Prevalence of Dental Caries and Gingivitis among children with Intellectual Disability in India

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Abstract

Introduction: Down syndrome (DS) is one of the most common genetic abnormalities, with highly variable prognosis. Oral diseases such as periodontal disease, malocclusion, mouth breathing, macroglossia, delayed teeth eruption, missing and malformed teeth, microodontia, diastema, and bruxism are common among individuals with DS. Hence, a study was planned to assess the caries experience and periodontal status of subjects with DS. Materials and Methods: A cross-sectional study was conducted among 92 DS patients in two different centers in Chennai and Pondicherry to assess the prevalence of dental caries and gingivitis, using dft/DMFT and Modified Loe and Silness Gingival Index, respectively. The subjects were examined by three trained and calibrated examiners using a pre-tested and pre-validated proforma. Data were entered in a Microsoft Excel spreadsheet and analyzed using SPSS software (version 20). Descriptive statistics were used. A value of \( P < 0.05 \) was considered significant. Results: The mean DMFT was low among male (1.47 ± 2.31) when compared to female (2.57 ± 4.57) which was found to be significant statistically. The gingival score was low among male (.85 ± 0.36) when compared to female (1 ± 1.00) which was found to be significant statistically. The mean dft among male and female were (.49 ± 1.37;.43 ± 1.09), respectively, which was found to be not significant statistically. Conclusion: Dental caries and gingival diseases are higher among children with DS. Dental caries was found both in primary dentition and permanent dentition.

Keywords: Decay, intellectual disability, oral disease, special population

Introduction

Down's syndrome (DS) is a genetic disorder in which subjects carry an extra chromosome. John Langdon Down (1866) was the first to describe DS and one century later, the primary cause of DS was reported as trisomy of chromosome 21.[3] DS is one of the most common genetic abnormalities and has a highly variable prognosis.[3]

Persons with DS are often short with a short neck and underdeveloped or hypoplastic mid-face, with slant-eyes appearance. They have narrow palpebral fissure, and present with a medial epicanthic fold. Visual impairment is common and may be due to speckling of the iris (Brushfield’s spots), cataracts, eye infections, and bi- or uni-lateral strabismus. Craniofacial abnormalities of mid-face often associate with poorly developed paranasal air sinuses, giving rise to a sloping

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Individuals with DS have specific oral diseases such as periodontal disease, malocclusion, mouth breathing, macroglossia, delayed teeth eruption, missing and malformed teeth, microdontia, diastema, and bruxism. The higher prevalence of periodontal disease is probably related to the impaired host response rather than specific periodontal pathogens. Scientific evidence of susceptibility to dental caries in the population with DS is limited and conflicting, making it difficult to establish firm conclusions. Most of the published studies report a lower prevalence and experience of caries in this group of individuals than in groups not affected by DS and groups with other disabilities. The low caries prevalence seems to be due to immune protection caused by the elevated salivary S. mutans specific IgA concentrations.

Recent studies have shown increased caries prevalence and poor periodontal status among DS patients. On the other hand, a systematic review on caries experience among DS children and adolescents show lower prevalence of dental caries. Also, a systematic review conducted with 27 studies has reported that patients with intellectual disabilities presented poorer oral hygiene and more prevalence of the periodontal disease. Hence, special care has to be given to these patients with DS. The study aimed to assess the Prevalence of Dental Caries and Gingival status among DS patients of Chennai.

**Materials and Methods**

A cross-sectional study was conducted among children affected by DS in Chennai, Tamil Nadu, India. A detailed protocol explaining the nature and purpose of the study was submitted to the Institutional Review Board, and after its scrutiny, ethical clearance was obtained from the institutional Ethics Committee, Saveetha University. A list of centers/schools/homes was collected before the start of the study, from which homes were randomly selected and permissions were obtained from the Head of the center after explaining the intent and nature of the study. Data Collection was scheduled in June 2018 in their premises. Children who were absent on the day of examination and not co-operative were not included in the study. Consent was obtained from their parents on the previous day of examination.

A pretested structured proforma was used for the collection of data. The Survey instrument comprised of two sections, the first section collected demographic information of the participants such as Name, Age in years, Gender, address, and basic details of parents.

The second part consisted of data regarding dental caries experience which was recorded using dft index for primary dentition and DMFT index for permanent dentition in a structured format. The tooth was considered carious (D component) if there was visible evidence of a cavity, including untreated dental caries. No radiographs were taken during the study. The missing (M component) included teeth with indications for extractions or teeth extracted due to caries. The filled (F component) included filled teeth.

Three trained examiners conducted the examination. Before the start of the study, the examiners were calibrated through a series of clinical training in the Department of Public Health Dentistry, Saveetha Dental College, before the study. The inter-examiner and intra-examiner reliability were calculated as 0.732 and 0.86, respectively, using kappa statistics. Dental examination was done with the child seated comfortably with proper headrest. A disposable mouth mirror and explorer was used for the examination. The Explorer was used very cautiously to prevent damage to the sound intact enamel surface and was used specifically to confirm the caries diagnosis.

The Silness–Löe plaque index was modified where score 0 denoted no plaque accumulation, and score 1 dental plaque accumulation when explorer was run along the gingival margins of the index teeth.

