنتكم.

اسم ولي الأمر: __________________________
الرقم: __________________________

أقرنا المذكور أعلاه بموافقةي على اشراك ابني/ابنتي في البحث كمتطوع، علماً بأنه قد تم شرح أهداف البحث.

توقيع: __________________________
التاريخ: __________________________

اسم الباحث وتوقيعه: __________________________
Appendix III: Questionnaire sheet

University of Khartoum

Faculty of dentistry

Questionnaire sheet

Child care giver

Age------- education---------- occupation ------------

<table>
<thead>
<tr>
<th>Practice</th>
<th>Count (N %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your child brush his/ her teeth</td>
<td></td>
</tr>
<tr>
<td>1) Yes</td>
<td></td>
</tr>
<tr>
<td>2) No</td>
<td></td>
</tr>
<tr>
<td>3) I don’t know</td>
<td></td>
</tr>
<tr>
<td>If your child brush his/her teeth he/she is</td>
<td></td>
</tr>
<tr>
<td>1) Brush alone</td>
<td></td>
</tr>
<tr>
<td>2) Brush under supervision</td>
<td></td>
</tr>
<tr>
<td>3) other specify</td>
<td></td>
</tr>
<tr>
<td>Frequency of brushing</td>
<td></td>
</tr>
<tr>
<td>1) Twice or more times per day</td>
<td></td>
</tr>
<tr>
<td>2) Once per day</td>
<td></td>
</tr>
<tr>
<td>3) other specify</td>
<td></td>
</tr>
<tr>
<td>Type of tooth brush</td>
<td></td>
</tr>
<tr>
<td>1) Electrical</td>
<td></td>
</tr>
<tr>
<td>2) manual</td>
<td></td>
</tr>
<tr>
<td>3) other specify</td>
<td></td>
</tr>
<tr>
<td>Use of mouth wash</td>
<td></td>
</tr>
<tr>
<td>1) Yes</td>
<td></td>
</tr>
<tr>
<td>2) No</td>
<td></td>
</tr>
</tbody>
</table>
Does your child rinse the mouth after eating or drinking  
1) Yes  
2) No  
3) Some times  
4) I don’t know  

History of visiting dental clinic  
1) Never visited  
2) Less than 12 months  
3) More than 12 months  
4) other specify  

What is your reason for last dental visit  
1) There is a problem  
2) First dental visit  
3) Recall appointment  
4) other specify  

Type of treatment perceived  
1) Only medication  
2) Fluoride application  
3) Extraction  
4) Periodontal scaling  
5) Tooth filling  
6) Pulp therapy  
7) Anothers  

**Attitude**  
Milk teeth don’t require good care as it is going to fall away  
1) Yes  
2) NO  
3) I don’t know  

Is good dental health important for
<table>
<thead>
<tr>
<th>optimum general health</th>
<th>1) Yes</th>
<th>2) No</th>
<th>3) I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your main source of oral health information</td>
<td>1) Media</td>
<td>2) dentist</td>
<td>3) No body</td>
</tr>
<tr>
<td>In your opinion how can you maintain good dental health of your child</td>
<td>1) Reducing sugar</td>
<td>2) By supervising and helping in tooth brushing</td>
<td>3) By visiting dentist</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you hear about fluoride</td>
<td>1) Yes</td>
<td>2) NO</td>
<td></td>
</tr>
<tr>
<td>What is role of the fluoride</td>
<td>1) Prevent tooth decay</td>
<td>2) Has no role</td>
<td>3) Give freshness</td>
</tr>
<tr>
<td>Does the tooth paste contain fluoride</td>
<td>1) Yes</td>
<td>2) No</td>
<td>3) I don’t know</td>
</tr>
</tbody>
</table>
Which of the following food items can cause tooth decay

