



ORIGINAL ARTICLE

Prevalence of dental caries among male students aged 15–17 years in southern Asir, Saudi Arabia

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KEYWORDS

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Abstract *Background:* Dental caries had been studied by several studies in Saudi Arabia among different age groups and at various places. According to World Health Organization (WHO), assessment of caries at 15 years of age is more meaningful. The objective of this survey was to assess the prevalence of dental caries among 15–17-year teenage students in Abha, Saudi Arabia. Results of the present study can be used as baseline data for future oral health interventions for the population.

Methods: A stratified cluster random sampling was followed in selecting the students. The clinical data was collected using dentition status component of WHO oral health assessment form 2013. Five investigators were trained and calibrated with 20 subjects for two successive days (Cronbach's Alpha = 0.91). Data was analyzed for descriptive statistics and Mann-Whitney *U* test was applied to compare the DMFT scores.

Results: Prevalence of dental caries among the study population was found to be 72.9%. The DMFT scores were found to be highest in the posteriors (90.7%). First permanent molar was the most common tooth affected by dental caries in all quadrants.

Conclusion: The present study revealed that there is a high prevalence of dental caries among students aged 15–17 years in Abha, Saudi Arabia. Caries prevalence was highest in mandibular posterior segments, however, it was lowest in mandibular anterior segments. There is an urgent need for both preventive and curative dental health services in the region. It is recommended that a coordinated school dental program may be initiated in the area.

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1. Introduction

Dental caries is defined as a localized, post-eruptive, pathological process of external origin involving softening of the hard tooth tissue and proceeding to the formation of a cavity (WHO-Technical Report Series 242). Dental caries has been

the most common oral health problem in the world (WHO-World Oral Health Report, 2003). Untreated dental caries can affect the quality of life as a result of pain or discomfort, tooth loss, impaired oral functioning, disfigurement, missing school time and loss of work hours (Locker, 1997; Petersen, 2003; Naito et al., 2006; Jackson et al., 2011). Furthermore, untreated dental caries is associated with weight loss, repress growth and affects the cognitive functions of young adults (Sheiham, 2006).

It is imperative to have baseline data concerning dental caries status in a population to understand the magnitude of the problem and plan for improvement strategies. In Saudi Arabia, previous studies (Al-Agili, 2013) had been performed concerning the prevalence and severity of dental caries and the first nationwide study to assess dental caries was done in 1999 among 12–13-year-old children (Al-Shammery, 1999) while the second national study was done in 2010 with the primary objective to correlate dental fluorosis and dental caries in 6–18-year-old children (Al-Dosari et al., 2010). Majority of oral health surveys were conducted locally and at different age groups (Khan, 2003; Al-Dosari et al., 2004; Al-Malik and Rehbini, 2006). Variations in the age groups among the studies make it difficult to compare the results concerning caries status between populations. The global index age group for international comparisons of the oral diseases was found to be 12 years. However, WHO also suggested that the assessment of caries prevalence at the age of 15 years (where the permanent teeth would have been exposed to the oral environment for three years) would be more meaningful (WHO, 2013). Standardization of age group also helps to have a consolidated estimation of dental caries at a national level.

Furthermore, individual tooth surfaces have varying susceptibility to dental caries which may again differ between populations and age groups (Chestnutt et al., 1996; Demirci et al., 2010). Assuming that the adolescent age group, especially boys, could be at high risk for dental caries due to their behaviors in where they spend longer times outdoors, their higher consumption of snacks between meals and cariogenic diet. Therefore, the present study was undertaken with the objective of assessing the prevalence of dental caries among 15–17-year male teenage students in Abha, Saudi Arabia.

2. Materials and methods

The present cross-sectional study included the sampling frame of all male teenaged school students aged 15–17 years in Abha city. The sample size was calculated based on the total population of Abha ($n = 236,157$) as of 2013 statistical report and age wise population distribution from population pyramid of Saudi Arabia (15–19 years = 4.2%) (City Population of Saudi Arabia updated, 2013; Population pyramid of Saudi Arabia, 2015). The approximate total male population between 15 and 17 years was found to be 9918. The minimum sample size was found to be 1997 (Confidence level = 95%, $Z = 1.96$). A stratified cluster random sampling procedure was followed to get a representative sample of secondary school children in Abha city. A detailed list of all male secondary schools in the city was obtained through the concerned authority. 20 schools were randomly selected and the required official permission for the study was obtained from respective school authorities. All the teenaged students in the selected schools

without any systemic disease were included in the study. The ethical clearance was obtained from the Institution Review Board of King Khalid University, College of Dentistry.

