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Oral health status of children with mouth breathing due to adenotonsillar hypertrophy

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ABSTRACT

Objectives: Mouth breathing is an important health problem, commonly encountered in children. In children, adeno-tonsillar hypertrophy is the main reason causing partial or complete upper airway obstruction and reduction in airflow. This study aimed to determine the oral health status of children aged 3–15 years, with mouth breathing who were due to have surgery for adeno-tonsillar hypertrophy and referred to the Department of Otorhinolaryngology at Children's Hospital of a University in Ankara, Turkey between January–July 2015.
Methods: The approval of the Non-Interventional Clinical Researches Ethics Board of Hacettepe University and written informed consents from the parents were obtained. The parents completed a questionnaire before the surgery. The children were examined using dental mirror and explorer under dental unit lighting. Oral health status was evaluated with DMFT/S, dmft/s, ICDAS II, dental plaque and gingival indices. The chi-square test, Kruskal Wallis and Mann Whitney U tests were used to statistically analyse the results, with statistical significance $p < 0.05$.
Results: Of the 170 children who had adenotonsillar hypertrophy with mouth breathing, 150 the parents agreed to participate the study. 77 of the children (51.3%) were male; the mean age was 5.9 ± 2.6. Mean dmft was 3.8 ± 3.6, dmfs 9.7 ± 1.1, DMFT 0.4 ± 1.0 and DMFS 0.6 ± 1.5 respectively. Among the children, 101 (67.3%) had cavitated dental caries, and according to ICDAS II, none had healthy teeth, 15 (10.0%) had initial, 42 (28.0%) had moderate and 93 (62.0%) had advanced caries. Of the children, 89.3% had gingivitis and the proportion of gingivitis in posterior region was found to be significantly higher than anterior region ($p < 0,001$).
Conclusions: The oral health status of mouth breathing in children with adeno-tonsillar hypertrophy was poor. To reduce the risk of dental caries and periodontal disease among these children, regular dental follow-up and preventive programmes for oral health are needed.

1. Introduction

Nasal breathing is the first physiological function developed at birth [1] and responsible for the process of air cleansing, humidifying and warming for the lung [2]. Mouth breathing is an unnatural act when the primary air way is blocked by oversized tonsils and adenoids, nasal septal deviation, sinusitis, turbinate hypertrophy and nasal polyp [2]. Linder-Aronson [3] reported that nasopharyngeal obstruction, whether by adenoid hypertrophy or other etiology, increased resistance to nasal airflow such that children were forced to mouth breathe. Adenotonsillar hypertrophy was reported leading factor causing partial or total obstruction of upper airways in childhood [4]. Generally, it has been observed the most frequent and serious between 4 and 8 ages [5]. According to the results of a study, the prevalence was 11% in Turkey [6]. In the pediatric population, the obstructive sleep apnea (OSA) prevalence is 3%, especially related to adenotonsillar hypertrophy [7,8].

The adenotosillar hypertrophy may affect the children in many ways, leading to eustachian tube dysfunction/otitis media [8,9], snoring [10], rhinosinusitis [8,9], OSA [11], failure to thrive [12], swallowing problems [8,9], reduced ability to smell and taste [8,9], halitosis [8,9], speech problems [8,9], excessive daytime sleepiness, poor oxygenation of brain [13], immature hearing, learning disabilities [14], attention deficit disorder with hyperactivity, bedwetting [15–17], and abnormal dentofacial growth [18–20]. Chronic mouth breathing may lead to craniofacial changes as maxillary growth retardation,

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mandibular retrusion, crossbite, dolichocephalic face as well as myofunctional alterations like chewing, swallowing, speech disorders [20,21]. With regard to oral health problems, the complaint of oral dryness is common in mouth breathers due to saliva vaporization can increase the risk of tooth decay and inflammation of the gingiva. The saliva is of vital importance for the oral health. The lack of the mechanical cleansing of saliva results in accumulation of food debris and dental plaque thereby promoting an aciduric and acidogenic oral microflora that provides the development of caries [2,22] and halitosis [23–25].

A multi disciplinary management approach including general and pediatric dentists, ear, nose and throat (ENT) specialists, and orthodontists is important for early diagnosing and treatment of oral health problems of mouth breathing children. If mouth breathing is noticed and treated early, its negative effects on dentofacial development, oral health status and associated medical and social problems could be reduced or averted [26–28].

This study aimed to determine the oral health status of a group of children, aged 3–15 years with mouth breathing who were due to have surgery for adeno-tonsillar hypertrophy in Turkey.

1.1. Material method

This descriptive study was conducted at the Department of Pediatric Dentistry of a Dental Faculty in Ankara, the capital city of Turkey between January and July 2015. Within this period, 150 cooperated 3-15 years-old patients (73 females and 77 males) with no chronic systemic disease, immunodeficiency, or acute infection, and who were due to have surgery for adeno-tonsillar hypertrophy at the Otorhinolaryngology Department Outpatient Clinic of a University Hospital were consulted to Pediatric Dentistry Clinic for assessing the oral health status before the adenotonsillar operation. Tonsils which was evaluated for surgery during examination were hypertrophic as blocking the oropharyngeal airway, and chronically infected with many crtypts on them. Any acute infection of tonsils was excluded from the study since this situation might affect the results.

