Prevalence of Taurodont Primary Teeth in Turkish Children

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Abstract

Objectives: The objective of this study is to determine the prevalence of taurodontism in primary teeth among Turkish pediatric population.

Methods: A retrospective study in which 1,219 digital panoramic radiographs of patients from 4 to 10 years of age were evaluated by two specialists (one radiologist and one pedodontist).

Results: Taurodontism was found in 30 patients, constituting 2.46% of the studied sample. The difference in the prevalence of taurodontism between the males and the females was not statistically significant ($p>0.05$). Taurodontism was found more frequently in the mandible than in the maxilla ($p<0.05$).

Conclusions: The prevalence of taurodontism in primary dentition is high and must not be ignored. Taurodontism in primary dentition is a condition that should be taken into consideration to avoid complications for pedodontists.

Key Words: Taurodontism, Primary teeth, Dental anomalies, Prevalence

Introduction

Taurodontism is a dental anomaly characterized by a significant shape abnormality that involves the roots. This anomaly is a condition that causes the pulp chamber or pulp tissue to enlarge and root bifurcation or trifurcation to migrate to the apices; this results from the shortening of the roots and root canals [1].

The term taurodontism was first defined in 1913 by Sir Arthur Keith [2]. It was subdivided into three types, as hypotaurodontism, mesotaurodontism and hypertaurodontism, depending on the relative amount of apical displacement of the floor of the pulp chamber [3]. It appears both in permanent and deciduous teeth, but deciduous teeth are more frequently affected than permanent teeth [4,5]. Its etiology is unclear; however, it has been suggested that taurodontism may be caused by the diaphragm of Hertwing's epithelial root sheath not invaginating the horizontal level [6].

The diagnosis of taurodontism is based on a subjective radiographic evaluation. In the literature, there are several investigations reported the prevalence of taurodontism for permanent teeth has been reported to being between 0.25% and 0.60% [7-10]. However, there is only one study in the literature addressing the prevalence in the primary teeth. According to Navageni et al, the prevalence of taurodontism in the primary first molars was found that the prevalance of taurodont primary first molars was found to be 0.4% [11].

The purpose of this study is to evaluate the frequency of taurodontism in primary teeth and to determine the correlations regarding the locations of taurodont teeth.

Materials and Methods

A total of the 1,843 panoramic radiographs that had been done at the Department of the Paediatric Dentistry at Ataturk University and Erciyes University, Turkey, from February 2009 to September 2012, were reviewed retrospectively. Only radiographs with acceptable radiographic surveys that showed the teeth properly were chosen for the study. In addition, teeth with restored and severe root resorption were not included in this study. A total of 624 panoramic radiographs were excluded, resulting in a final sample size of 1,219. The age range of the patients whose radiographs were used in this study was 4 to 10 years.

All panoramic radiographs were evaluated by two specialists (one radiologist and one pediatric dentist) and classified subjectively in terms of the presence or absence of taurodontism and the location of the taurodont teeth. Two specialists (referred to as HS and ISB) separately evaluated each radiograph. If disagreement existed, a joint evaluation by all specialists was made until a consensus was reached. The measurements adopted in a study by Shifman and Chanannel [12] were used to determine the presence of taurodontism. Shifman and Chanannel proposed that taurodontism is present when the distance from the lowest point at the occlusal end of the pulp chamber (point A) to the highest point of at the apical end of the chamber (point B), divided by the distance from A to the apex, is 0.2 or greater ($a/b \geq 0.2$) (*Figure 1*).

