

## Torus Palatinus and Torus Mandibularis in Edentulous Patients

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### Abstract

**Aim:** To determine the prevalence of tori in Jordanian edentulous patients, the sex variation in their distribution, and their clinical characteristics.

**Methods:** Three hundred and thirty eight patients were examined in the Prosthodontic Clinic in the Department of Restorative Dentistry at Jordan University of Science and Technology. The location, extent, and clinical presentation of tori were recorded related to the age and sex of patients.

**Results:** The overall prevalence of tori was 13.9%. The prevalence of torus palatinus was 29.8% (14/47), while that of torus mandibularis was significantly higher 42.6%(20/47). Both types of tori were associated with each other in 27.7% of cases (13/47).

**Conclusions:** There was no significant difference in the prevalence of tori between males and females. There seems to be a strong association between mandibular and palatal tori.

**Keywords:** Tori, torus palatinus, torus mandibularis

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## Introduction

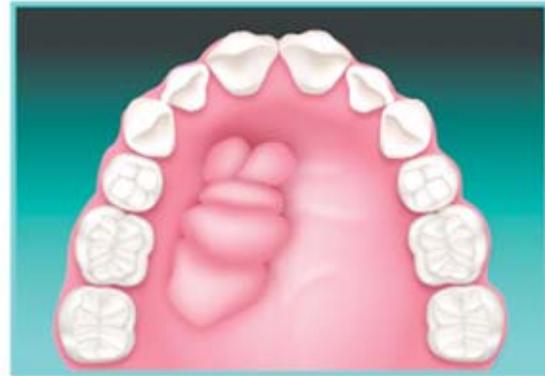
Tori are benign anatomical bony prominences occurring in the hard palate and the lingual aspect of the mandible. Although they are generally asymptomatic, surgical intervention may be required in some cases for prosthodontic purposes.<sup>1</sup> Currently, tori are considered to be an interplay of genetic and environmental factors with a familial occurrence suggesting autosomal dominant inheritance with reduced penetrance.<sup>2</sup> Suzuki and Saki<sup>10</sup> suggested the two anomalies are due to the same autosomal dominant gene. This is supported by the study of Johnson et al.<sup>11</sup> who found about 85% of children with torus mandibularis or torus palatinus had at least one parent with one or the other anomaly. They are not part of the Gardener syndrome.

A recent study<sup>3</sup> revealed torus palatinus in association with other factors can be considered in the decision for testing bone density in otherwise normal postmenopausal women. On the other hand, the prevalence of torus mandibularis and parafunctional activity was reported to be higher in patients with temporomandibular joint disorders than in controls.<sup>4</sup>

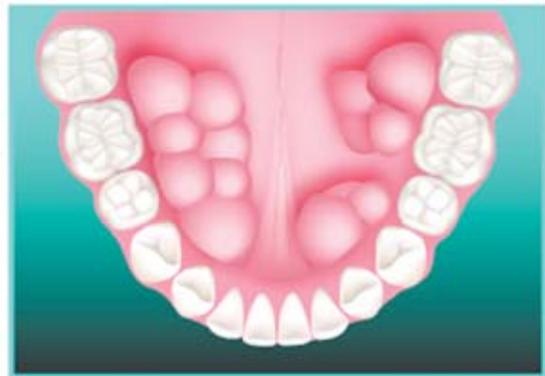
The occurrence of tori in various ethnic groups ranges from 9% to 66%. Even between similar ethnic groups living in different environments, different figures have been reported. The prevalence of torus mandibularis among whites and blacks ranges from 8% to 16% and shows no sex difference.<sup>2,3,5</sup> The prevalence is a little higher among Orientals and highest among Eskimos reaching up to 40%<sup>9</sup> with a significant difference in gender up to 25.3% in Eskimo females but only 13.3% in Eskimo males.

