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Artículo de Investigación

Prevalence of *torus mandibularis* in Al Muthanna province, Iraq

Prevalencia del torus mandibular en la provincia de Al Muthanna, Irak

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ABSTRACT

Background: Torus mandibularis is a multifactorial hyperplastic bone overgrowth of lingual aspect of premolar region. It can cause discomfort in some cases. Its occurrence is influenced by a mixture of genetic and environmental factors.

Objectives: To assess the prevalence of torus mandibularis in terms of gender, age, shape, size, and location in patients attending the Teaching Clinic of the College of Dentistry of Al Muthanna University.

Methods: This cross-sectional study included five hundred and twenty three patients. Their chief complaint, age, sex, and presence of *torus mandibularis* were collected, and analyzed.

Results: Thirty two out of 523 patients presented torus mandibularis, 19 females and 13 males. *Torus mandibularis* was reported in 2 patients of the age group <20, 18 of the age group 21-40 years, 9 patients of the 41-60 age group, and 3 patients of the ≤61 years age group. It appeared in flat, spindle and nodular shapes. The percentage of flat shapes was high in females 34.37% and males 18.75%. The highest percentage of torus mandibularis was found in premolar region 16, followed by molar region 9, 5 in premolar-molar, and 2 in incisor-premolar areas.

Conclusion: Low prevalence of torus mandibularis was observed in this study. Torus mandibularis cases prevailed in the 21-40 year age group, and appeared as flat, medium-sized growths in the premolar region. The authors recommend future studies to identify variant markers across the genome in Iraqi patients with *torus mandibularis*.

RESUMEN

Introducción: El torus mandibular es un crecimiento óseo hiperplásico multifactorial de la cara lingual de la región premolar, que en algunos casos causa molestias o irritación. Su aparición se ve influenciada por factores genéticos y ambientales.

Objetivos: Evaluar la prevalencia del *torus mandibular* en función del sexo, la edad, la forma, el tamaño y la localización en pacientes que acuden a la Clínica Docente de la Facultad de Odontología de la Universidad Al Muthanna.

Métodos: Este estudio transversal incluyó a 523 pacientes. Se recogieron y analizaron sus principales síntomas, edad, sexo y presencia de torus mandibular.

Resultados: Treinta y dos de 523 pacientes presentaron torus mandibular, 19 mujeres y 13 hombres. Se reportó torus mandibular en 2 pacientes del grupo de edad <20, 18 del grupo de edad 21-40 años, 9 pacientes del grupo de edad 41-60 y 3 pacientes del grupo de edad ≤61 años. Se presentó en formas planas, fusiformes y nodulares. El porcentaje de formas planas fue alto en mujeres 34,37 %, y hombres 18,75 %. El mayor porcentaje de *torus mandibularis* se encontró en la región premolar 16, seguido de la región molar 9, 5 en áreas premolar-molar y 2 en áreas incisivo-premolar.

Conclusión: Se observó una baja prevalencia de torus mandibular. Los casos predominaron en el grupo de edad de 21 a 40 años, presentándose como crecimientos planos y de tamaño mediano en la región premolar. Se recomienda

realizar estudios futuros para identificar marcadores de variantes en el genoma de pacientes iraquíes con torus mandibular.

INTRODUCTION

The meaning of *torus* (plural *tori*) in Latin is "swelling" or "bulge".[1] It refers to a benign bony outgrowth named according to its anatomical location. When a bony growth forms at the midline of the palate, it is termed *torus palatinus*. Meanwhile, a protruding growth between the canines and premolars on the lingual surface of the mandible is called *torus mandibularis* (TM).[1,2]

The prevalence of *tori* varies between previous studies, ranging from over 60% to as low as 1%.[1] Additionally, there is a great variation in their prevalence according to the shape and size.[2] The incidence of *torus mandibularis* is 5.2-18.8 % in Europeans, 12.1% in Africans, and 9.2-29.9% in Asians, and is commonly observed in persons aged 30-50 years.[1]

Several risk factors are associated with the development of these *tori*, such as hyperthyroidism, hypertension and bruxism.[2] *Torus mandibularis* is a gradual formation of a bony prominence along the lingual aspect of the mandible, typically in the premolar region and above the mylohyoid line.[3,4] It consists of dense cortical bone with minimal bone marrow, surrounded by thin mucosal and periosteal layers. The mucosa often experiences irritation or injuries from toothbrushing and exposure to hot liquids.

