The Frequency of Taurodontism in an East Anatolian Orthodontic Patient Population

Bir Doğu Anadolu Ortodonti Hasta Popülasyonunda Taurodonti Sıklığı

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ABSTRACT Objective: The aim of the present study was to determine the frequency and sexual difference of taurodontism in a sample of orthodontic patient population with respect to sexes, jaws and dental localization using the criteria of Shifman and Chanannel. **Material and Methods:** A retrospective study was performed using periapical and panoramic radiographs of 1.324 patients ranging in age from 12 to 20 years. All data (age, sex and systemic disease or syndrome) were obtained from the files of the patients. Molar teeth-except third molars-were included in this study. Statistical analysis of the data was performed using the computer program SPSS and the frequency distribution for taurodontism was also calculated. Pearson chi-square test was used to compare the frequency of taurodontism between male and female subjects. **Results:** Taurodontism was observed in 4.5% of the subjects and 1.9% of the molar teeth examined. It was almost equally distributed between females and males. Taurodontism was distributed more frequently in maxilla than mandible. The maxillary second molar was the most frequently affected tooth. **Conclusion:** Taurodontism is found to be uncommon in an orthodontic patient population, however, further larger scale studies are required to assess its frequency in the general population to compare it with the other ethnic groups.

Key Words: Epidemiology; radiography, panoramic

ÖZET Amaç: Bu çalışmanın amacı, bir ortodontik hasta popülasyon örneginde Shifman ve Chanannel kriterini kullanarak cinsiyete, çenelere ve diş lokalizasyonuna göre taurodontinin sıklık ve cinsiyet farklılığını belirlemekti. **Gereç ve Yöntemler:** Yaşları 12 ile 20 yıl arasında değişen 1.324 hastanın periapikal ve panoramik radyografileri kullanılarak retrospektif bir çalışma yapıldı. Tüm veriler (yaş, cinsiyet, sistemik hastalık ya da sendrom varlığı) hastalara ait dosyalardan elde edildi. Üçüncü büyük azı dişi dışındaki tüm azı dişleri çalışmaya dahil edildi. Verilerin istatistiksel analizi SPSS bilgisayar programı kullanılarak yapıldı ve ayrıca taurodontinin sıklık dağılımı da hesaplandı. Kız ve erkek hastalar arasındaki taurodonti sıklığını karşılaştırmak için de Pearson ki-kare testi yapıldı. **Bulgular:** Taurodonti, incelenen hastaların %4.5'inde ve incelenen büyük azı dişlerin %1.9'unda gözlendi. Taurodonti, kızlar ve erkekler arasında yaklaşık olarak eşit oranda saptandı. Taurodonti, üst çenede alt çeneye nazaran daha sık dağılım gösterdi. Üst 2. Büyük azı dişi en çok etkilenen dişti. **Sonuç:** Taurodontinin bir ortodontik hasta populasyonunda yaygın olmadığı bulundu. Bununla birlikte, taurodontinin genel popülasyondaki sıklığını diğer etnik gruplarla kıyaslamak için daha geniş skalada çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Epidemiyoloji; radyografi, panoramik

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Taurodontism is a condition in which the tooth trunk is elongated and the floor of the pulp chamber is displaced apically with proportionately shortened roots.[1] The condition was first described in 1913 by Sir Arther Keith.[2] According to the size of the root trunk relative to the

shortness of the roots, Shaw classified taurodont teeth into hypo-, meso-, and hypertaurodont forms.[3]

The etiology 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 dentin.[4] Previously, taurodontism was related to syndromes such as Down's and Klinefelter's.[5] A close association of taurodontism and X-chromosomal aneuploid states has also been demonstrated.[5,6] Today, it is considered as an anatomic variance that could occur in a normal population.[7]

Since taurodontism is essentially an internal dental abnormality, it can only be assessed clinically on radiographs. The ideal method for an objective measure of this feature should be based on anatomical points that vary least with age.[8] Shifman and Chanannel developed a method for the assessment of taurodontism from intraoral radiographs.[7] They proposed that taurodontism was present when the distance from the lowest point at the occlusal end of the pulp chamber (*A*) to the highest point of at the apical end of the chamber (*B*) divided by the distance from *A* to the apex is 0.2 or greater and when the distance from *B* to the cementoenamel junction (CEJ) is greater than 2.5 mm (Figure 1).

The aim of the present study was to determine the frequency and sexual difference of taurodontism in a sample of orthodontic patients using the criteria of Shifman and Chanannel.[7]

MATERIAL AND METHODS

A total of 1.467 patient records at the Department of Orthodontics, Ataturk University, were reviewed. Only the records that had adequate radiographic surveys showing the teeth properly were chosen for inclusion in the study; periapical and panoramic radiographs were used. In addition, carious or restored teeth, when present, were not included in the study. A total of 143 dental records were excluded and final samples of 1.324 records of orthodontic patients ranging in age from 12 to 20 (774 females and 550 males; mean age: 16.4) were included in this study.

