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RESEARCH ARTICLE

PREVALENCE OF CLINICALLY OBSERVABLE DENTAL ANOMALIES IN QASSIM, SAUDI ARABIA

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ABSTRACT

The objective: The aim of this study was to determine the prevalence of developmental dental anomalies among the intermediate schools' Saudi students in Qassim region of Saudi Arabia.
Subjects and Methods: The study was based on clinical examination of a selected dental anomalies among 2826 Saudi children (1562 male and 1264 female) aged 12-14 year from different administrative areas of Qassim, Saudi Arabia.The anomalies were related to the number, size and shape of permanent teeth.
Results: The following anomalies were identified: hypodontia (0.4%), supernumerary teeth (0.1%), microdontia (0.4%), peg-shaped lateral incisors (0.6%), macrodontia (1.7%), dens in dent (0.1%) and talon cusp (1.0%).These anomalies were more prevalent in female than male children.
Conclusion: The prevalence of the dental anomalies among 12-14 years old school in Qassim area showed to be higher than the recommended international rates.

INTRODUCTION

Studies in mice and other vertebrates have shown that the well-coordinated interactions of several transcription factors and growth factors regulate the precise position, number, size, and shape of teeth within developing arches. (Goldenberg *et al*., 2000) But little is known about the molecular mechanisms involved in morphogenesis of human dentition. A disturbance in these mechanisms may result in various dental anomalies. The etiology of dental anomalies in humans, however, remains largely unclear. A number of these anomalies such as tooth agenesis may be genetically determined (Whittington and Durward, 1996) or may manifest as clinical features of a systemic syndrome. Literature shows considerable variations in the occurrence of dental anomalies between countries and regions within the same country having socially and ethnically diverse population groups. The anomalies which occur most frequently in children are missing teeth, supernumerary teeth, fused teeth and peg lateral incisors (Osuji and Hardie, 2002). As the clinical management of patients is complicated by the presence of these anomalies, every dental practitioner needs to be aware of their frequency of occurrence in the community he/ she is serving. Qassimregion is one of the thirteen administrative provinces of Saudi Arabia, and almost in the center of the Arabian Peninsula. It has a population of 1.234.531 (2010) and an area of 73,000 km^2. It is the seventh populated province in the country. It has more than 400 cities, towns, villages, and Bedouin settlements. Its capital city is Buraydah, which is inhabited by approximately 49% of the region's total population. Although several studies have determined the prevalence of dental anomalies in different provinces of Saudi Arabia, none have been reported from Qassim Region. (Afify and Zawawi, 2012, al-Emran, 1990, Ghaznawi Hassan *et al*., 1999, Osuji and Hardie, 2002, Salem, 1989, Salama and Abdel-Megid, 1994). The purpose of this study was to determine the prevalence of some selected dental anomalies among the school children aged 12-14 years in Qassim Region.

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Study site and population

This cross-sectional survey involved 12- to 14-year-old intermediate school children in four randomly selected administrative areas of Qassim region in Saudi Arabia: Buraydah city, adjoining areas of Buraydah, Unaizah and Arras.

Study sample

The sample size was calculated based on the finding of a previous cross-sectional study conducted in the western region of Saudi Arabiathat reported the highest ever prevalence of at least one dental anomaly (45.1%) in the country (Afify and Zawawi, 2012). When 0.02 was used as the precision level, the sample size was estimated as 2377. The list of intermediate schools in the selected areas provided by the Ministry of Education constituted the sampling frame for the study. A total of 32 schools were chosen at random to yield the required sample size. The number of schools selected in study areas

corresponded to their respective populations. The total number of children in the selected schools was 2835. The exclusion criteria for the study included children with any significant medical history, history of loss due to trauma, extraction or orthodontic treatment; cases of ectodermal dysplasia, Down's syndrome, cleft lip and palate and radiation therapy of the face or neck region. Based on these criteria nine children were excluded from oral examination leaving behind 2826 children (1562 males and 1264 females) to participate in the study.

Ethical Approval

The study protocol was approved by the Research Ethics Committee of Qassim University. Parents of children to be included in the study were sent informed consent forms through the administration of the respective schools. All these forms were returned with a positive consent.