TM is frequently asymptomatic; thus, treatment is generally limited to follow-up and observation. However, TM interferes with dental treatment and daily living, such as the design or removal of mandibular dentures and plaque control, and causes sleep apnea.[2]

TM is generally discovered incidentally during a dental examination, as it commonly presents asymptomatically. It develops progressively and gradually during the second and third decades of life,[3] becoming more prominent until middle age. TM can be classified morphologically into unilateral or bilateral solitary, unilateral or bilateral multiple, and bilateral combined variants.[4]

TM may have variations in size, but they are usually smalls. The most commonly observed form is flat, with the bilateral solitary type reported as the most prevalent. This presentation is typically identified through a combination of clinical evaluation and radiographic examination.[1,5]

TM is a relatively common oral finding and is considered a normal anatomical variant rather than a pathological condition. These growths are typically painless and asymptomatic, although they may cause discomfort or irritation in some cases. TM appears as a raised bony lump or ridge along the lingual surface of the mandible, with the margin facing the tongue. It usually occurs bilaterally—

present on the both sides of the mandible—but may be also unilateral.[5] The size and shape of *torus mandibularis* can vary among individuals; in some cases, it can become quite large.[6,7]

The exact cause of *torus mandibularis* remains unclear, but evidence suggests a multifactorial etiology.[2,8] Its development is thought to be influenced by a combination of genetic and environmental factors. TM appears to be more prevalent in certain populations and is believed to have a hereditary predisposition.[9]

Although *torus mandibularis* itself does not require treatment, it may cause clinical concerns in specific situations.[10] For instance, if it interferes with speech or chewing, or causes persistent discomfort, a dentist or oral surgeon may recommend surgical removal. However, such procedures are typically performed only when necessary due to potential surgical complications.[8]

To date, studies have examined the prevalence of *torus mandibularis* and its association with demographic and clinical factors—including gender, age, and temporomandibular joint (TMJ) health—in samples from Iraq.[9-12]

Ismail and Hamad [10] reported a prevalence of 5.3% for *torus palatinus* (TP) and 7.2% for TM. The male-to-female prevalence ratio was 1:3.42 for TP and 1:1.81 for TM. Their study noted that both TP and TM were more common in females, and found a statistically significant association between TMJ dysfunction syndrome and the presence of these *tori* ($P<0.05$). Specifically, they documented 49 cases (5.3%) of TP and 67 cases (7.2%) of TM.

Similarly, Faiza[12] reported a 10.9% prevalence of TM among examined patients, with a higher occurrence in females than in males. The study also revealed significant differences in size across age groups, with the most common presentation being a single, flat-shaped *torus* in a bilateral location.

However, a literature review showed no previous publications regarding the prevalence of TM in the population of Al Muthanna province. Consequently, the current study aims to document the prevalence of *torus mandibularis* and its relationship with demographic factors in Al Muthanna province, Iraq.

METHODOS

A cross-sectional study was conducted at the Teaching Clinic of the College of Dentistry, Al Muthanna University (TC/CD/AU), between February and May 2019. The study participants included patients attending the TC/CD/AU for various concerns. Trained dental surgeons collected data from a total of 523 patients. The diagnosis of TM was made based on clinical examination, including visual inspection and digital palpation. Data collected included, age, gender, and main complaint of the patients and the absence or presence of TM.