Torus palatinus does not show wide ethnic variations in the prevalence ranging between 20% and 30%, except a very low prevalence in South American Indians.<sup>11</sup> It is, however, twice as frequent in females as in males.<sup>2,4</sup> Summers found a prevalence of 28.5% in females. Both tori are found to be associated in 3% to 8% of cases.<sup>6</sup>

Torus mandibularis is covered by an extremely thin layer of soft tissue and for that reason they may be easily irritated by slight movement of the denture base in an edentulous mouth.<sup>10</sup> Torus



Torus Palatinus



Torus Mandibularis

mandibularis presents many challenges when fabricating a complete denture for a patient. The mucosa tends to be thin and will not tolerate the occlusal loading of a denture. Large mandibular tori may prevent complete seating of impression trays and the finished denture. Large undercuts in a torus may lock the denture into place or preclude the fabrication of a lingual flange in the area.<sup>10</sup> Similarly torus palatinus can be annoying to complete or partial denture patients. This is especially true if the prosthesis exceeds a tolerable size which then can interfere with proper seating leading to tissue inflammation. Discoloration of tori may be of concern to the patient as a case was presented involving a patient with minocyclin-induced staining of torus palatinus and alveolar bone.<sup>26</sup>

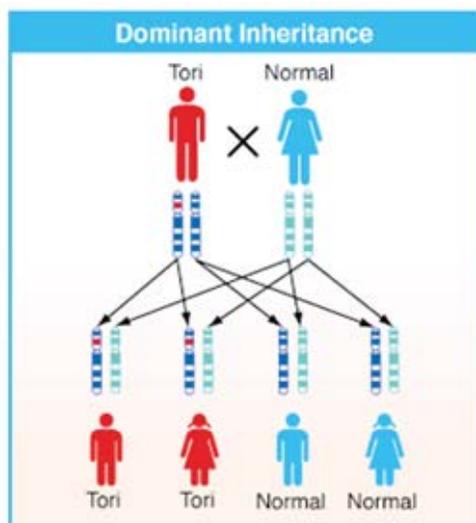
This study aims to determine the prevalence of tori in edentulous Jordanian adults, the sex variation in their distribution, and their clinical aspects. There are no studies yet on tori in this ethnic group. There is a need to compare our findings with other surveys to form baseline data

for further epidemiological studies about tori and to facilitate further discussions on this bony anomaly. Furthermore, this group of edentulous patients are the most affected by the implications of tori compared to dentate patients.

## Methods and Materials

### Study Population and Clinical Examination

The study was conducted in the Prosthodontics Clinic in the Department of Restorative Dentistry of Jordan University of Science and Technology in Irbid, Jordan. Prior to the commencement of the study, criteria for the diagnosis and classification of tori were agreed between the two examiners. The existence of tori had systematically and routinely been ascertained by visual inspection and palpation. An examination protocol was developed for recording lesions that included site and clinical characteristics. The protocol was piloted and finalized.



Three hundred and thirty eight edentulous patients (150 males and 188 females) who attended the Prosthodontics Clinic for constructing new complete dentures were enrolled in this study (age range 30-90 years) after obtaining a full medical history. All designated features of tori were recorded.

The following criteria were used to classify different shapes of tori:

1. **Flat Torus:** Occurring as a slightly convex protuberance with a smooth surface for

mandibular tori. The same applies for palatal tori but extending symmetrically on both side of the palate.

2. **Lobular Torus:** Present as a pedunculated or sessile lobular mass that can arise from a single base. This applies for tori in both locations.
3. **Nodular Torus:** Occurring as a multiple protuberance each with individual bases; these may coalesce forming grooves between them. This applies for tori in both locations.
4. **Spindle Torus:** Present along the midline ridge along the palatal raphe area for palatal tori and elongated tori bilaterally in the mandible for mandibular tori.

### Statistical Analysis

Cross tabulation was used to calculate the overall prevalence of tori and the frequency of each clinical type. The Chi-square test was used to determine the significance of differences between two different rates.

