



Full Length Research Paper

Oral diseases prevalence and co-morbid factors among children with down syndrome, Gezira State, Sudan

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Abstract

Down syndrome (DS) is congenital chromosomal disorder syndrome, (Trisomy 21) characterized by mental deficiency and growth retardation. The dental caries and gingivitis are noticed to be more common among this group of patients, associated with reduced resistance to infections. This study aims to assess the prevalence of oral diseases, poor oral hygiene and associated factors, among children with trisomy 21. This cross sectional facility-based study was conducted in Medani School for children with special needs, in central Sudan. The total number recruited was 93 special-needs school pupils. Cases with trisomy 21 were 33 and all were recruited in this study. Simplified WHO basic oral health assessment tests conducted by a dentist, were used to assess; (i) DMFT (ii) calculus deposit and calculus index (Oral Hygiene Index) and (iii) Gingivitis and periodontal index. Male: female ratio was 2:1.3. Parents were mainly unskillful workers and house-wives. Dental plaque was reported in 100% of cases, calculus in 26 (78.8%), gingivitis in 26 (78.8%), periodontitis in 10 (30.3%) and dental caries (100%). Delayed tooth eruption was reported in 13 (39.4%) of cases. Dental plaque index was 0.84%, calculus index was 0.55 and oral hygiene index was 1.39. This study showed a high prevalence of poor oral hygiene among children with DS. Many factors were incriminated. Raising awareness and involvement in care of oral hygiene by mothers and school staff is highly recommended

Key words: Trisomy 21, oral hygiene, dental caries, DMFT, dental plaque, food debris, calculus, periodontitis, calculus index, children with special needs, Sudan.

INTRODUCTION

Dental caries is bacterial infection that causes demineralization and destruction of tooth enamel, dentin and cementum. It is a result of the production of acid by bacterial fermentation of food debris accumulated on the tooth surface (Mkidd, 2005). Many factors are incriminated such as place, time and pH, host factors, race and ethnic group, as well as patient's age, sex, heredity, socio-economic status, habits, emotional disturbances and dietary changes (Heloe and Haurggordm, 1981). DMFT acronym is; decayed (D), missing (M) and filled (F) tooth (T). It tends to rise with age as dental caries process is irreversible if cavitation has occurred. DMFT trends are high particularly in children. (Heloe and Haurggordm, 1981). Environmental rather

than genetic factors play a predisposing role not a causal one in dental caries. The health system for dental care delivery is probably strongly influenced the relationship between DMFT rates and socioeconomic status. There is strong positive correlation between socio-economic factors such as educational level, income, dietary habits and dental caries in African populations. Low-income groups have less filled teeth than high-income (Heloe and Haurggordm 1981; Yousif 2007; Chen et al., 1997).

Periodontal diseases constitute a major health problem in many developing countries among both children and adults. They are more prevalent and more severe among low education, income occupational groups, compared with the high socioeconomic groups.

(Chen et al., 1997; Offenbacher et al., 2008). This pattern seems to exist across all types of economics. The primary cause of periodontal diseases is bacterial plaque irritation. However, small amounts of plaque are compatible with gingival and periodontal health and some patients may resist larger amounts of plaque for long periods without developing destruction periodontitis. Other factors both local and systemic predispose to plaque accumulation or alter the tissue response to plaque (Offenbacher et al., 2008; Mona 2003; Cichen et al., 1998).

Down syndrome is a trisomy in chromosome 21. It is characterized by mental deficiency and growth retardation. The prevalence of periodontal disease is almost 100% occurring in patients with trisomy 21 under 30-year old. Although plaque, calculus and local irritant are present and oral hygiene is poor the severity of periodontal destruction exceeds that explainable by local factors alone (Cichen et al., 1998; Cheng et al., 2011). Cutler et al, in study for two brothers with acute necrotizing ulcerative gingivitis concluded that two factors have been proposed to explain the high prevalence and increase severity of periodontal destruction in trisomy 21 associated with reduced resistance to infections because of gingival poor circulation (Cutler et al., 1994). The prevalence of gingivitis is very high among this group of patients, due to high vascularization of gingival tissue. In his study of adult Chinese with trisomy 21, Cheng concluded that adults with DS had poorer periodontal health than similar age-and gender-matched control subjects (Cheng et al., 2011)

Modifiable risk factors that play a great role in causation and progression of chronic oral diseases are prevalent among children with learning disabilities. The environmental and host factors had been documented as associated factors with periodontal diseases and dental caries in children with trisomy 21.