Statistical analysis of the data was made using the SPSS computer program (SPSS 16, NY, USA), and the frequency

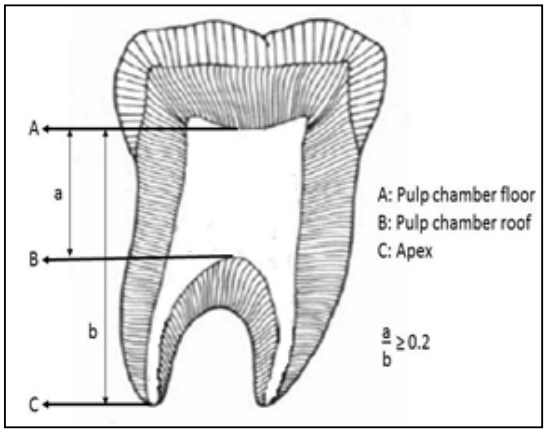

Figure 1. *The measurements were used to determine taurodontism.*

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distribution for taurodontism was then calculated. The Pearson chi-square test was used to compare the frequency of taurodontism between male and female patients ($p<0.05$).

Results

Panoramic radiographic images from 1,219 patients, including 671 females and 548 males, were examined retrospectively. The average age of the patients was 7.3 (SD 1.2) years and the age range was 4 to 10 years. Taurodontism was found in 30 patients, constituting 2.46 % of the studied sample. There was a slightly higher prevalence among females, at 1.06% (13 of 1,219), with male prevalence found to be 1.4% (17 of 1,219). The difference in prevalence between the male and female patients was not statistically significant ($p>0.05$).

The examination included 6,257 primary molars from 1,219 panoramic images. Taurodontism was found in 81 primary molars, constituting 1.2% of the studied sample. *Table 1* shows the distribution of the taurodont teeth in the maxilla and mandibles by gender and tooth type. Of the 81 taurodont teeth, 54 were found in mandibles and 27 in maxilla. Taurodontism was found more frequently in the mandible than in the maxilla ($p<0.05$), with 15 of the 30 patients having the taurodont teeth in the mandible, 2 of them having the taurodont teeth in the maxilla and 13 having the taurodont teeth in both the mandible and the maxilla. This constitutes 50%, 6.7%, and 43.3 % of the studied sample, respectively. Taurodont teeth were found most frequently in the primary mandibular first molars (56.7%), followed by the primary maxillary second molars (19.7%) and the primary maxillary first molars (13.6%). Taurodont teeth were found bilaterally and symmetrically in 25 of the 30 patients who had taurodont teeth. The most frequent bilateral taurodont teeth were found in the mandibular primary first molars (*Figure 2-3*). *Table 2* shows the distribution of bilateral taurodont teeth in the maxilla and the mandible.

Discussion

Taurodontism is seen in posterior teeth and affects both permanent and deciduous dentition. It can be seen bilaterally [5]. Although taurodontism generally occurs in patients who do not have any syndrome, there are occasional reports of an association with certain syndromes and dental developmental disorders, including hypodontia, amelogenesis imperfecta, dentinogenesis imperfecta, ectodermal dysplasia syndrome,

Table 1. *Distribution of the taurodont primary teeth.*

Teeth Type	Mandibula				Maxilla			
	Male (n)	Female (n)	Total		Male (n)	Female (n)	Total	
			(n)	(%)			(n)	(%)
Primary First molar	19	27	46	56.7	4	7	11	13.6
Primary Second Molar	6	2	8	9.9	10	6	16	19.7
Total	25	29	54	66.6	14	13	27	33.4

