ASSESSMENT OF TOTAL ANTIOXIDANT CONTENT OF TUPEK LEVELS WITH DOWN SYNDROME

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Annotation: This article provides information on the levels of assessment of the general antioxidant capacity of the saliva in the case of Down syndrome

Keywords: Down syndrome, total antioxidant capacity, sialic acid, nitric oxide

It has been reported that worldwide caries prevalence in DS is low compared to normal individuals. This may be due to factors such as delay in eruption of teeth, changes in saliva composition, teeth morphology with less pronounced pits and fissures, and difference in microbiota associated with dental biofilm.4 One of the functions of saliva is to protect dentition against dental caries.5 Saliva pH ranges between 6.3 and 6.9. Flow rate and buffering capacity of saliva play an important role in the organization of oral microbiota. In DS individuals, there may be physiological alterations in the flow rate and composition of saliva, which influence colonization of oral microorganisms.4 Individuals with DS have high levels of oxidative stress (OS) throughout their lifespan. Genes that are overexpressed on chromosome 21 are associated with OS and neuronal apoptosis. The lack of balance in the metabolism of free radicals generated during processes related to OS may have a direct role in producing neuropathologies like atherosclerosis, early aging, immunological default, and neurologic disorders.5,6 It has been suggested that levels of antioxidants could be altered in response to an infection or disease.7 However, information on antioxidant levels in saliva of DS children is lacking. Hence, the present study was taken up to assess the total antioxidant capacity (TAC), nitric oxide (NO), and sialic acid (SA) of saliva in children with DS and its relation to their oral health status.

The present study was carried out at different institutions and schools for special children in Bangalore city, India. These included Bethany Special School, Cluny convent Special School, Arunachethana, and Nachikethana. Ethical clearance to conduct the study was obtained from the institutional review board. Prior to the study, consent was obtained from the authorities of the schools. Children with associated medical conditions and those on regular long-term medication were not included. Children who were unable to cooperate sufficiently for collection of saliva were excluded from the study. Only those children who obtained written consent from their parents/caretakers were included in the study. Therefore, 34 noninstitutionalized children in the age group of 7–12 years having DS formed the study group (group I). The control group (group II) consisted of 34 normal, healthy children visiting the Department of Pedodontics and Preventive Dentistry (Tables 1 and 2). These children were matched for age and gender with children of the study group. Prior to dental examination and assessment of salivary parameters, the nature of the study was explained and written consent taken from the parents/ caretakers of all children. A proforma was used to gather demographic data and other relevant medical information of each child. A single investigator conducted the oral examination and assessed salivary parameters with the help of an assistant to record the data. Intraoral examination of children with DS was done with the assistance of a school teacher or parent/caregiver to gain cooperation from the children. The W.H.O. criteria were used for diagnosis and recording of dental caries.8 The Community Periodontal Index probe was used to confirm visual evidence of caries on the occlusal, buccal, and lingual surfaces. Training and calibration for examination of dental caries was carried out in the Department of Pedodontics and Preventive Dentistry. Dental caries was recorded by a dental surgeon sitting besides the examiner so that the codes given by the examiner could be easily heard. Ten percent of children were examined twice for intraexaminer reliability. The kappa value for intraexaminer agreement of the tooth status was 0.88. Oral hygiene status was assessed using the simplified oral hygiene index (OHIS) given by Green and Vermilion9 and its modification for the deciduous

dentition as give by Miglani et al. 10 Prior to collection of saliva, the child was instructed to rinse with 15 mL of distilled water in order to wash out any food debris and exfoliated cells.11 Unstimulated saliva was collected during the day, 1 hour after breakfast with the child seated in a quiet environment in the “coachman” position.12,13 The child was seated on the chair with the head bent slightly down and was asked not to swallow or move his tongue or lips during the period of collection.14,15 Saliva was allowed to accumulate in the floor of the mouth and the child was made to expectorate into a sterile graduated jar with a sufficiently wide mouth, until 3 mL of saliva was collected. The salivary samples were transferred to the laboratory in sterile eppendorf tubes stored in ice at −4°C. Each sample was centrifuged at 3,000 rpm for 20 minutes.15 Estimation of TAC, NO, and SA levels in saliva was done using spectrophotometry analysis (phosphomolybdenum method),16 Griess method,17 and Diphenylamine method,18 respectively. Data obtained were subjected to statistical analysis using Kruskal–Wallis to find the significance of the study parameters on continuous scale between the two groups. Mann-Whitney test was used for pairwise comparisons. Spearman’s rank correlation test was used to find the correlation between dental caries, OHI-S and the levels of the TAC, NO, and SA. Significance was considered at $p < 0.05$ and $p \leq 0.001$ as highly significant. In comparison to normal children (group II), DS children (group I) showed significantly lower TAC of saliva and significantly higher salivary SA levels (Table 3). In both groups of children, dental caries was higher in primary dentition when compared to their permanent dentition (Table 4). In DS children (group I), there was an inverse relationship between TAC and dental caries (Table 5). Normal children (group II) showed an inverse relationship with salivary levels of NO and permanent dentition caries (Table 6). An inverse relationship between oral hygiene and TAC of saliva was observed in both groups (Tables 5 and 6). Intragroup comparison between males and females did not show any significant difference in their dental caries and oral hygiene scores (Table 7). But there was a significant difference between the TAC of saliva between males and females in only the normal children (group II)

(Table 8). Normal male (group II) children had significantly better oral hygiene than males with DS (group I). A similar finding wasalso observed between female children in both groups (Table 9). In comparison to males with DS (group I), normal males (group II) had significantly higher TAC levels in saliva. Males with DS (group I) had significantly higher salivary SA levels than normal males (group II). Similarly, females with DS (group I) also had significantly higher salivary SA levels (Table 10). There is contradictory information in literature regarding the incidence of oral diseases in patients with DS. These controversies are due to failure of the criteria used to choose the population to be studied, absence of control groups, and use of nonstandardized criteria for diagnosis, inexperienced investigators, and lack of statistical analysis of the results.19 The extreme difficulty, in maintaining satisfactory oral hygiene, is basically responsible for the high incidence of gingival disease in these patients. They need assistance to carry out routine oral hygiene measures. In younger children, the oral hygiene status of DS children may be good, because they may be assisted by parents. However, as they grow older, the assistance they receive from parents and caregivers begins to reduce, because it is believed that an older child does not need help with tooth brushing. Therefore, oral hygiene becomes poorer with age.20 The present study also found the oral hygiene of DS children to be markedly lower than that of normal children. Patients with DS have altered microbiological composition of subgingival plaque, including Actinomyces and Hemophilus strains. The amount of plaque and calculus seen on the teeth is not proportionate to the severity of the disease.21 Early, severe periodontal disease is often seen with the onset of mid to late teen years and affecting the lower anterior teeth.22 This is thought to be related to a lowered host response resulting from a compromised immune system.

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