

Prevalence of Taurodontism in Premolars Among Patients at a Tertiary Care Institution in Trinidad

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ABSTRACT

Objectives: A study was undertaken to assess the prevalence of taurodontism in premolars in a group of adult dental patients in Trinidad and Tobago since there is no such data available for the region.

Methods: Periapical and orthopantomograms of 1090 randomly selected patients were examined for the presence of an apically displaced pulp chamber without the usual constriction at the cemento-enamel junction.

Results: Prevalence of taurodontism in a sample of 1090 patients was 11.28%. Of the 5324 premolars examined, 4.79% were taurodonts. Prevalence of taurodontism was higher in males (6.46%) compared to females (3.66%). A Statistically significant difference ($p < 0.0001$) was observed in the prevalence of taurodontism in mandibular premolars compared to maxillary premolars (9.07% vs 0.56%).

Conclusion: Prevalence of taurodontism in premolars among Trinidadian patients, as assessed by radiographic study, was 4.79% and it was higher in the males compared to females. Significant differences were also observed between mandibular and maxillary premolars.

Prevalencia de Taurodontismo en Premolares Entre Pacientes de una Institución de Cuidado Terciario en Trinidad

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RESUMEN

Objetivos: Se emprendió un estudio para evaluar el predominio de taurodontismo en premolares en un grupo de pacientes dentales adultos en Trinidad y Tobago, ya que no existen datos disponibles de este tipo en la región.

Métodos: Radiografías periapicales y ortopantomogramas de un total de 1090 pacientes seleccionados aleatoriamente, fueron examinados en busca de presencia de desplazamiento apical de la cámara pulpar, sin la constricción usual en la unión cemento-esmalte.

Resultados: La prevalencia de taurodontismo en una muestra de 1090 pacientes fue 11.28%. De los 5324 premolares examinados, 4.79% eran taurodontes. La prevalencia del taurodontismo fue más alta en los varones (6.46%) que en las hembras (3.66%). Estadísticamente se observó una diferencia significativa ($p < 0.0001$) en la prevalencia de taurodontismo en los premolares mandibulares, en comparación con los premolares maxilares (9.07% vs. 0.56%).

Conclusión: La prevalencia de taurodontismo en los premolares entre los pacientes trinitenses, de acuerdo con la evaluación del estudio radiográfico, fue 4.79% y resultó ser más alta en los varones, en comparación con las hembras. También se observaron diferencias significativas entre los premolares mandibulares y los maxilares.

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INTRODUCTION

Taurodontism is a morphologic variation in which the body of the tooth is enlarged and roots are reduced in size. Taurodont teeth have large pulp chambers and apically positioned furcation (1). This term comes from *tauros*, meaning “bull” and *odont* meaning tooth or “bull tooth”. Sir Arthur Keith coined the term taurodontism in 1913 although Gorjanovic-Kramberger, in 1908, was the first to describe this type of tooth (2, 3). In taurodontism, the floor of the pulp chamber and furcation area are situated more apically resulting in shortened roots and root canals.

Diagnosis of taurodontism has been based on subjective radiographic evaluation or sometimes an arbitrary criterion that are not universally recognized (4–8). Appearance of the taurodont tooth is very characteristic and the unusual nature of this condition is best visualized on the radiograph (9, 10). The teeth involved are almost invariably molars or premolars affecting only a single tooth or multiple teeth in the same quadrant and can be unilateral or bilateral (10). Involved teeth assume a rectangular shape rather than tapering towards the roots. The pulp chamber is extremely large with a greater apico-occlusal height than normal and lacks the usual constriction at the cervical region of the teeth with exceedingly short roots. The bifurcation or trifurcation may be only a few millimetres (mm) above the apices of the roots (10).

Taurodontism was initially thought to be absent in modern populations, at least in the extreme forms. There is an increasing number of reports of taurodontism in the present day human permanent dentition, deciduous dentition or both (11–17). It appears that taurodontism is more prevalent than was previously thought.

The aetiology of taurodontism is unclear. It is thought to be caused by the failure of Hertwig’s epithelial sheath diaphragm to invaginate at the proper horizontal level, resulting in a tooth with short roots, elongated body, an enlarged pulp and normal dentine. Some recent reports have described an association between taurodontism, familial inheritance and genetic malformations (16, 18). It is said to be more prevalent in patients with cleft lip and palate than in normal subjects (19). Taurodontism has been associated with syndromes such as Down’s, Klinefelter’s, Apert’s, oral-facial-digital (Mohr’s syndrome) and Tricho dento-osseous syndrome (20). However, today it is considered as an anatomic variant that could occur in a normal population (8).

Quantitative accounts of prevalence, however, have been limited to studies of Americans of European heritage (21, 22), African Americans (22), British children (23), Israeli (8), Jordanian (24), Saudi Arabian (12), Chinese (25) and Australian Aborigines (26). The objective of this study was to assess the frequency of taurodontism in premolars of dental patients from a tertiary care institution in Trinidad and Tobago by radiographic analysis and to compare the results with published data in different population groups.

SUBJECTS AND METHODS

A randomly selected sample of 1090 dental records of patients who had attended the School of Dentistry, Faculty of Medical Sciences, The University of the West Indies, Trinidad and Tobago, between 1999 and 2003 were examined. A patient was excluded if he/she was less than 18 years and if the periapical/orthopantomogram were not of high quality and/ or failed to show posterior teeth. In addition, carietic, restored and fractured teeth, incomplete apical foramen formation, undetectable furcation and fused roots were not included. Inclusion criteria included a tooth with large pulp chamber in relation to outer tooth configuration, less marked cervical constriction than the normal tooth form, an apically displaced furcation and short roots (Figure).