If TM was identified, its position (anterior, middle and posterior region) and shape (unilobulated, bilobulated and multilobulated) were recorded. The size of *tori* was estimated using the following classification: small (<3mm), medium (3-6mm), and large (>6mm). The shapes of *torus mandibularis* were categorized in four types—flat, nodular, spindle, and lobular—according to a previous study.[6,13]

Inclusion criteria: All patients presenting with dental complaints who attended the Dental diagnosis department between February and May 2019 were included in the study.

Exclusion criteria: Patients with incomplete data forms were excluded from the study.

Limitations: The study was limited by incomplete patient records and potential inaccuracies in clinical documentation.

Ethical considerations: Ethical approval was obtained from the Ethics and Research Committee of the College of Dentistry, Al Muthanna University (No.01-02-TM/2019). Written informed consent was obtained from all participants.

Statistical analysis

Data were tabulated and statistically analyzed using Microsoft Excel. Fisher's exact test was used to evaluate the association between gender and the presence of *tori*. A p-value <0.05 was considered statistically significant.

RESULTS

Among the 523 patients enrolled in this study, 32 individuals (6.1%) were identified as having *torus mandibularis* (TM), comprising 19 females (3.63%) and 13 males (2.48%). (Figure)

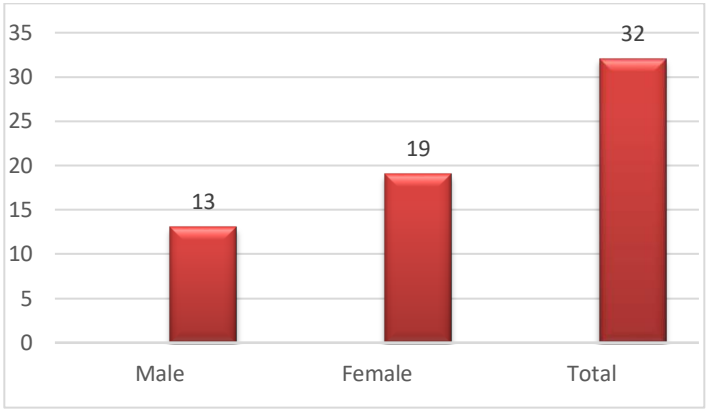

Fig. Distribution of *torus mandibularis* in relation to gender.

Patients diagnosed with TM were categorized into four age groups: under 29 years, 21-40 years, 41-60 years, and over 61 years. The distribution of TM cases among these age groups was as follows: 2 (6.25%) under 20 years, 18 (56.25%) aged 21-40 years, 9 (28.12%) aged 41-60 years, and 3 (9.37%) over 61 years.The gender-specific distribution of TM across age groups was: males: 2 (6.25%) under 20, 6 (18.75%) aged 21-40, 2 (6.25%) aged 41-60, and 3 (9.37%) over 61; females: 0 (0.00%) under 20, 12 (37.50%) aged 21-40, 7 (21.87%) aged 41-60, and 0 (0.00) over 61. (Table 1)

Table 1. TM prevalence in relation to gender and age

Age groups (y)	Male	Female	Total
	N & %	N & %	N & %
	With tori		
Less than 20	2(6.25)	0 (0.00)	2 (6.25)
21-40	6 (18.75)	12 (37.5)	18 (56.25)
41-60	2 (6.25)	7 (21.87)	9 (28.12)
61 and above	3 (9.37)	0 (0.00)	3 (9.37)
Total	13 (2.48)	19 (3.63)	32 (6.11)

Based on size, TM was classified as small (<3mm), medium (3-6mm) and large (>6mm). Among females, the distribution was 7 (21.87%) small, 12 (37.50%) medium, and 0 (0.00%) large. Among males, the distribution was 5 (15.62 %) small, 8 (25.00%) medium, and 0 (0.00%) large (table 2). Statistically, no significant difference in TM size by gender was found (P=1.000).