Data were entered in a Microsoft Excel spreadsheet and analyzed using SPSS software (version 20). Shapiro–Wilks test was used to test the normality of the data. Descriptive statistics were used. Independent t test was used to determine the mean differences at 5% significance level (P < 0.05)

**Results**

The study sample consisted of 92 subjects of which 72 (84.8%) were males and 14 (15.2%) were females [Figure 1]. The mean dft among male and female were (49 ± 1.37; 43 ± 1.09), respectively, which was found to be not significant statistically. However, the mean DMFT among male and female were (1.47 ± 2.31; 2.57 ± 4.57), respectively, which was found to be significant statistically [Table 1]. The mean dft score among different age groups (less than 12 years; 12–15 years and 15 to 20 years) were (1 ± 1.8; 0.4 ± 1.26; 0.03 ± 0.15), respectively, and was found to be significant statistically (P = 0.009). The mean DMFT score among different age groups (less than 12 years; 12-15 years and 15 to 20 years) were (0.67 ± 1.28; 1.3 ± 1.41 and 6.05 ± 2.80), respectively, and was found to be significant statistically (P = 0.001) [Table 2].

The gingival score among males and females were (0.85 ± 0.36; 1 ± 1.00), respectively, which was found to be significant statistically with a P value of 0.001 [Table 3]. The mean gingival score among different age groups (less than 12 years; 12-15 years; 15 to 35 years and more than 35 years) were (0.79 ± 0.41; 0.9 ± 0.32; 0.92 ± 0.27 and 1.0 ± 0.0), respectively, and was found to be not significant statistically (P = 0.325) [Table 4]. There was a positive correlation between DMFT and gingivitis which was
statistically significant, there was a positive correlation between dft and gingivitis which was not significant statistically, there was a negative correlation between dft and DMFT which was not significant statistically [Table 5].

**Discussion**

DS is a congenital autosomal anomaly characterized by generalized growth and mental deficiency.\[16,17\] The risk for this chromosomal aberration is one out of 600-1000 live births.\[18,19\]

As there is a paucity of literature regarding the prevalence of dental caries and gingivitis among DS children, this study was conducted to assess the dental status and gingival status of DS children.

In our study, the prevalence of dental caries among the study subjects was found to be 56.5% and 43.5% were found to be caries-free. Similar results were obtained in the study done by Brown et al.\[20\], in which 44% of the samples were caries-free. Morinushi et al.\[21\], conducted a study to evaluate the incidence of dental caries in 75 DS children in the age group of 2–18 years. They found 46.1% of these children to be caries-free. In the study conducted by Sarath Asokan et al.\[18\], a lower percentage (n = 30, 29.4%) of the DS children studied to be caries-free. On the contrary, Stabholz et al.\[19\], examined the prevalence of dental caries in 32 DS children, aged 8-13 years and found 84% of them to be caries-free. This higher incidence of caries could be due to the lack of awareness about dental visits, irregular dietary habits, inadequate oral hygiene measures, lack of fluoridated water, easy availability of high sucrose-containing cheap foodstuffs, parental neglect and lack of initiative towards prevention.

In our study, the gingival score among male and female were (0.85 ± 0.36; 1 ± 1.00), respectively, which was found to be significant statistically. The mean gingival score among different age groups (less than 12 years; 12-15 years; 15 to 35 years and more than 35 years) were (0.79 ± 0.41; 0.9 ± 0.32; 0.92 ± 0.27 and 1.0 ± 0.0), respectively, and was found to be not significant statistically (P = 0.325). The higher prevalence of periodontal disease may be due to impaired host response rather than specific periodontal pathogens.\[10\]

In our study, there was a positive correlation between DMFT and gingivitis which was statistically significant, there was a positive correlation between dft and gingivitis which was not significant statistically and there was a negative correlation between dft and...
DMFT which was not significant statistically. This may be due to improper oral hygiene habits among the subjects which have led to the accumulation of plaque leading to gingival disease and dental caries.

Primary health care is a whole society-based approach that ensures healthcare to all. The patients with DS are vulnerable population and should be screened by primary care physician, since they are the most accessible source of healthcare, on regular intervals. Primary and primordial preventive procedures such as oral hygiene instructions, the importance of tooth brushing habits should be emphasized to parents, teachers as well as caretakers. Awareness programs should be conducted among the caregivers regularly to improve their knowledge of dental diseases.[22] The use of a powered toothbrush for maintaining oral hygiene can be promoted.[23] Emphasis should be made by the Government to Universities to adopt a special school and run programs benefiting the special population.

**Conclusion**

Based on the findings of this study, it can be concluded that dental caries is higher and periodontal status is poor among children with DS. Dental caries was found both in primary dentition and permanent dentition. The study reveals that mental impairment remains as a predisposing factor for all oral health problems among various age groups and gender.

**Key points**

1. Dental caries experience among DS patients varies widely.
2. Dental caries is seen both in primary and permanent dentition of the subjects.
3. Periodontal health is poor among the study subjects.
4. Early interventions like oral hygiene instructions, educating the caregivers and periodical screening can be done at primary care level.

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**Conflicts of interest**

There are no conflicts of interest.

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