

Prevalence of Torus Palatinus and Torus Mandibularis in the Split-Dalmatian County, Croatia

Sonja Kraljević Šimunković¹, Matko Božić², Iva Z. Alajbeg¹, Nikša Dulčić¹ and Vanja Vučićević Boras³

¹ University of Zagreb, School of Dental Medicine, Department of Prosthodontics, Zagreb, Croatia

² Health Care Center Split, Island of Vis, Croatia

³ University of Zagreb, School of Dental Medicine, Department of Oral medicine, Zagreb, Croatia

ABSTRACT

Torus palatinus (TP) and torus mandibularis (TM) are non-pathological outgrowths of unclear etiology that develop from the jaw bone. The purpose of the present study was to report on the prevalence, shape and location of TP and TM in the population of the Central Dalmatian region, Croatia. The study comprised of 1679 subjects, 985 females and 694 males, age range from 9 to 99 years who were examined by clinical examination and analysis of the plaster casts. Torus palatinus was found in 42.9% subjects and torus mandibularis in 12.6% of the subjects. Spindle-shaped torus palatinus was the most frequent type (45.6%). The most frequent type of torus mandibularis was bilateral solitary torus mandibularis (35.4%). Furthermore, torus palatinus was found in 40.1% of the total number of females and in 46.8% of the total number of males, indicating a significantly higher prevalence in the male population ($p=0.006$). Torus mandibularis was found in 11.3% of the female population and in 14.6% of the male population, again indicating significantly higher prevalence in the male population ($p=0.046$). The results of this study show significantly higher prevalence of torus palatinus and torus mandibularis in the male subjects. Furthermore, no differences in the prevalence of either TM or TP regarding age were found.

Key words: prevalence, torus palatinus and mandibularis, Croatia

Introduction

Exostoses are non-pathological outgrowths of the cortical and sometimes also spongy part of bone. It has been proved histologically and radiographically that such outgrowths are benign in nature. The etiology of the development of tori is still unknown and several factors have been proposed as causative such as: genetic background, race, masticatory stress, developmental anomalies, infection and disturbances in nutrition as well as continued growth¹⁻³. Gorsky et al.⁴ reported that vertical transmission of TP was found in 19 families suggesting autosomal dominant mode of transmission. Autosomal dominant pattern of inheritance was also found in 150 families in Japan⁵. Currently the etiology of tori has been postulated as an interplay of multifactorial genetic and environmental factors⁶⁻⁸. With regard to shape, torus palatinus (TP) is divided into flat, spindle-shaped, nodular and lobular, whereas torus mandibularis (TM) is divided

into unilateral solitary and bilateral solitary, unilateral multiple, bilateral multiple and bilateral combined. Their size can range from millimeter to centimeter. In terms of eating, speaking and swallowing, as well as planning of complete and partial dentures, smaller tori do not cause a problem in the majority of cases, whereas larger tori can cause significant problems^{9,10}. Al Quran and Al-Dwairi¹¹ reported that the prevalence of TP was 29.8% and of TM was significantly higher (42.6%). However, the same authors did not find significant differences in the prevalence of tori between males and females. The prevalence of TM among whites and blacks ranges from 8–16%^{7,12} and shows no sex difference. However, in Eskimo females the TM are more prevalent (25.3%) in comparison to the Eskimo males (13.3%)¹³. Piera-Navarro et al.¹⁴ found greater incidence of tori in females as well as Gonzalez et al.¹⁵ and Yildiz et al.¹⁶ but contrary to the Soleri et al.¹⁷,

Bernaba et al.¹⁸ as well as Sonnier¹⁹ found greater prevalence of TP in males.

The purpose of the present study was to report the prevalence, shape and location of TP and TM in the population of the Split-Dalmatian county as well as to evaluate possible differences with respect to the age and gender.