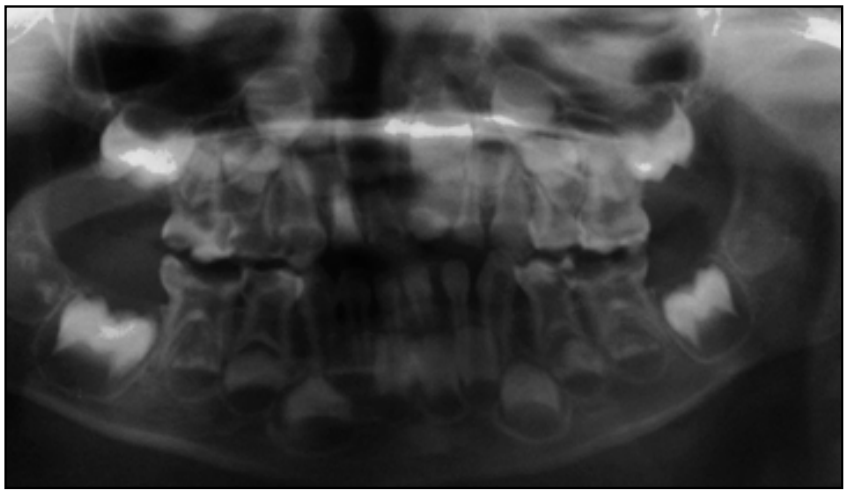

Figure 2. *The panoramic radiography reveals the primary first taurodont mandibular molars bilaterally.*

Figure 3. *The panoramic radiography reveals the all primary second taurodont molars bilaterally.*

Table 2. *Distribution of bilateral taurodont primary teeth in the maxilla and the mandible.*

	Mandibula		Maxilla	
Tooth Type	**No.**	**%**	**No.**	**%**
Primary First molar	21	61.7	4	11.7
Primary Second Molars	3	8.8	6	17.6
Total	24	70.5	10	29.5

Down syndrome, and Klinifelter syndrome [1,13-15]. In our study, no differences were found in the prevalence of taurodontism in relation to gender. Our study was compatible with other studies in the literature [8]. However, some studies in the literature found the prevalence of taurodontism to be more frequent in female than in male patients [7,9].

There has been considerable research into the distribution of taurodontism among different populations. In a study conducted on a population in Jordan by AM-G Darwazeh et al., the prevalence of taurodontism was found to be 0.8% and the prevalence of taurodontism in posterior teeth was found to be 4.4% [9]. Among young adults in China, the prevalence of taurodontism was found to be 46.4%, and the prevalence of taurodontism in the posterior teeth was 21.7% [16]. The highest prevalence, at 60%, has been found in the Finnish population [17]. Also, a study that Topcuoglu et al. conducted on the Turkish population found the prevalence of taurodontism to be 22.8% and the prevalence of taurodontism in the posterior teeth to be 4.2% [18]. However, these are the only studies that have been done on the prevalence of taurodont permanent teeth. The only study that recorded the prevalence of taurodontism in the primary dentition was conducted on an Indian population. According to this study, the prevalence of taurodont mandibular primary first molars was found to be 0.4% [11]. In our study, the prevalence of taurodontism was found to be 2.4% in all posterior primary teeth and the prevalence in the primary first mandibular taurodont teeth was found to be 2%. The reason for these differences could be attributed to ethnic variations and to the methods used to detect taurodontism. Also, the causes for the differences of the prevalences between the primary and permanent dentition might be that the primary teeth have different root and crown morphology and the numbers of posterior teeth in permanent dentition are higher than in primary dentition.

Endodontic treatment for taurodont teeth is a complex and difficult procedure because the taurodont teeth have unusual root-canal systems in terms of both shape and number. During access opening in pulp therapy for taurodont teeth, dentists should carefully analysed such teeth since perforation may be occured because of increased incidence of haemorrhage. Sodium hypochlorite can be used to support irrigation of the canal because the taurodont teeth have unusual root-canal systems [19]. Conventional obturating materials, such as zinc oxide eugenol in bulk, may take longer to resorb, which might delay the natural exfoliation of the tooth. Therefore, iodoform and a combination of calcium hydroxide have been recommended for root-canal treatment of the taurodont teeth, because its resorption rate is faster [20,21].

Conclusion

In conclusion, there is a high prevalence of taurodontism in primary dentition, and which should not be ignored. Bilateral-symmetric taurodontism is seen in greater numbers in patients who have taurodont teeth. Therefore, taurodontism in primary dentition is a condition that should be taken into consideration to avoid complications such as root-canal perforation and also because root canals cannot be disinfected properly during partial pulpotomy or pulpectomy for pedodontists.

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