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Prevalence of torus palatinus in Turkish Schoolchildren

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Abstract Torus palatinus (TP) is the most common exostosis of the maxillofacial skeleton. It usually does not cause symptoms, but removal may be required if it interferes with the function, denture placement, or suffers from recurring traumatic surface ulceration. Large variations in the prevalence of TP have been reported in different populations and were associated with age and sex. The aim of this study is to investigate the prevalence, size, and location of TP in a population of young Turkish. A total of 1,943 schoolchildren, 1,056 males and 887 females, ranging in age from 5 to 15 years were assessed for the prevalence, size and location of TP. Inspection and palpation were examined for the presence or absence of TP. The prevalence of the TP in study population was 30.9%. TP was found significantly more in females than in males (34.3, 28.1%, $P < 0.005$). The more of TP were smaller than 2 cm (91.5%), and in molar location (62.9%). This study indicated that the prevalence of TP in Turkish population was high. There was a strong correlation between the prevalence of TP and age or sex.

Keywords Torus palatinus · Palate · Prevalence · Epidemiology

Introduction

Torus palatinus (TP) is an exostosis of the hard palate situated along the median palatine suture, involving the processi palatini as well as the os palatinum. It consists of compact and cancellous bone and is formed by the hypertrophy of the spongy and oral compact layers, the

nasal compact layer remains unchanged [24]. Generally accepted as an anatomical variation rather than a pathological condition [25] and usually considered to develop during the second or third decade of life. Although TP is not pathologically significant, they may interfere with the construction and function of removable dentures, as well as oral functional movement. In clinical dentistry, TP has been frequently noticed that may complicate prosthetic work. Pressure from a denture on the mucosa overlying these variations in the structure of the palate may cause discomfort to the patient [27].

The surgical removal of palatine torus should be avoided, but if the torus is so large that it extends beyond the vibrating line and over part of the soft palate, it should be removed or reduced in size [26].

A wide variety of prevalence rates have been reported in numerous studies on different racial populations [1–4, 8, 9, 11–14, 17–20, 23–25] (Table 1). The prevalence of TP varies in different populations from 1.4% to 66%. Racial differences appear significant, with a high prevalence in Asian populations [1, 4, 13, 14, 18, 23]. In most ethnic groups TP is found more frequently in female [1, 12, 14, 15, 25] while a higher prevalence in males was reported in Brazilian Indians [3], and African Americans [22].

The etiology of TP has been investigated, however, no consensus has been found. A large number of investigations have tried to explain the influence of genetic [7, 10, 18], and environmental factors [12, 15], nutritional, and possible climatologic factors. It is common knowledge that racial divergences or ethnic group differences with regard to the occurrence of these characteristics are considerable. A previous Turkish study [11] performed in dry skulls, reported a high prevalence (45.4%) of TP. However, the prevalence of TP in Turkish living subjects is unknown.

The aims of this study were to determine the prevalence, size and location and to investigate the sex and age related changes of TP in a population of young Turkish.

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Table 1 Prevalence of TP in different populations

Study populations (Author(s))	TP (%)
Eskimos [25] ^a	66.0
Southern Thai [14]	61.7
Thai [1]	58.1
Yugoslavs (Zagreb) [24]	49.7
Chinese [4]	48.0
Turkish [11] ^a	45.4
Japanese [13]	39.3
Norway, Lofoten [8]	38.2
Icelandic, South-Thingeyjarsysla [2]	33.8
Norway, Gudbrandsdalen [8]	32.7
Malaysians [23]	24.4
Northern Thai [18]	23.1
Israelis [9]	21.0
Korean [17] ^a	18.8
Icelandic, North-Thingeyjarsysla [2]	14.6
Germans [18]	13.5
Brazilian Indian [3]	10.0
Norway, Osla area [12]	9.2
Nigerian [20]	4.5
Saudi Arabia [19]	1.4
Turkish (Present Study) (Yildiz et al. 2004)	30.9

^aSkulls

Materials and methods

The study was performed at the primary school in the Sanliurfa City, in Southeastern Region of Turkey. The study included a total of 1,943 schoolchildren, 1,056 males and 887 females, who were divided into two major age groups: 5–10 years, and 11–15 years. The presence or absence of TP was assessed by inspection and palpation. The size of the TP was measured with calipers. The torus palatinus size was graded according to the classification of Gorsky et al. [9] as more or less than 2 cm. The locations of TP were classified as premolar, molar, and molar–premolar.

The Statistical Package for Social Science (version 7.5) was used for the analyses. The Chi-square test was used to test for group differences. Differences between groups with $P < 0.05$ were considered significant.