Materials and Methods

The study was carried out on 1679 subjects of the Split-Dalmatian county in Croatia ranging in age from 9 to 99 years. The study comprised of 985 female and 694 male subjects. The subjects were examined by one examiner in several dental practices in the Central Dalmatian region. Criteria for inclusion of patients were all the patients attending those dental settings regardless of age and gender. The investigation lasted for two years. The following methods were used: clinical examination and palpation – predilection sites of possible development of torus palatinus and torus mandibularis were examined by palpation; analysis of plaster casts – impressions of the subjects’ upper and lower jaw were taken and plaster casts were made in the laboratory. Changes in the middle part of the palate were analyzed in the upper jaw and tori were recorded as flat, spindle-shaped, nodular or lobular. Sublingual part of the lower jaw was analysed regarding mandibular tori which were then recorded as solitary bilateral, multiple bilateral, combined bilateral, solitary unilateral, and multiple unilateral.

Data were analysed by χ^2 -test and the level of significance was 0.05.

Results

The study comprised of 1679 subjects, 694 males (41.3%) and 985 females (58.7%). The majority of male subjects were aged between 30 and 39. The majority of females were in the sixth decade of life, ranging from 50

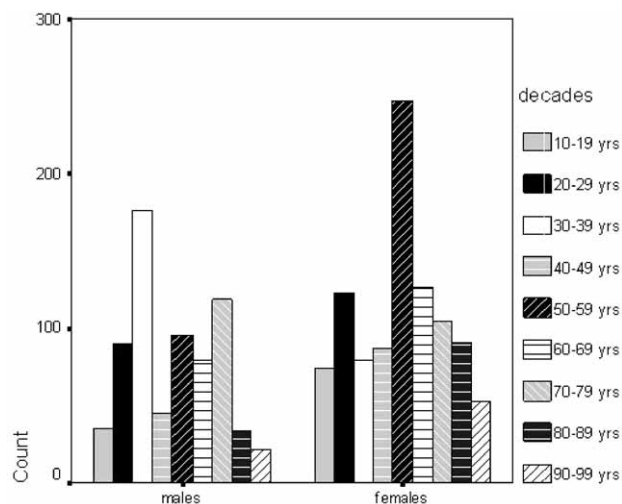


Fig. 1. Distribution of the studied subjects in relation to the gender and age.

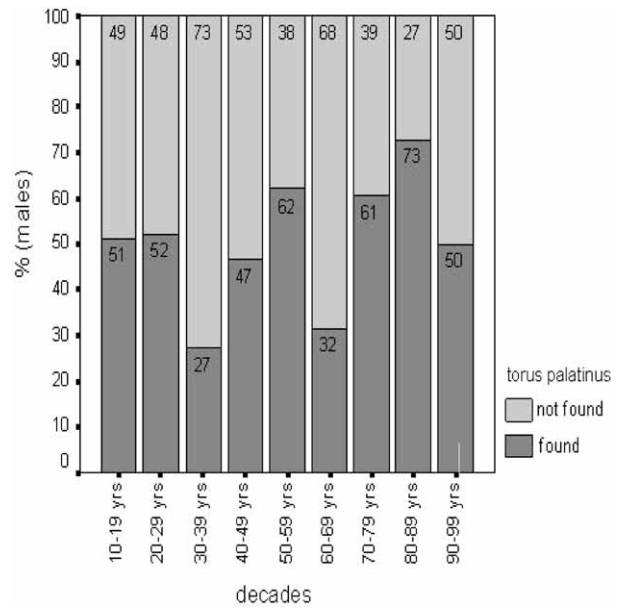


Fig. 2. Proportions of the prevalence of torus palatinus in the male subjects according to the age groups.

to 59 years of age (Figure 1). From the total number of 1679 subjects, 720 (42.9%) had torus palatinus, whereas torus mandibularis was found in 212 subjects, which is 12.6% of the total population. Spindle-shaped torus palatinus was the most frequent type (45.6% of the subjects with torus palatinus). The most frequent type of torus mandibularis was bilateral solitary torus mandibularis (35.4% of subjects). Furthermore, torus palatinus was found in 395 females (40.1% of the total number of females) and in 325 males (46.8% of the total number of males), indicating a significantly higher prevalence of torus palatinus in the male population when compared to the female population ($p=0.006$). Torus mandibularis was found in 111 females (11.3% of the female popula-