The role of community and school-based healthcare professionals in promoting good oral health using evidence-based preventative strategies, and in encouraging early, regular contact with dental services is important to address. Shore et al. (2004) showed that, poorly intact periodontium, pockets bleeding, calculus, deep and shallow pockets were significantly higher in Down syndrome patients than in controls (Shore et al., 2004) (DMF-S) showed significantly lower mean scores for the Down syndrome group compared with both control groups (Stabholz et al., 1991). Services targeted toward groups with special needs could generate better outcomes comparable to those seen in other service users and underserved populations (Bradley and Alister, 2003).

This study aims to assess and evaluate the oral health status among children with trisomy 21 in a public school for children with special needs in Medani city, central Sudan. It is part of data base to establish appropriate oral health care system for children with special needs and

among normal pupils on normal stream through the national school health programme.

MATERIAL AND METHOD

This cross-sectional study was carried in Medani School for children with special needs, the only free public school for that group of children in the country. The total number of children with variable disabilities was 93. Male to female ratio was 2:1.3. There were 33 children with trisomy 21 all were recruited in this study (a full coverage); the same number, sex and age of other children with other disabilities were included in this study as control group.

Tool of data collection

Data were collected from school records and interview for school teachers. A simplified WHO basic oral health assessment form was used to assess: (i) DMFT (ii) Soft deposit and calculus index (Oral Hygiene Index) (iii) Gingivitis and periodontal index.

The children were examined by dentists using a mirror, dental explorer and graduated periodontal probe to assess dental caries prevalence (DMFT) and gingivitis and periodontitis and the overall oral hygiene.

Oral Health Situation Analysis

The part of investigations aims at estimating caries prevalence measured by the DMFT index. The index was used to get an estimation illustrating how much the dentition status being affected by dental caries. It was either calculated for 28 (permanent) teeth, excluding the wisdom teeth, or the 32 teeth. The WHO recommends 32 teeth (Chen et al, 1997).

The Oral Hygiene Index (OHI-I-S) is composed of the combined soft food debris index and calculus index (Greene and Vermilion, 1964) Chandra and Chandra 2002).

Soft index = The total scores of segments or quadrants of the upper jaw (Anterior, left and right) + the total segment or quadrants of lower jaw and the number of segment or quadrants. Calculus index = the total of the upper scores + the total of the lower scores and the number of segment scores. Oral Hygiene Index = Soft index + calculus index. A simplified version exists, the OHIs (Greene and Vermilion, 1964; Chandra and Chandra, 2002).

To calculate the oral hygiene index the following formulae were used

$$\text{Dental plaque} = \frac{\text{upper plaque sextants} + \text{lower plaque sextants}}{\text{Number of sample} \times \text{total number of sextants}}$$

Table 1: Shows the distribution and number of D.S study group according age group

	0-5	6-10	11-15	>15	Total (%)
age group in years	1(3.0%)	12 (36.4%)	12 (36.4%)	8 (24.2%)	33 (100%)

Table 2: Dental caries and periodontal diseases among children with Down' syndrome

Dental problems	Number of cases	%
		%
Dental plaque	33	100
Food Depress	16	48.5
Calculus	26	78.8
Gingivitis	26	78.8
Periodontitis	10	30.3
Dental Caries	33	100

Table 3: The magnitude of dental caries index DMFT in study and control groups

Variable	Number	Decayed (D)		Missed (M)		Filled (F)		DMFT
		D	Mean	M	Mean	F	Mean	DMFT Mean
Dawson syndrome	33	275	8.3	37	1.1	1	0.03	9.4
Control Group	33	92	2.7	36	0.78	5	0.2	3.72

Chi-Square=25.427d.f =2 P.value = 0.0000

$Calculus\ index = \frac{upper\ calculus\ sextants + lower\ calculus\ sextant}{Number\ of\ sample \times total\ number\ of\ sextants}$
Oral hygiene index = plaque index + Calculus index

prevalence of dental caries and periodontal diseases among study group. This was reflected by a high DMFT index (9.4%), plaque index (0.84) and calculus index (0.55) compared to (3.7),(0.25) and (0.04) of the control group

Statistical Analysis

SPSS and Microsoft window descriptive statistic package was used for adjustment, analysis and to compare data.

RESULTS

The total number of cases was 33 mainly aged between 6 and 15 years (Table 1). Parents were mainly house wives and free laborers.

Tooth brushing practice and attitude showed remarkable differences and compliance where 17 (51.5%) were cooperative, 9 (27.3%) were reluctant but responded by continuous enthusiasm on training and the rest 7(21.2%) were obstinate to respond.