METHODS

The study participants were asked to sit in a chair under natural lightto be examined using disposable diagnostic set. A standardized format of examination was followed in all schools by all examiners. Children's permanent dentition was examined for congenitally missing (normally expected to erupt by the age of the examinee) and supernumerary teeth by counting the number of teeth in the dental arch. The morphological anomalies of teeth including peg-shaped lateral maxillary incisors, talon cusps, dens in dente and fused teeth were identified by their characteristic shapes and features. The anomalies related to tooth size, microdontia and macrodontia, were differentiated morphometrically by clinical examination. The findings were recorded on a printed form. The collected data were analysed using SPSS (Statistical Package for Social Sciences) version 17 to estimate the percentage of children having different dental anomalies observed during the study. Chi-square test was applied to find out the relationship between the occurrence of dental anomalies among the study participants to their gender, place of living and parents' consanguinity. The six dentists who carried out dental examination of the study participants were trained using a set of forty slides of clinical cases of the above mentioned dental anomalies. The 2-hour training session was followed by a calibration exercise during which the dentists examined a group of 20 children having the selected anomalies. The same group of children was also examined by a gold examiner who had already been calibrated for a similar survey. The Kappa test values for intra- and inter-examiner reliability for the six examiners ranged between 0.79-0.85.

RESULTS

The study sample included 2826 children. Of these 1562 (55.3%) were male and 1262 (44.7%) female students with a mean age of 13.3±1.9 years (Table 1). Concerning the place of living, 35.9% resided in the city of Buraydah, 28.5% in the adjoining areas of this city, 18.8% in Unayzah and 16.8% in Arras. About 73% of the study participants had parents who had no blood relation before marriage. A total of 123 (4.3%) children presented with various dental anomalies during the survey. The dental anomalies identified in the study sample included hypodontia (0.4%), supernumerary teeth (0.1%), microdontia (0.4%), peg-shapedlateral maxillary incisors (0.6%), macrodontia (1.7%), dens in dent (0.1%) and talon cusp (1.0%).No child had more than one anomaly. As depicted in Table 2, the female students had a statistically higher prevalence of hypodontia ($p<0.05$), peg-shaped lateral maxillary incisors ($p<0.001$), macrodontia ($p<0.001$) and talon cusp ($p<0.05$) than their male counterparts. The place of living and the parents' consanguinity were not significantly related to the frequency of occurrence of dental anomalies observed in the study (Table 3 and 4).

Table 1. Distribution of dental anomalies according to demographic data

	No.	%
Gender		
Male	1562	55.3
Female	1264	44.7
Area		
Buraydah	1015	35.9
Related to Buraydah	805	28.5
Unayzah	531	18.8
Al-Rass	475	16.8
Parents' consanguinity		
Not related	2066	73.1
Related	760	26.9

Table 2. Distribution of dental anomalies according to gender

Dental anomalies	Male (n=1562)		Female (n=1264)		Total (n=2826)	
	No.	%	No.	%	No.	%
Hypodontia[1]	3	0.2	9	0.7	12	0.4
Supernumerary	1	0.1	3	0.2	4	0.1
Microdontia	3	0.2	7	0.6	10	0.4
Peg-shaped[2]	2	0.1	15	1.2	17	0.6
Macrodontia[3]	12	0.8	37	2.9	49	1.7
Fusion	0	0.0	1	0.0	1	0.0
Dens in dente	2	0.1	0	0.0	2	0.1
Talon cusp[4]	10	0.6	18	1.4	28	1.0
Total	33	2.1	90	7.1	123	4.3

χ^2: Chi-square test applied Statistically significant difference between males and females at: [1,4]$p < 0.05$ and [2,3]$p<0.001$

Table 3. Area-wise distribution of dental anomalies

Dental anomalies	Areas									
	Buraydah		Related to Buraydah		Unayzah		Arras		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Hypodontia	7	0.7	2	0.2	1	0.2	2	0.4	12	0.4
Supernumerary	3	0.3	0	0.0	0	0.0	1	0.2	4	0.1
Microdontia	1	0.1	7	0.9	0	0.0	2	0.4	10	0.4
Peg-shaped	6	0.6	3	0.4	4	0.8	4	0.8	17	0.6
Macrodontia	15	1.5	16	2.0	7	1.3	11	2.3	49	1.7
Fusion	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0
Dens in dente	0	0.0	2	0.2	0	0.0	0	0.0	2	0.1
Talon cusp	11	1.1	10	1.2	4	0.8	3	0.6	28	1.0
Total	44	4.3	40	4.9	16	3.1	23	4.8	123	4.3

χ^2: Chi-square test applied All area-wise differences statistically non-significant at $p < 0.05$

Table 4. Relationship between parents' consanguinity and dental anomalies

Dental anomalies	Parents' consanguinity					
	Positive		Negative		Total	
	No.	%	No.	%	No.	%
Hypodontia	7	0.3	5	0.7	12	0.4
Supernumery	4	0.2	0	0.0	4	0.1
Microdontia	8	0.4	2	0.3	10	0.4
Peg-shaped	10	0.5	7	0.9	17	0.6
Macrodontia	31	1.5	18	2.4	49	1.7
Fusion	0	0.0	1	0.1	1	0.0
Dens in dente	1	0.0	1	0.1	2	0.1
Talon cusp	20	1.0	8	1.1	28	1.0
Total	81	3.9	42	5.6	123	4.3