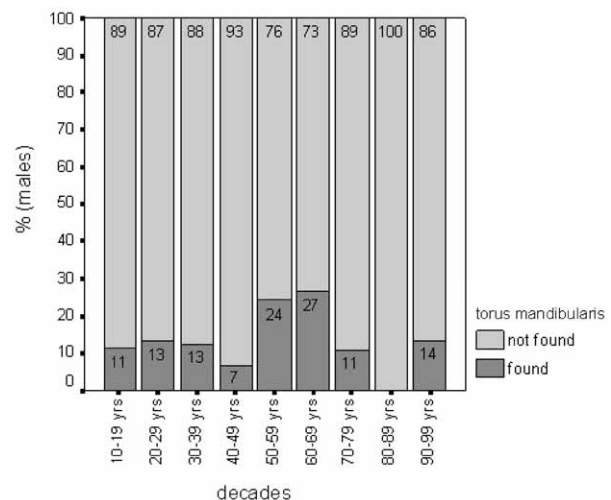


Fig. 3. Proportions of the prevalence of torus mandibularis in the male subjects according to the age groups.

TABLE 1
PREVALENCE OF DIFFERENT TYPES OF TORUS PALATINUS WITH REGARD TO THE GENDER

| | | Torus palatinus | | | | | |
|--------|----------------------------|-----------------|----------------|---------|---------|-------|--------|
| | | Flat | Spindle-shaped | Nodular | Lobular | Total | |
| Male | Total | | 113 | 148 | 53 | 11 | 325 |
| | % within gender | | 34.8% | 45.5% | 16.3% | 3.4% | 100.0% |
| | % within type of exostosis | | 46.1% | 45.1% | 49.5% | 27.5% | 45.1% |
| | % within total | | 15.7% | 20.6% | 7.4% | 1.5% | 45.1% |
| Female | Total | | 132 | 180 | 54 | 29 | 395 |
| | % within gender | | 33.4% | 45.6% | 13.7% | 7.3% | 100.0% |
| | % within type of exostosis | | 53.9% | 54.9% | 50.5% | 72.5% | 54.9% |
| | % within total | | 18.3% | 25.0% | 7.5% | 4.0% | 54.9% |

tion) and in 101 males (14.6% of the male population), again indicating significantly higher prevalence of torus mandibularis in the male population in comparison with the female population ($p=0.046$). The chi-square test showed that there were no significant differences in the various shapes of TP as well as TM in relation to gender ($p=0.114$; $p=0.291$). In the male subjects there was no tendency of either increase or decrease in the proportion of TP and TM with increasing age. No tendency of either increase or decrease in the proportion of TM in relation to age was observed in females.

Discussion and Conclusion

In the worldwide literature prevalence of TP has been reported to be as high as 66% and prevalence of TM as high as 64%¹⁻¹⁰. Relatively high prevalence of tori seen in this population might be explained by the fact that the subjects came from the Dalmatian coast where people eat a lot of fish as it has been suggested by Eggen et al.⁶ that saltwater fish consumption possibly supplies higher lev-

els of polyunsaturated fatty acids and Vitamin D that is involved in bone growth which increases the occurrence of tori. Spindle shaped tori were the most frequent type of tori seen in our subjects which is in agreement with Reichart et al.²⁰ as well as Jainkittivong A et al.²¹ and contrary to the results of most other authors who found that TP are usually flat^{18,22-24}. Bilateral solitary TM was the most prevalent type of TM which is in concordance with many authors^{10,20,22,25}. With regard to the gender, no significant differences were found in the occurrence of various morphological shapes of torus palatinus and torus mandibularis. The results of this study show that tori of both jaws are more frequently found in males when compared to the females. This finding is in agreement with most of other studies performed on people or skulls regarding tori^{7,8,18,26}. Alvesalo et al.²⁷ suggested that sexual dimorphism in the manifestation of torus mandibularis might be a consequence of the effect of Y chromosome on growth, occurrence, expression and timing development of mandibular tori. Haugen¹⁰ suggested that genetics might be responsible factor for the sex difference.