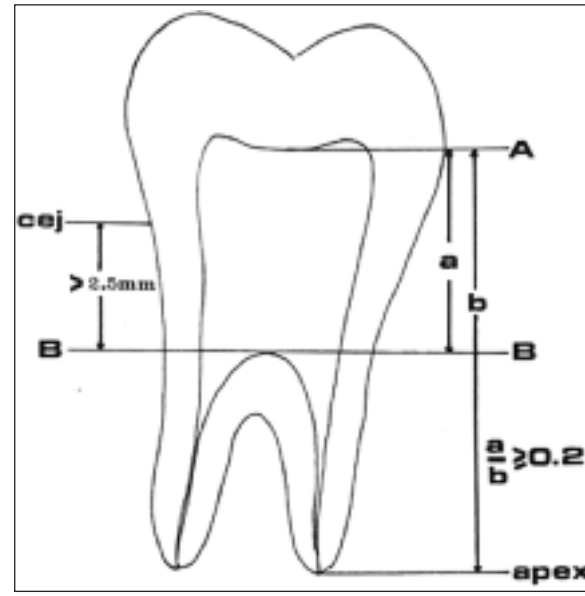

FIGURE 1: The measurements, based on study by Shifman and Chanannel, were used to determine presence of taurodontism. A, The lowest point at the occlusal end of the pulp chamber. B, the highest point at the apical end of the pulp chamber. CEJ, The cementoenamel junction.

All radiographs were classified subjectively by the first investigator or the second with respects to the present or absence of taurodontism. Any questionable finding was included in the positive record at this stage. All positive radiographs were subsequently reviewed by both investigators together, and radiographs were objectively assessed with calipers with the use of the criteria of Shifman and Chanannel for taurodontism.[7] Molar teeth-except third molars-were included in this study. Statistical analysis of the data was performed using the computer program SPSS and the frequency distribution for taurodontism was calculated. Pearson chi-square test was also used to compare the frequency of taurodontism between male and female subjects. The level of significance was set at 5%.

RESULTS

Of 1.324 patients, 197 (1.9%) taurodont molar teeth were determined in 59 (4.5%) patients. Anomalies were found in 4.5% (n= 35) of females compared with 4.4% (n= 24) of males (p= 0.89) (Table 1).

TABLE 1: The frequency of taurodontism according to sexes.

Gender	n	Taurodontism	Frequency	x^2	P value	Totally (%)
Female	774	35	4.5	0.02	0.89	59 (4.5)
Male	550	24	4.4			

TABLE 2: Distribution of the frequency of taurodontism among different molar tooth.

Tooth	Number of examined teeth	Number of the taurodontism	Percentage of taurodontism (%)
Maxillary	5216	132	2.5
First molar	2576	38	1.5
Second molar	2640	94	3.6
Mandibular	5145	65	1.3
First molar	2550	24	0.9
Second molar	2595	41	1.6
Totally	10361	197	1.9

Taurodontism were more distributed in maxilla (2.5%) than mandible (1.3%). The most taurodont molar teeth were found to be the maxillary second molars (3.6%), followed by mandibular second molars (1.6%), maxillary first molars (1.5%) and mandibular first molars (0.9%) (Table 2).

DISCUSSION

In some studies, the prevalence of taurodont molar teeth was reported though the criterion for the diagnosis of taurodontism differs.[1,3,7,8] Of these, we have not been able to find any study published in East-Anatolian population and this appears to be the first report on the frequency of taurodontism of molar teeth for this population.

Most authors do not give an objective analysis of cases presented, preferring a subjective diagnosis.[6,9-11] The ideal method for an objective assessment of taurodontism should be based on anatomical points that vary least with age. Jorgenson et al considered the ratio of the pulp chamber to crown height as an indicator for taurodontism.[12] However, this ratio can be affected by attrition of the crown. In this study, Shifman and Chanannel's method was used to define the taurodontism objectively.[7]

The reported rate of occurrence for taurodontism ranges from 5.6% to 46.4% and higher than the prevelance rate of 4.5% found in this study.[8] The variations in prevalence among different investigations may be due to ethnic variations, and the method used for interpretation of taurodontism and the type of the teeth examined. Some studies have included premolar teeth, while others believe that premolar teeth may not be affected by taurodontism.[13-16] In this study, premolar teeth were also not evaluated for occurrence of taurodontism because in taurodontism the furcation is more apically positioned and premolar teeth, except upper first premolar, usually do not have this feature.

In our sample the frequency of patients with taurodont molar teeth was 4.5%, which is less than the data reported by Darwazeh et al (8.0%) for Jordanian dental patients but more than the data reported by Davis, who reported that 2.7% of the patients had taurodont molar teeth.[1,17] Ruprecht et al found a prevalence of 11.3% for molar teeth in Saudi dental patients using the Shifman and Chanannel's method.[16] The variations may be due to ethnic variations and the method used for interpretation of taurodontism. The frequency of taurodontism in our sample was equally distributed between females and males, which is consistent with the other studies.[1,16,18-20] In contrast, MacDonald-Jankowski and Li found that females had not only a higher prevalence of taurodontism but also more taurodonts per individuals.[8]

Our finding of a higher frequency of taurodonts in the maxillary molar teeth, especially the second molar teeth, is consistent with that of Tulensalo et al and MacDonald-Jankowski and Li.[8,21] In contrast, Shifman and Chanannel found taurodontism to be more frequent in the mandibular second molar teeth.[7]

The result of the present study has shown a frequency of 1.9% for posterior teeth except for 3rd molars. This value is less than the data reported by Darwazeh et al (4.4%) but more than the data reported by Shifman and Channanel (1.5%).[1,7] The third molar teeth was excluded from our study because root formation in young population is incomplete and they are generally acknowledged to be the most commonly congenitally missing teeth.[22]

In conclusion, taurodontism is found to be uncommon in an orthodontic patient population, however, further larger scale studies are required to assess its frequency in the general population to compare it with the other ethnic groups.

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