χ^2: Chi-square test applied All differences regarding parents' consanguinity statistically non-significant at $p < 0.05$

DISCUSSION

The present study revealed that only 123 (4.3%) intermediate school children in Qassim region of Saudi Arabia were affected by dental anomalies. This finding is in agreement with the outcome of a hospital based study by (Osuji and Hardie, 2002) that found a 6% prevalence of congenital anomalies in a group of 1878 children in Tabuk (a city in the North-Western region of Saudi Arabia). The results of the present study, however, grossly deviated from those of some earlier studies that reported a much higher prevalence of dental anomalies in different regions of Saudi Arabia. Afify and Zawawi (2012) after studying the dental records and the orthopantomographs of 878 hospital patients reported the highest ever prevalence of 45.1% in Jeddah city in the western part of Saudi Arabia. Similarly the prevalence found in the present study was significantly less than that reported for school children (39.2%) in Maharashtra, India (Kathariya *et al*., 2013) and for subjects visiting an outpatient clinic in Madhya Pradesh (34.28%). (Gupta *et al*., 2011) However, (Guttal *et al*., 2010) found dental anomalies affecting only 1.88% of patients during a prospective study in Karnataka, India. In the present study macrodontia constituted the most common dental anomaly affecting 1.7% of Saudi school children in Qassim, followed by talon cusp (1.0%), peg-shaped lateral incisors (0.6%), hypodontia (0.4%), microdontia (0.4%), supernumerary teeth (0.1%), and dens in dente (0.1%). Only 12 children, constituting 0.4% of the total sample in the study under discussion, presented with hypodontia in contradiction with the findings of the previous studies showing the prevalence of the same anomaly in different parts of Saudi Arabia as high as 25.7% in Jeddah (Afify and Zawawi, 2012) and as low as 4% in Riyadh.(al-Emran, 1990) The findings of the present study concerning hypodontia closely matched with those of the Indian studies by (Kathariya *et al*., 2013) and (Gupta *et al*., 2011) indicating frequency of occurrence of this anomaly as 4.8% and 4.2% respectively. Merely 0.2 % of the participants in the present study had supernumerary teeth, an estimate that was almost similar to 0.3% prevalence of this anomaly found in Jeddah by Afifyand Zawawi (2012) and 0.5% in Gizan by Salem (1989) but lower than 1.2% prevalence reported by Ghaznawi *et al.* (1999) in Jeddah and 0.8% noticed by Osuji and Hardie (2002) in Tabuk. A much higher percentage of Indian school children (5.3%) exhibited this anomaly compared to the Saudi children. (Kathariya *et al*., 2013). Among the dental anomalies related to the tooth size studied in the present survey, cases of macrodontia accounted for a higher prevalence (1.7%) than those affected by microdontia (0.4%). Almost comparable frequencies of occurrence of macrodontia were highlighted by the present study and the Indian study in Maharashtra (1.3%) (Kathariya *et al*., 2013) but the study by by Ghaznawi Hassan *et al*., (1999) noted a much lower prevalence (0.5%) of this anomaly in Jeddah, Saudi Arabia. The Indian studies in Maharashtra (Kathariya *et al*., 2013) and Madhya Pradesh (Gupta *et al*., 2011) reported a much higher prevalence of microdontia (4.3% and 2.58% respectively) than that observed in the present study.

The percentage of Qassim children having peg-shaped lateral incisors (0.6%) approximately coincides with the figures quoted by Salem (1989) (0.37%) in Gizan and by Salama and Abdel-Majid (1994) (0.7%) for 1300 male students in Riyadh city (Central region) but it was markedly less than 4% prevalence among 13-14 years old male students examined in Riyadh by al-Emran. (1990). The talon cusp was present in 1% of children examined in the present study, a figure that was higher than that reported from Tabuk (0.48%) and almost similar (0.98%) to the finding of the Indian study by (Gupta *et al*., 2011) but significantly lower than the prevalence (6.3%) noticed by (Kathariya *et al*., 2013) in Indian school children. In the study under discussion only one child had a fused tooth compared to seven children (0.37%) in Tabuk study. (Osuji and Hardie, 2002) Both these figures are comparatively lower than that (3.0%) found in the Indian study by (Kathariya *et al*., 2013)

Conclusion

This study of the prevalence of the dental anomalies among 12-14 years old school in Qassim area showed to be higher than the recommended international rates. The results show that 94.3% of the 2826 examined students are free of dental anomalies , Peak value of the anomalies are found in Arrass and areas related to Buraydah , there was a significant difference between the distribution of the anomalies among male and female.

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