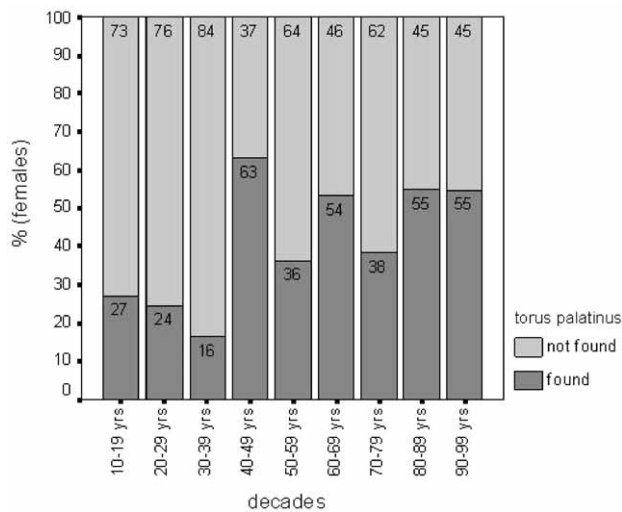


Fig. 4. Proportions of the prevalence of torus palatinus in the female subjects according to the age groups.

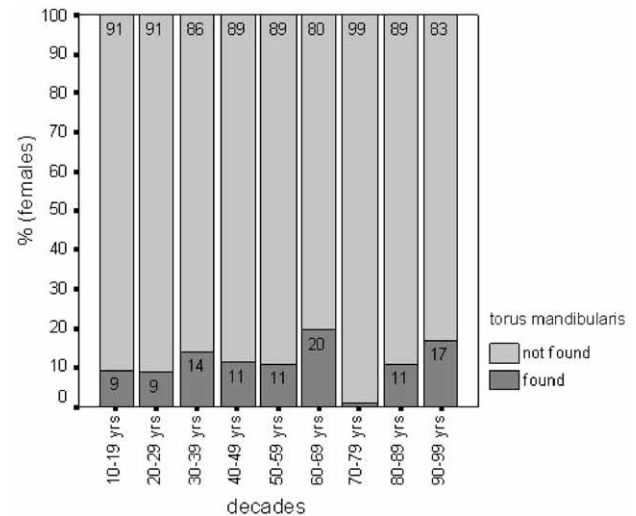


Fig. 5. Proportions of the prevalence of torus mandibularis in the female subjects according to the age groups.

TABLE 2
PREVALENCE OF VARIOUS TYPES OF TORUS MANDIBULARIS IN RELATION TO THE GENDER

| | | Torus mandibularis | | | | | |
|--------|----------------------------|----------------------|-----------------------|----------------------|-----------------------|------------------------|--------|
| | | Solitar bilateral | Multiple bilateral | Combine bilateral | Solitar unilateral | Multiple unilateral | Total |
| Male | Total | 39 | 14 | 19 | 17 | 12 | 101 |
| | % within gender | 38.6% | 13.9% | 18.8% | 16.8% | 11.9% | 100.0% |
| | % within type of exostosis | 52.0% | 41.2% | 55.9% | 36.2% | 54.5% | 47.6% |
| | % within total | 18.4% | 6.6% | 9.0% | 8.0% | 5.7% | 47.6% |
| Female | Total | 36 | 20 | 15 | 30 | 10 | 111 |
| | % within gender | 32.4% | 18.0% | 13.5% | 27.0% | 9.0% | 100.0% |
| | % within type of exostosis | 48.0% | 58.8% | 44.1% | 63.8% | 45.5% | 52.4% |
| | % within total | 17.0% | 9.4% | 7.1% | 14.2% | 4.7% | 52.4% |