Results

Torus palatinus was recorded in 602 (30.9%) of the 1943 individuals. It was found to be significantly higher ($P < 0.005$) in females (34.3%) than in males (28.1%)

Table 3 Distribution of TP in relation to age, sex and size

Age groups (Years)	Males		Females		Total	
	< 2 cm <i>n</i> (%)	> 2 cm <i>n</i> (%)	< 2 cm <i>n</i> (%)	> 2 cm <i>n</i> (%)	< 2 cm <i>n</i> (%)	> 2 cm <i>n</i> (%)
5–10	203 (91.9)	18 (8.1)	207 (91.4)	19 (8.6)	410 (91.7)	37 (8.3)
11–15	69 (90.8)	7 (9.2)	72 (91.2)	7 (8.8)	141 (90.9)	14 (9.1)
Total	272 (91.5)	25 (8.5)	279 (91.4)	26 (8.6)	551 (91.5)	51 (8.5)

Age versus size, $X^2 = 0.019$, $P = 0.901$ Sex versus size, $X^2 = 0.106$, $P = 0.991$ **Table 2** Prevalence of torus palatinus in relation to age and sex

	Total	Males	Females	Age group (Years)	
				5–10	11–15
Total <i>n</i>	1,943	1,056	887	1,497	446
TP <i>N</i>	602	297	305	447	155
%	30.9	28.1	34.3	29.8	34.7

Sex versus prevalence of TP, $X^2 = 8.546$, $P < 0.005$ Age versus prevalence of TP, $X^2 = 3.848$, $P < 0.05$

(Table 2). There was a significant correlation between the prevalence of TP and age ($P < 0.05$) (Table 2). The male to female prevalence ratio was 1:1.2.

Of the TP cases the mostly (91.5%) was smaller than 2 cm. The age and sex differences in the distribution pattern of TP according to size were not statistically significant. The relationship of TP occurrence and size to age and sex is shown in Table 3.

Torus palatinus were located in molar, molar–premolar, and premolar area in 62.9, 32.5, and 4.4%, respectively (Figs. 1, 2). There was not statistically significant association between age and location of TP (Table 4).

Discussion

The prevalence of TP varies in different population from 1.4% to 66.1% (Table 1). In young individuals this ratio varies in different ethnic groups from 1.4% to 33.8% [2, 9, 19, 20]. In our study, prevalence of TP (30.9%) was higher than in other studies among different races in young individuals [9, 19, 20], except Icelandic schoolchildren (33.8%) in South-Thingeyjarsyslas [2]. An earlier Turkish study [11], performed in dry skulls, also showed higher prevalence (45.4%). This different prevalence in different populations suggested ethnic factor as one of the influences. Between similar ethnic groups living in different environments [2, 8], or different ethnic groups living in same environments [5, 9], different prevalence have been reported. The formation of TP has been attributed to various factors by various authors. A large number of investigators have evaluated the influence of genetic [7, 10, 18], and environmental factors [12, 15], including masticatory stress [6, 7, 12, 14, 18], and nutritional [8], factors. The prevalence of TP within the

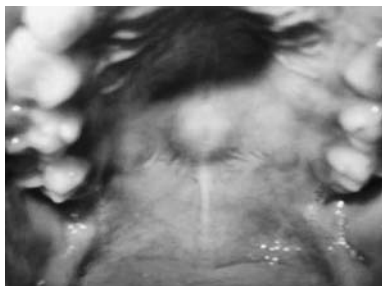


Fig. 1 Torus palatinus, located molar area, in a female, aged 13 years

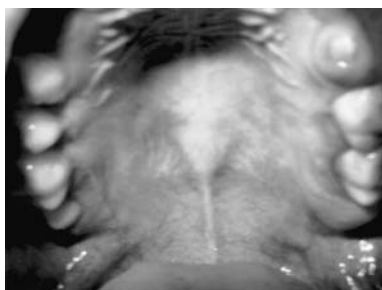


Fig. 2 Torus palatinus, located molar-premolar area, in a female, aged 12 years

some race reported by different author, differ greatly (Table 1). The discordant results of different authors possibly result from the numbers of persons, different geographic location, and standards. The prevalence of TP obtained from skulls was always higher than those from living subjects (Table 1). These can be explained by the fact that small TP is easily identified in skulls than in living subjects, when mucosa and mucous glands obscure them [12, 25].

In our study, there was a significant correlation ($P < 0.05$) between the prevalence of TP and age (Table 2). These results are supported by other studies [1, 15, 25]. Earlier studies have observed TP more frequently during the second and third decade of life [1, 3, 12, 21], whereas in our present study, TP have been observed during the first decade [9, 18, 19].

In the present study, TP was significantly ($P < 0.005$) more prevalent in female than in male (34.3% and 28.1%, respectively). Our results agree with previous studies in showing that TP is more common in females

Table 4 Distribution of TP in relation to age and location

Age groups (Years)	TP N	Location		
		Molar n(%)	Premolar n (%)	Molar-premolar n (%)
5–10	447	286(63.9)	21(4.7)	140(31.4)
11–15	155	93(60.0)	6(3.8)	56(36.2)
Total	602	379(62.9)	27(4.4)	196(32.5)

Age versus location, $X^2 = 1.283$, $P = 0.526$

[1, 12, 14, 16, 25]. The prevalence ratios of male to females in our study are also in accordance with other studies [8, 16].

In our study, most of TP was smaller than 2 cm (91.5%), and located in molar area (62.9%). Gorsky et al. [9] reported that 97.7% of TP smaller than 2 cm, and 72.7% located in molar area in 4–10 age group. King and More [16] reported that 67% of TP smaller than 2 cm. The prevalence of TP in the molar to the molar-premolar area tended to increase with age, but statistically non-significant.

It is necessary to evaluate the bony prominences of the maxilla during diagnosis to plan for the relief position of complete maxillary denture fabrication. If the TP is positioned too far posterior, it can interfere with the development of a posterior palatal seal. In such case, surgical removal may be required for denture stability [17, 26].

The high prevalence of TP was indicated in Turkish population. The TP was found more in female than in male. The prevalence of TP increased with age. The development of TP should postulate to be interplay of multifactorial genetic and environmental factors.

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