The clinical data was collected using dentition status component of WHO oral health assessments form 2013 (WHO Oral Health Surveys, 2013). Five investigators were trained and calibrated with 20 subjects for two successive days (Cronbach's Alpha = 0.91). The recording assistants were also trained for recording examination forms and they accompanied examiner throughout the study. Consent from each subject was taken after explaining the purpose and nature of the study. Examination of study subjects was done inside the schools by a sterile mouth mirror and explorer in a well-ventilated, uncongested area with sufficient natural light. An adequate number of sterilized instruments was made available during the survey and current recommendations and standards for infection control were followed. After clinical examination of the study subjects, they were educated regarding the importance of oral health, maintenance of oral hygiene and periodic dental visits. The subjects requiring immediate care were referred to King Khalid University, College of Dentistry, Abha. The collected data was entered into the computer (MS-Office, Excel), after which was subjected to statistical analysis using SPSS Version 16.0. Kolmogorov-Smirnov test was applied to check the normality of data. The data was analyzed for descriptive statistics and Mann-Whitney U test was applied to compare the DMFT scores.

3. Results

The present study examined a total of 3411 male secondary school students aged 15–17 years in Abha city. The prevalence of dental caries among the study population was found to be 72.9%. The mean total DMFT was 4.3 ± 5.59 , with its components: decayed teeth = 3.1 ± 3.34 , missing teeth = 0.3 ± 0.65 and filled teeth = 0.9 ± 1.6 (Table 1). The DMFT scores were found to be highest in the posteriors (90.7%) as compared to mandibular anterior teeth (9.3%) (Table 2). The mean decayed, missing and filled scores were significantly higher in

Table 1 Mean DMFT scores of the study population.

	n	Mean \pm SD	%
Decayed teeth (D)	10,701	3.1 ± 3.34	73.0
Missing Teeth (M)	862	0.3 ± 0.65	5.9
Filled Teeth (F)	3090	0.9 ± 1.6	21.1
DMFT-Total	14,653	4.3 ± 5.59	100.0

Table 2 Distribution pattern of DMFT values of subjects within oral cavity.

	Anterior		Posterior	
	n	%	n	%
Decayed	1186	11.1	9515	88.9
Missing	35	4.1	827	95.9
Filled	142	4.6	2948	95.4
Total	1363	9.3	13,290	90.7

mandibular teeth than maxillary teeth ($p < 0.05$) (Table 3). The most common tooth affected by dental caries was permanent first molars followed by second molars in all quadrants. Also, least number of decay was found among lower anterior teeth (Graphs 1 and 2).

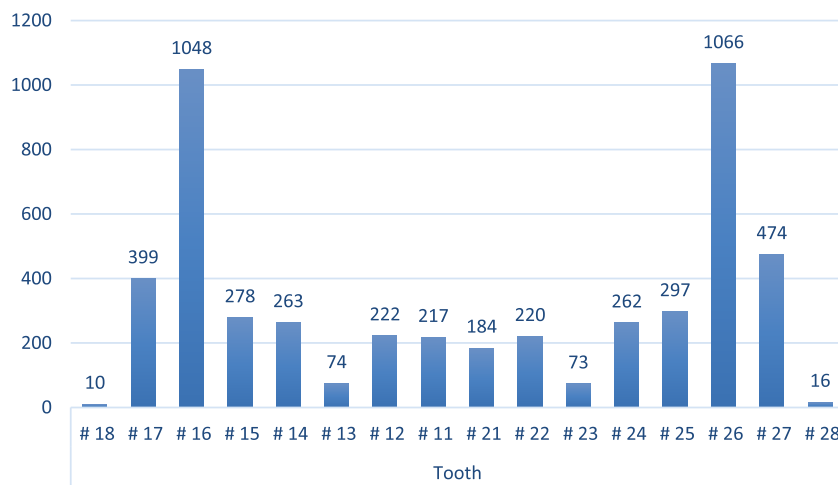
4. Discussion

The present study among school students aged 15–17 years showed a high prevalence of dental caries as 72.9%. The earlier surveys in the kingdom are done in various regions with lack of

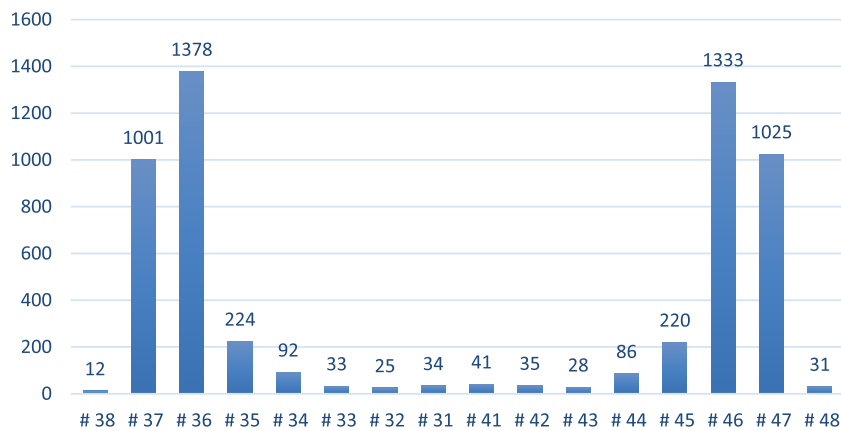
Table 3 Comparison of DMFT scores in maxilla and mandible.