Table 2. Distribution of *torus mandibularis* (TM) by gender and *torus* size

TM sizes	Female (n=19)	Male (n=13)	Total (n=32)
	N & (%)	N & (%)	N & (%)
Small (<3mm)	7 (21.87)	5 (15.62)	12 (37.50)
Medium (3–6mm)	12 (37.5)	8 (25.0)	20 (62.50)

According to shape, TM appeared as flat, spindle-shaped, or nodular. In females, the frequencies were 11 (34.37%) flat, 5 (15.62%) spindle-shaped, and 3 (9.37%) nodular. In males, the frequencies were 6 (18.75%) flat, 4 (12.50%) spindle-shaped, and 3 (9.37%) nodular (table 3). A significant relationship was found between gender and TM shape ($P<0.05$).

Table 3. TM shape in relation to gender

TM shape	Female	Male	Total
	N & %	N & %	N & %
Flat	11 (34.37)	6 (18.75)	17 (53.12)
Spindle	5 (15.62)	4 (12.5)	9 (28.12)
Nodular	3 (9.37)	3 (9.37)	5 (15.62)
Total	19 (59.37)	13 (40.62)	32

TM was also categorized by location on the mandible: incisor-premolar (I-P), premolar (P), premolar-molar (P-M), and molar (M) regions. Overall, the premolar region was the most commonly affected site, with 16 cases (50.0%). This was followed by the molar region with 9 cases (28.12%). The premolar-molar and incisor-premolar regions accounted for 5 (15.62%) and 2 (6.25%) cases, respectively. The 21-40 years age group had the highest incidence of TM, with 16 cases (50.0%) located in the premolar region and 2 cases (6.25%) in the incisor-premolar region. In the 41-60 years group, TM was primarily found in the molar region, with 7 cases (21.87%) and 2 cases (6.25%) in the premolar-molar region. Among those aged 61 and above, TM was seen only in the premolar-molar region, accounting for 3 cases (9.37%). The under-20 years group had only2 cases (6.25%), both located in the in the molar region. (Table 4)

Table 4. Distribution of TM cases by location and age group

Age groups (y)	I-P area	P area	P-M area	M area
	N & %	N & %	N & %	N & %
Less than 20	0 (0.00)	0 (0.00)	0 (0.00)	2 (6.25)
21-40	2 (6.25)	16 (50.0)	0 (0.00)	0 (0.00)
41-60	0 (0.00)	0 (0.00)	2 (6.25)	7 (21.87)
61 and above	0 (0.00)	0 (0.00)	3 (9.37)	0 (0.00)
Total	2 (6.25)	16 (50.0)	5 (15.62)	9 (28.12)

DISCUSSION

Torus mandibularis has been reported in different countries around the globe.[14-17] Exostoses and *tori* are localized bony protrusions composed of dense, compact bone with limited bone marrow. *Torus mandibularis* (TM) is characterized as a non-malignant, non-pathological bony growth of unknown etiology,[18] typically observed on lingual surface of the mandible around the premolar region.[19] The prevalence of TM varies widely, ranging from 6% to 32% in different populations worldwide.[14,20-22] In northern Malaysia, the prevalence of TM was reported at 2.8%,[2] while in India and Karachi the rates were 6.9% and 8.6%, respectively.[4] In the current study, the overall prevalence of TM was 32 individuals, constituting 6.1% of the study population. This figure is comparable to those reported in earlier studies conducted in Baghdad, Samawah[9-12] and other countries.[1, 10-13,17,23,24] Ismail and Hamad[10] reported TM in 67 patients (7.2%), while Faiza[12] documented a higher prevalence of 10.9% among Iraqi patients. Both studies reported a female predilection, with a male-to-female ratio of 1:1.81[8] and female prevalence of up to 14%.