1) chocolates
2) bakery products
3) soft drinks
4) all of the above
5) I don’t know
جامعة الخرطوم
كلية طب الأسنان
استبيان
الشخص المعني بالطفل
الأم
الاب
اخر
رقم التلفون
عمره
مستوى تعليمه
امي تانوي
جامعي
ما بعد الجامعي
الوظيفة
1- هل طفلك ينضح أسنانه
(1) نعم
(2) لا
(3) لا اعرف
2- لو كانت اجابتك بنعم طفلك ينضح أسنانه/ا
(1) ينضح لوحده
(2) ينضح بمساعدة من الأهل
(3) اخري
3- عدد مرات السواك
(1) مرة واحدة في اليوم
(2) مرتين في اليوم و أكثر
(3) اخري
4- نوع فرشاة الأسنان التي تستخدمها
(1) بدويه
(2) كهربائيه
(3) اخري
هل تستخدم غسول الفم
(1) نعم
(2) لا
هل طفلك يمضعم فمه بعد الاكل
(1) نعم
(2) لا
(3) لا اعرف
تاريخ زيارتك طبيب الأسنان
(1) لم ازوره من قبل
(2) اقل من 12 شهراً
(3) أكثر من 12 شهراً
(4) اخري
ما هو سبب زيارتك الاخيره لطبيب الأسنان
(1) كانت في مشكلة
(2) الزيارة الاولى لطبيب الأسنان
(3) فحص روتيني
(4) متابعة
(5) اخري
نوع العلاج الذي تلقيته

(1) ادوية فقط
(2) فلورايد
(3) خلع
(4) نظافة لثة
(5) علاج جذور
(6) حشوء
(7) اخرى

اسنان اللبن لا تحتاج لعناية جيدة لانها تسقط

(1) نعم
(2) لا
(3) لا أعرف

هل الصحة الجيدة للعمل مهمة للصحة العامة

(1) نعم
(2) لا
(3) لا أعرف

ما هو مصدرك الرئيسي لمعلوماتك عن صحة الفم

(1) وسائل الإعلام
(2) طبيب الأسنان
(3) لا احد
(4) اخرى
في رأيك كيف تحصل على صحة أسنان جيدة لطفلك

1) نقل السكر
2) بارشاد ومساعدة في السوكي
3) بزيارة طبيب الأسنان
4) كل ما سبق

هل سمعت بالفلوورايد

1) نعم
2) لا

لو كانت اجابتك بنعم

ما هو دور الفلورايد

1) يمنع التسوس
2) يعطي راحة جيدة للقلم
3) يزيل المواد الجيرية
4) ما عنه دور
5) لا أعرف

هل معجون الأسنان يحتوي علي فلورايد

1) نعم
2) لا

ما هو نوع الأطعمة الآثاء بسبب التسوس

1) الشكولاتة
Appendix IV: Data collection sheet

بسم الله الرحمن الرحيم

University of Khartoum

Faculty of Dentistry

Dept. of Pedo, Ortho, & Preventive Dentistry

Interview & clinical examination form
Data Collection Sheet

Registration No.

1. Personal data:
   - Child’s Name

2. Age ______ Date of birth: 

3. Medical history: ______________________________________________
   _____________________________________________________________
   _____________________________________________________________
   __________

4. Clinical examination:
   - Dentition status: Primary ______ mixed ______
   Permanent ______

   - WHO criteria for dentition status:

   55 54 53 52 51 61 62 63 64 65
   18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28
<table>
<thead>
<tr>
<th>Status</th>
<th>Permanent teeth</th>
<th>Primary teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Decayed</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>Filled</td>
<td>2</td>
<td>C</td>
</tr>
<tr>
<td>Missing as a result of caries</td>
<td>3</td>
<td>E</td>
</tr>
<tr>
<td>Not recorded</td>
<td>4</td>
<td>F</td>
</tr>
</tbody>
</table>

dmft score:                      DMFT score

Appendix V: Approval from thesis committee
السيد/ مدير مستشفى جعفر إبستوف
 السلام عليكم ورحمة الله تعالى وبركاته

في إطار تطوير البحث الخاص
سوف تجري طالبة الدراسات العليا/ هديه محمد أحمد مصطفى
حاجة، الأستاذة أسماء الأفناط.

بحث عنوان:
Oral health knowledge in parents and quality of life among Sudanese cerebral palsy children

علمياً ينطلق البحث يتطلب مجهود وطموح، كشف في مملوك
الأسرة. يعتمد على فحص سمني الكليوكسي، واعتماد في وحدة المخ
والاعصاب، وسيتم اختيار بحث واسعة مثير للاهتمام في عملية الفحص
وأي طفلك يحتاج إلى متابعة الأستاذ سويف يتم تحوله إلى عيادة طب أطفال
الأطفال - جامعة الخرطوم لإجراء المعالجة اللازمة.

نرجو من سياسكم التكرم بتسهيلاً مهماً.

ولكم الشكر والتقدير

د. عابدين عبد الله عبد الله
عميد كليه طب الأطفال