### Results

The results of this study showed the overall prevalence of tori was 13.9% (47/338) (Table 1). There was no significant difference in the overall prevalence of tori between males and females ( $p > 0.05$ ). The prevalence of torus palatinus was 29.8% (14/47), while that of torus mandibularis was significantly higher 42.6% (20/47). Both tori were associated with each other in 27.7% of cases (13/47).

Table 2 shows the prevalence of palatal and mandibular tori in different age groups of the study population. There were significantly ( $p < 0.05$ ) more reported cases of palatal and mandibular tori in the oldest age group (81-90). This is due to the few number of patients within this age range compared to other age groups and should not be taken as a generalization. Palatal tori were reported in 7.7% and mandibular tori reported in 15.4%; this contributed to the high percentage of the overall tori. However, the association between both tori was most common in the 61-70 age group (10%).

Among the different clinical types of tori in both jaws (60 tori), 33% were flat, 18% were spindle, 33% of the nodular type, and around 15% were

Table 1. Prevalence of tori in the study population according to location.

Location	Males 150 n (%)	Females 188 (%) n	Total 338 (%) n
Palate	8 (5)	6 (3)	14 (4.1)
Mandible	11(7)	9 (4.7)	20 (6)
Total Palate and Mandible	7(4.6)	6 (3)	13 (3.8)
Total	26 (17)	21(12.7)	47 (13.9)

\*  $p > 0.05$  between males and females for all locations

Table 2. Prevalence of different forms of tori according to age groups.

Age group	Study population (338) (%) N	Palate (14) (%) N	Mandible (20) (%) N	Palate and Mandible (13) (%) N	Total 47 (%) N
30-40	85 (25)	3 (3.5)	2 (2.4)	2 (2.4)	7 ( 8.3)
41-50	100 (29.6)	6 (6)	7 (7)	4 (4)	17 (17)
51-60	60 (17.8)	2 (3.3)	3 (5)	2 (3.3)	7 (11.6)
61-70	30 (8.9)	1 (3.3)	4 (13.3)	3 (10)	8 (26.6)
71-80	50 (14.8)	1 (2)	2 (4)	1(2)	4 (8)
81-90	13 (3.9)	1 (7.7)	2 (15.4)	1 (7.7)	4 (30.8)

\*No significant difference in dmft and gender  $P = 0.171$

Table 3. Clinical shapes of tori.\*

Shape	Palatal tori (14) **(%)N	Mandibular tori (20) ***(%)N	Total (shapes of tori) N
Flat	15(56%)	5 (15%)	20
Spindle	3 (11%)	8 (25%)	11
Spindle	5 (18%)	15 (45%)	20
Spindle	4 (15%)	5 (15%)	9

\* Total number of tori associated in both jaws=13

\*\*the percentage is out of the total number of palatal tori=27

\*\*\* the percentage is out of the total number of mandibular tori=33

of the lobular type (Table 3). Palatal tori were predominantly of the flat type and contributed to the high percentage of flat tori, while nodular tori were the majority in the mandible and had the major contribution to the high percentage of nodular tori.

### Discussion

This is the first study to report the prevalence of tori in edentulous patients in Jordan. The results showed a high prevalence of tori (13.9%). This is higher than what has been found in earlier reported studies; 12.3% in Trinidad and Tobago West Indies<sup>1</sup>, 6.6% in Jamaican Blacks<sup>14</sup>, but less than the prevalence reported in a Ghanaian community (14.6%).<sup>24</sup> However, the present study did not show any significant difference in the prevalence of either palatal or mandibular tori between males and females implying the sex based factor has little influence on the prevalence of tori. This is in contrast to a Norwegian study<sup>15</sup> and other studies<sup>2,5,12,16,18,20</sup>, which demonstrated males had a higher ratio to females for tori. Haugen<sup>30</sup> suggested genetics as the responsible factor for the difference, while Alvesalo<sup>31</sup> suggested sexual dimorphism in the manifestation of torus mandibularis might result from the effect of Y chromosome on growth, occurrence, expression, and timing of development of mandibular tori. Similarly, there was no significant difference in the prevalence between mandibular (9%) and palatal tori (7%) ( $p>0.05$ ).