	Jaw	N	Mean	SD	Mean Rank	Mann-Whitney U	P-Value
Decayed	Maxilla	3411	1.50	2.042	3252.98	5276734.5	0.000 ^a
	Mandible	3411	1.64	1.752	3570.02		
Missing	Maxilla	3411	0.09	0.347	3325.46	5523969.5	0.000 ^a
	Mandible	3411	0.16	0.479	3497.54		
Filled	Maxilla	3411	0.36	0.882	3242.89	5242338.0	0.000 ^a
	Mandible	3411	0.55	1.024	3580.11		
DMFT	Maxilla	3411	1.94	2.230	3110.50	4790740.5	0.000 ^a
	Mandible	3411	2.36	1.909	3712.50		

^a Statistically significant at 5% level of significance.



Graph. 1 Frequency of dental caries in maxilla.



Graph. 2 Frequency of dental caries in mandible.

information in Asir population. Majority of the studies were done in Riyadh and Mecca. A recent systematic review of dental caries in Saudi Arabia studied all researches from 1988 to 2010 revealed that only 29 were related to children and considered appropriate for review (Al Agili, 2013). Among the eligible studies, only one national study was found dealing with dental caries in Asir region among 6–13-year-old children which revealed that dental caries was prevalent in 85.4% of the study sample (Abolfotouh et al., 2000).

The finding of the present study shows a higher prevalence of dental caries in Abha as found out by Akpata et al. (1997) in Hail, Wyne (2004) in Riyadh and Dosari et al. (2004) in Al-Qaseem. Additionally, a high variance ($\sigma^2 = 11.18$) was observed in the present study which reflected in larger standard deviation than mean values. Larger standard deviation than mean with respect to decayed (D) and missing (M) components of DMFT scores indicate that students who have caries also have extremely high number of decayed and missing teeth which is a matter of concern. Similarly, larger variance respect to filled (F) component suggested a high number of treated teeth which reflected greater awareness as well as utilization of dental services among those students. However, observations from the present study indicated that majority of teenage students lack awareness in prevention and management of dental caries.

The knowledge of caries pattern helps in understanding the nature of dental caries and assists to formulate strategies for prevention and treatment. In the present study, percentage of dental caries was found to be higher in molars (posteriors) than incisors (anterior). This finding was similar to that of Macek et al. in (2003) who reported that molars were more susceptible to dental caries than incisors, canines, and premolars. Dental caries among mandibular teeth was higher than that among maxillary teeth and least in mandibular anteriors which was in agreement with Luan et al. (2000) who conducted a ten year follow up study among the Chinese population. However, first permanent molar had the highest percentage of dental caries followed by second permanent molar which was in accordance with that found by other studies (Li et al., 1993; Stenlund et al., 2003). Although, the present study did not take tooth surfaces into consideration, high caries in posterior segment presumably be due to occlusal caries. Fissure sealants are strongly recommended in the high-risk populations (Berger et al., 2010; Oulis et al., 2011). Masood et al. in 2012, suggested compulsory oral health screenings starting at the age of 6 years and followed up for a certain period of time to target children with the highest caries risk. One of the interesting observation in this study was the symmetrical distribution of caries as found in other studies (Burnside et al., 2008; Sheiham and Sabbah, 2010). Understanding of the symmetrical distribution pattern of dental caries will help the clinicians to be more accurate during dental examinations (Vanobbergen et al., 2007) and can be a predictive factor for caries risk in other teeth of the same group.

The strength of this survey lies in high sample size and sample age group where a reliable data may be obtained through the school system. While considering the results it is also worth to note that this survey did not consider non-school attending children. However, according to recent reports, there was high literacy rate of 97% among males in the Kingdom (Central Intelligence Agency Report). Assuming smaller proportion of non-school attending children and high sample size than esti-

mation the findings of this study could be deemed more reliable. A further research considering socio-demographic factors including oral hygiene practices is required to understand the underlying determinants of high dental caries.

5. Conclusions

The present study revealed that there was a high percentage of untreated caries among teenaged students aged 15–17 years in Abha, Saudi Arabia. Caries prevalence was highest in posterior segments than the anterior segments and in mandibular more than maxillary teeth, however, the most affected tooth by dental caries was the first permanent molar. There is an urgent need to persuade students to adopt preventive oral health measures and seek dental treatment to enhance the retention of natural teeth into advanced age. It is recommended that a coordinated school dental program may be initiated in the area.

Conflict of interest

None.

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