The Non-Interventional Clinical Researches Ethics Board approval and parental written informed consents were obtained.

A doctor from the Department of Otorhinolaryngology performed the otorhinolaryngological evaluation. After a face to face questionnaire covering demographic data including age, sex, medical and dental history, oral health habits were completed by the parents implementation, all of the children were examined by the same pediatric dentist with dental mirror and ball-ended explorer (WHO 973/80-Martin, Solingen, Germany) [29] under dental unit lighting. All present teeth were examined keeping moist during the examination procedure, and compressed air was used to reveal the earliest visual signs of caries.

Diagnosis of dental caries was performed according to dmft/s, DMFT/S indices in which decayed(D), missing (M) and filled (F) teeth are evaluated and reported according to the number of teeth (DMFT) or surfaces (DMFS) involved with codes and criteria determined by World Health Organization (WHO) [29]. In this scale only teeth or surfaces with obvious cavitated lesions extending into the dentine have been counted. ICDAS II (the International Caries Detection and Assessment System) index developed to include early enamel caries lesions and stages of lesions was also used by means of a visual/tactile examination without radiographs.

The dental caries diagnosis was checked for intra-examiner agreement by employing two separate evaluations in 15 children with 1-week interval between examinations (Kappa score for ICDAS II = 0.91).

All four tooth surfaces were examined according to the gingival index and plaque index of Silness and Löe [30]. The ball ended explorer (WHO 973/80- Martin, Solingen, Germany) was slightly inserted into the gingival pocket between gingiva and teeth with a probing force not exceeding 20 g [29]. The probing was performed on four surfaces (mesial, distal, buccal and lingual) of the teeth. For every surface, the situation of gingiva was evaluated and coded as follows: 0 – 'no inflammation', 1 – 'mild inflammation: slight change in colour and little change in texture', 2 – 'moderate inflammation: moderate glazing, redness, oedema, and hypertrphy; bleeding on pressure', 3 – 'severe inflammation: marked redness and hypertrophy, tendency to spontaneous bleeding'. Scores for each surface are added and divided by the total number of surfaces of examined teeth in order to obtain the individual gingival score. The grade of plaque formation was evaluated similar to gingival index on four sites (mesial, distal, buccal and lingual) of teeth. The plaque accumulation was evaluated and coded as follows: 0 – 'no plaque', 1 – 'A film of plaque adhering to the free gingival margin and adjacent area of the tooth', 2 – 'Moderate accumulation of soft deposits within the gingival pocket, or the tooth and gingival margin which can be seen with the naked eye', 3 – 'Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.' The individual score was calculated as gingival score. Finally, the mean score for each index was calculated by adding the individual scores and dividing by the total number of patients. The mean plaque index (PI) was classified as follows: no < 0.1, minimal 0.1–1.0, moderate 1.1–2.0, and heavy 2.1–3.0 [31]. The mean gingival index (GI) was also classified similarly as no, mild, moderate and severe gingival inflammation. Patients having mild and severe gingival inflammation according to mean gingival indice scores was also recorded as having gingivitis.

Anterior teeth occlusion was classified as the ideal relationship, increased overjet and increased overbite, open-bite, tetatet relation and cross-bite relation.

Sagittal relationship of first permanent molars was evaluated as class I-II-III according to Angle classification [32]. Terminal plane relationship of primary second molars was recorded as flush terminal plane, mesial step, distal step [33]. Presence of posterior crossbite (uni- or bi-lateral), anterior open bite (> 2 mm) and increased overjet (> 3.5 mm) were also recorded.

Statistical analysis was carried out by using SPSS for Windows 21.0 (IBM Corp. Released, 2012. Armonk, NY: IBM Corp.). Number, percentage, mean, standard deviation, median, 1st and 3rd quartiles, minimum and maximum values were estimated for descriptive statistics. Shapiro–Wilk test, tested the normality of the distributions; Mann Whitney-U test was used for comparing between two independent groups and Kruskal-Wallis for more than two groups. Conover Test was performed for binary comparings when a significant difference was found between groups in Kruskal Wallis Test. Chi-square, Fisher's Exact test, or Fisher Freeman-Halton tests were used to asses the significance of the differences between categorical variables. The significance level was considered as 0.05 in all analyses.

2. Results

Among the participants, 51.3% was male; the mean age was 5.9 ± 2.6 years. Parents stated that 116 children (77.3%) suffer from ear infections, 60 (40.0%) throat infections more than three times in one year and having history of antibiotic use due to these infections. The most mentioned sleep related characteristic was snoring (94.7%), followed by salivate on the pillow while sleeping, obstructive sleep apnea, being sleepy during daytime, night bed-wetting, and headache after wake up. Regarding the information on behavior problems, 57.3% of the parents reported that their children were "nervous", and 40.7% "might have attention deficit" (Table 1).

Related to the complaints of participants about oral health, it was reported that they suffered from halitosis (72.0%), chapped lips (64.0%), dry mouth (60.0%), dental caries (44.7%), and dental pain (22.0%). About half of the children (47.3%) had never visited a dentist. Ninety-eight children (65.3%) had at least one bad oral habits nail-biting (51.0%), bruxism (39.8%), biting or sucking objects (43.8%), lip biting (7.1%), lip sucking (7.1%) and thumb sucking (4.0%).

It was determined that 51.3% of children was in primary, 42.0% in