Figure: Apically displaced furcation and short roots in mandibular premolar.

When there was more than a single radiograph, all were included provided they represented different quadrants in the mouth. All the permanent premolars with clear demarcations surrounding the anatomical crown and roots were evaluated. Taurodontism was measured through the use of panoramic radiographs and intra-oral periapical radiographs that met the inclusive criteria.

RESULTS

The study group comprised 479 (43.95%) males and 611 (56.05%) females with a mean age of 32 ± 12.19 years. The age range was 18 to 82 years and the average number of premolars per patient was 4.8. Their radiographs showed that 123 (11.28%) of these subjects had one or more premolar teeth that were taurodont and these were detected in 59 (12.32%) males and 64 (10.47%) females. Males had a higher prevalence of taurodontism than females (6.46% vs 3.66%). Statistical analysis (χ^2 test) showed a significant difference in the prevalence of taurodontism among male and female patients ($p < 0.001$). Of the 5324 premolars examined, 255 (4.79%) teeth were found to have taurodontism. Distribution of taurodont teeth among premolars in the maxilla, and mandible and in males and females are shown in Tables 1 and 2. The prevalence of taurodonts in male and female maxilla was 0.85% vs 0.37%. However, the difference was not statistically significant. The prevalence of

Table 1: Distribution of taurodont teeth among 1090 adult patients in the maxilla according to gender and tooth type

	Right maxilla						Left maxilla					
	First premolar			Second premolar			First premolar			Second premolar		
	NTE	TDP	%	NTE	TDP	%	NTE	TDP	%	NTE	TDP	%
Male	271	1	0.37	271	5	1.85	253	1	0.36	267	2	0.75
Female	405	3	0.74	416	2	0.48	393	1	0.25	401	0	0
Total	676	4	0.59	687	7	1.02	646	2	0.31	668	2	0.3

NTE: Number of teeth examined

TDP: Taurodonts present

Table 2: Distribution of taurodont teeth among 1090 adult patients in the mandible according to gender and tooth type

	Right mandible						Left mandible					
	First premolar			Second premolar			First premolar			Second premolar		
	NTE	TDP	%	NTE	TDP	%	NTE	TDP	%	NTE	TDP	%
Male	273	31	11.36	282	34	2.06	262	33	12.6	274	32	11.7
Female	406	40	9.85	393	20	5.09	381	33	8.86	376	17	4.52
Total	679	71	10.46	675	54	8	643	66	10.26	650	49	7.54

NTE: Number of teeth examined

TDP: Taurodonts present

Table 3: Percentage of taurodontism in premolars in maxilla and mandible by gender

Jaw	Male			Female		
	Premolars	TDP	%	Premolars	TDP	%
maxilla	1062	9	0.85	1615	6	0.37
mandible	1091	130	11.92	1556	110	7.07

TDP: Taurodonts present

taurodontism in the male and female mandible was 11.92% and 7.07% respectively (Table 3) and the difference was statistically significant ($p < 0.001$). Analysis of the prevalence of taurodonts in the male mandible *versus* maxilla showed a significant difference ($\chi^2 = 109.0$, $p < 0.0001$). Similarly, the difference in the prevalence of taurodonts between the female mandible and maxilla was highly significant. ($\chi^2 = 100.9$, $p < 0.0001$). A cluster analysis of total taurodonts in the mandible (9.6%) *versus* maxilla (0.56%) of both males and females combined showed a statistically significant difference ($\chi^2 = 211.2$, $p < 0.0001$). Mandibular first premolar was the most common tooth

involved in the female followed by mandibular second premolar whereas in males the distribution was nearly equal.

DISCUSSION

An understanding of the tooth morphology is essential for cavity preparation, root canal therapy as well as for tooth extraction. Endodontic treatment in taurodont tooth has been described as complex and difficult. Tooth morphology could hamper localization of the orifices, thus creating difficulty in instrumentation and obturation. The incidence of taurodontism, considered to be an anatomic variant that could occur in normal population, is very low. It is reported to be more

common in the molars although it can occasionally be seen in premolars as well (27). In the present study, the prevalence of taurodontism in premolars was 9.07% in the mandible and 0.56% in the maxilla.

Incidence of taurodonts in the premolars is low and very few data are available regarding the same (27). Out of 3449 mandibular premolars examined by Madeira *et al* (28), only 0.32% taurodonts were found whereas the present study detected 9.07%. They did not, however, find any taurodont in 1010 maxillary premolars. In a sample of 5324 premolar teeth examined in the present study, 4.79% were taurodonts. The lower incidence of taurodontism in maxillary premolars compared to mandibular (0.56% vs 9.07%) is in accordance with the published data.

The incidence of taurodontism has been reported to be from 2.5% to 5.6% in adult population (20). It is reported to be lower than 1% in modern man and 3% in primitive man, in Eskimos and American Indians (29). No data were presented so far regarding differences in the occurrence of taurodonts, if any, between the right and left side of the jaws. In the present study, in both genders, the right side of the maxilla had a greater number of taurodonts compared to the left side. In males, the right and left mandible showed almost an equal distribution of taurodonts whereas in females, the number was slightly higher in the right mandible. In conclusion, prevalence of taurodontism in a sample of 1090 Trinidadian patients was 11.28%. Of the 5324 premolar teeth examined, 4.79% were taurodonts. Prevalence in the mandibular premolars was higher in both males and females compared to that in the maxilla (9.07% vs 0.56%). Males presented a higher prevalence of taurodontism in comparison with females especially in the mandible.

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