Furthermore, the finding of more TP in men is in concordance with Sonnier et al.¹⁹ who found higher prevalence of palatal exostoses in men as well. Ihunwo and Phukubye²⁸ also found that the TM was more prevalent in male skulls when compared to the female ones (4:1). The same authors concluded that occurrence of torus in their sample could be attributed to a possible increase in clenching and grinding activity with a resultant stress from masticatory hyperfunction which was also substantiated by other authors^{5,29,30}. Kerdpon and Sirirungrojying³¹ found strong association between clenching and grinding and presence of TM. The association between formation of tori bruxism has been supported by the results of Eggen and Natvig⁶. Also research has shown that the loss of tooth influences prevalence of torus³². In addition, the number of functioning teeth appears to be an important factor on the presence of torus⁶. The same author stated that functional forces significantly influence the incidence of torus and that the frequency of TM decreases with increasing tooth loss. However, our results of increased incidence of tori with increasing age might

suggest that together with tooth loss, alveolar ridges and tori are prone to more intensive masticatory stress and therefore the tori have tendency to grow (enlarge). Occurrence of exostoses is related to the increasing age as suggested by Larato et al.³³ and Jankittivong et Langlais³⁴ which is in concordance with our finding. Furthermore, Al Quran and Al-Dwairi¹¹ reported that there was a higher prevalence of tori in the 81–90 years age group but added also that the sample of that age group was relatively small and thus does not represent objectively the finding. Our results are in contrast with Sonnier et al.¹⁹ who noted that the prevalence of exostoses decreased after 50 years of age as well as Choyayeb and Volpe³⁵ who also found no relationship between age and the presence of tori in either jaw.

In conclusion, our results do show that the presence of TP and TM is significantly higher in males when compared to the females. There is a trend towards higher prevalence of TP and TM with increasing age, although not significant.

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V. Vučićević Boras

University of Zagreb, School of Dental Medicine, Department of Prosthodontics, Gundulićeva 5, 10 000 Zagreb, Croatia
e-mail: vvboras@hotmail.com

UČESTALOST TORUSA PALATINUSA I TORUSA MANDIBULARISA U POPULACIJI SREDNJE DALMACIJE

SAŽETAK

Torus palatinus (TP) i torus mandibularis (TM) su nepatološke izrasline nepoznate etiologije na čeljusnim kostima. Cilj ovog istraživanja bio je opisati učestalost, oblik i smještaj TP i TM u populaciji Srednje Dalmacije. Nadalje, zanimalo nas je otkriti postoje li razlike obzirom na dob i spol ispitanika. U istraživanju je sudjelovalo 1679 ispitanika, 985 žena i 694 muškaraca od 9 do 99 godina koje je tijekom dvije godine pregledavao jedan stomatolog. Korištene su sljedeće metode: klinički pregled i analiza sadrenih modela. Od ukupno 1679 ispitanika, 42,9% je imalo torus palatinus, dok je torus mandibularis pronađen u 12,6% ispitanika. Vretenasti oblik torusa palatinusa bio je najčešći (45,6%). Najčešći oblik torusa mandibularisa bio je bilateralni jednostruki (35,4%). Nadalje, torus palatinus pronađen je u 40,1% žena i u 46,8% muškaraca što ukazuje na veću učestalost u muškaraca u odnosu na žene ($p=0,006$). Torus mandibularis je pronađen u 11,3% ispitanica i u 14,6% ispitanika, što također ukazuje na veću učestalost u muškaraca nego u žena ($p=0,046$). Rezultati ovog istraživanja pokazuju značajno veću učestalost torusa palatinusa i torusa mandibularisa u muških ispitanika. Nadalje, nije bilo razlika u prevalenciji TM i TP s obzirom na dob ispitanika.