The high prevalence of tori among the 81-90 years age group in our study should not be considered very important because the sample of that age group is small and might not reflect the true prevalence. A larger sample size is needed for future studies. The results of the present study are in disagreement with Choyayeb and Volpe<sup>25</sup> who found no relationship between age and the presence of tori in either jaw.

The role of nutrients in the etiology of tori has been recently reviewed by Eggen et al.<sup>15</sup> who suggested saltwater fish consumption in Norway possibly supplies higher levels of polyunsaturated fatty acids and Vitamin D that is involved in bone growth which increases the chances of tori. Also it has been reported genetic and dietary factors may be involved in the etiology and variation in the prevalence of tori. For the time being, genetic factors are the probable culprits in the occurrence of tori in Jordan as fish



consumption is not common as in other parts of the world having water sources. In parallel with this suggestion earlier studies suggested eating tough food may be implicated in the etiology of tori as this may trigger pressure towards the median palatine region, thereby, leading to the thickening of the palatal vault. In these studies researchers observed the probability of finding mandibular tori in a person bearing palatal tori was more than twice as high in a person without this characteristic.<sup>17</sup> The results of our study supported this observation as mandibular and palatal tori were associated with each other in nearly 28% of all individuals with tori.

The present study suggested most tori in the palate were flat and most of the mandibular tori were of the nodular type. This is in agreement with previous studies.<sup>2,4,17,19</sup> Most individuals in this study were unaware of the presence of tori and did not present clinical symptoms. No other clinical medical conditions or dental anomalies were observed in the present study in association with tori. Sasaki<sup>22</sup> reported an association between palatal and mandibular tori and chronic phenytoin therapy. Rarely may tori be associated with exostosis<sup>21</sup>, unerupted mandibular canines<sup>11</sup>, sclerosteosis<sup>24</sup>, or parafunctional activity.<sup>4</sup>

The presence of either palatal or mandibular tori can obscure the radiographic details of maxillary sinuses and lower premolars and interfere with the construction of removable prostheses. For

example, the lower labial bar is rarely indicated as a major connector for a removable partial denture.<sup>32</sup> It can be used satisfactorily when large mandibular tori interfere with conventional lingual bar placement or when the lower teeth are severely lingually tipped and placement of a lingual bar is not possible. In the present study patients, only with nodular and lobular forms of tori, were referred for surgical reduction prior to the construction of complete dentures which incorporate a combination of soft acrylic flanges and liners.<sup>29</sup>

Torus mandibularis may be not only annoying to the patient in interfering with removable prostheses but can also cause obstructive sleep apnea.<sup>27</sup> Similarly, difficult endotracheal intubation was reported to be associated with the presence of torus mandibularis.<sup>28</sup>

However, the presence of tori might be advantageous since they may be used as sites for harvesting bone for ridge augmentation procedures to replace a missing tooth<sup>23</sup> and the potential use of the mandibular and palatal tori as sources of autogenous cortical bone in periodontal surgery.<sup>25</sup> Torus mandibularis might be useful as an indicator of increased risk of temporomandibular disorders in some patients.

### Conclusion

Palatal and mandibular tori require no treatment unless they become so large they interfere with function, denture placement, or suffer from recurring traumatic surface ulceration. When treatment is elected, the lesions may be surgically removed.

Slowly enlarging, recurrent lesions occasionally are seen, but there is no malignant transformation potential. A patient should be evaluated for Gardner syndrome if they present multiple bony growths or lesions not in the classic torus or locations. Intestinal polyposis and cutaneous cysts or fibromas are other common features of this autosomal dominant syndrome.

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