The indicators of dental caries and periodontal diseases are shown in tables (3) and (4). There was a high

DISCUSSION

This study documented that children with DS have learning disability of some sort, which was reflected in personal health care and subsequently oral health care. Periodontal disease is almost predominant in patients under 30 year of age (Cichen et al., 1998). The DMFT was 3.2 for young children and 6.4 for older individuals (WHO, 2000). This study also revealed that all children of different ages and gender were affected with dental caries and gingivitis that progressed to periodontal diseases. The rate of dental caries, which is an irreversible process, tends to rise with age. This study showed a high prevalence of dental caries among study group. This was reflected by a high DMFT index of (9.4) compared to 3.7 of the control group.

Table 4: The magnitude of dental plaque, calculus, gingivitis and periodontitis indices in study and control groups

Variable	Dental plaque		Calculus		Gingivitis		Periodontitis	
	No	Mean	No	Mean	No	Mean	No	Mean
Control group (33)	50	0.25	8	0.04	10	0.05	00	00
Down's syndrome individual(33)	167	0.84	108	0.55	95	0.48	37	0.19

Chi-Square=25.822d.f. =3P.value =0.0000

Dental plaque and calculus are the main causes of dental caries, gingivitis and periodontal diseases. This study revealed that poor oral hygiene that explained by plaque index of (0.84) and calculus index of (0.55) and a high oral hygiene index of (1.39), which is considered the main cause of high prevalence of dental caries and periodontal diseases. The high prevalence of dental caries and periodontal diseases proved with high DMFT (9.4), gingivitis index (0.48) and periodontal index (0.19) in the study, as compared to control group. This is not conforming to study of primary school children in Ethiopia which showed a lower periodontal index of (0.1). Yousif (2007) in Gezira State revealed that the DMFT was (6.5) (Yousif, 2007). Many previous studies from Asia and Europe showed high prevalence and significant difference of gingivitis and periodontitis not only between DS and control student but between DS study groups themselves due to poor oral hygiene and oral health care (Offenbacher et al., 2008; Mona, 2003). However, the development of gingivitis and periodontitis is probably more complex as it may involve other system factors, oral environment, pathogenicity of organism and plaque maturity (Offenbacher et al., 2008; Mona, 2003).

The prevalence of the destructive periodontal I diseases follows a linear progression from adolescence to old age. The strong correlation with age probably reflects the cumulative effect of the disease, rather than diminished resistance (Mona, 2003). The severity of periodontal diseases increased with age, but still very few adults less than 35 years of age showed signs of periodontal destruction (Cutler et al., 1994; Ghandour and Ibrahim, 2000). In this study, the magnitude of dental plaque, calculus, gingivitis and periodontitis indices where significantly high (P. 0.000) in the study compared to the control group. Cutler et al (1994) in their study of two brothers with acute necrotizing ulcerative gingivitis concluded that two factors have been proposed to explain the high prevalence and increase severity of periodontal destruction in DS (Cutler et al., 1994). There are reduced resistance to infections and poor terminal gingival circulation and also a defect in T-Cell maturation, polymorpho-nuclear leukocyte chemotaxis, increased number of P-intermedia in children with DS oral cavities (Yousif, 2008; Izumi et al., 1989).

Environmental rather than genetic factors play a predisposing role in dental caries. There is strong positive correlation between socio-economic factors such as educational level, income, dietary habits and dental caries in African populations (Heloe and Haurggordm, 1981). The DMFT rates and socioeconomic status showed a contradicting relationship as a low-income groups have less filled teeth than high-income groups (Heloe and Haurggordm, 1981). Chen and colleagues (1997) demonstrated that periodontal diseases among all age groups is more prevalent and severe among populations of low levels of education, low income occupations in comparison to those of high socioeconomic status and education (Chen et al., 1997).

It is well documented that there is a direct relation between dental diseases and the state of cleanliness of the oral cavity (Ahlberg et al., 1996). Tooth brushing frequency increases with better education, occupation and income level (Ahlberg et al., 1996, David and Mitchell 2003). In this study tooth brushing practice and attitude showed remarkable differences between pupils. Seventeen were cooperative, 9 were reluctant but responded by continuous enthusiasm on training and the rest 7 were obstinate to respond.

The previous study of normal individual in Gezira state and other studies in Sudan clearly revealed the magnitude of periodontal disease parameters as measured using the OHI-S' (Cutler et al., 1994; Chandra and Chandra, 2002; Ghandour, 1991).

The significant difference of DMFT (9.5) among children with DS between this study and those studies from Europe may be due to the absence of quantitative and/or qualitative dental health services and family and community care in the Sudan, in addition to physiological and genetic confounding factors (Bradley and Alister, 2003; Shapira et al., 1991; Michalowics et al., 2000).

In conclusion the present study showed that periodontitis gingivitis and the oral hygiene index were high among children with DS as compared to children with other disabilities. Oral health education programme through school health system is recommended. Establishment of a well-equipped clinic especially designed for the management of dental problems of especial needs patients is needed.

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