The current study also explored the distribution of TM by gender, revealing that TM was more common in females than in males, with 19 cases (3.63%) in females and 13 (2.48%) in males. It comprised 19 (3.63%) females and 13(2.48%) males. The findings of the current study are consistent with studies that reported a higher prevalence of *torus mandibularis* in females;[2] however high percentages have also been reported in males. Similar findings were observed in studies done by Ismail and Hamad,[10] and Faiza[12] in Iraq, all showing females predilection. Previous researchers have suggested that *tori* may be influenced by sex-related factors.[25,26] Nevertheless, no clear explanation for the gender differences in *torus mandibularis* has been established.[19] Genetic factors have been implicated in its etiology. *Tori* have also been associated with Turner syndrome (45, X); additionally, the presence of Y chromosome in females may influence the growth, occurrence, expression, and timing of TM development, thereby contributing to the observed sexual dimorphism.[25]

The findings of the present investigation revealed that the largest proportion of cases (56.25%) occurred in the 21-40-year age group, followed by 28.12% in the 41-60 year group. However, no statistically significant differences were found among age groups (P<0.05). These findings align with previous research indicating that TM prevalence tends to increase between the ages of 30 and 59 years, as reported by Ismail and Hamad.[10] They documented the highest incidence of TM in individuals aged 50 years and above, attributing it to parafunctional habits and bruxism, which exert greater force on the mandibular arch than on the maxilla. Another study explained that variations in TM prevalence may be related to functional factors, with a tendency for the condition to decline in those aged 60 and older.[2, 27]

Regression of *tori* may occur following the tooth loss.[27] In the current study, a low incidence of TM was recorded in the >61 age group, with 3 cases (9.3%) overall—3 males (9.37%) and no females (0.0%). These results agree with a previous study that showed, through multiple logistic regression, that TM occurrence was dependent on gender but not on age.[28] Moreover, the present study recorded the lowest incidence of TM in individuals under 20 years of age, accounting for just 2 cases (6.25%). These results agree with a previous study that also reported the lowest incidence in the 10-19 age group,[27] confirming the minimal occurrence of TM in adolescents.

Regarding size, the majority of TM cases were of medium size (3-6mm) accounting for 20 (62.50%) cases, followed by small size (<3mm) with 12 (37.59%) cases. No large-sized TM cases were reported. Statistically, no significant difference was found (P=1.000). Most patients with medium-sized TM were in the 21–40 age group. These results agree with observations from previous studies,[1,2,28] that revealed masticatory stress tends to increase from adolescence into adulthood and declines with age. Furthermore, tooth loss leads to reduced masticatory function and may contribute to the regression of *tori* after the age of 60.

The shape of TM was also examined in relation to gender. The most commonly observed shape was flat, followed by spindle-shaped, with nodular being the least common. A significant relationship between TM shape and gender was found (P<0.05). Most flat-shaped TM cases were seen in females, while males exhibited a lower incidence across various TM shapes. These results diverge from a previous study in Pakistan, which reported medium-sized and spindle-shaped *tori* as the most common,[26] Similar trends were observed in other countries such as Croatia, and among the Malay population.[2]

The current study also examined the relationship between TM location and age group. The most common location was the premolar region 16 (50.0%) among those aged 21-40, while the least common location was in the incisor-premolar region (6.25%). These findings are compatible with previously published research.[27,28]

CONCLUSION

The current study found a prevalence of TM of 6.1% among patients attending the Teaching Clinic of the College of Dentistry at Al Muthanna University, Iraq, with a female predilection. The majority of TM cases occurred in individuals aged 21-40 years, followed by those aged 41-60 years and >61, with the lowest incidence in those under 20. Medium-sized TMs were the most common, followed by small-sized ones; no large TMs were recorded, and the difference was not statistically significant. The flat shape was most frequently observed, followed by the spindle-shaped, and nodular was the least common. The premolar region was the most affected site, particularly among the 21-40-age-group. As the authors of this study, we recommend future research focused on identifying genetic markers associated with TM in Iraqi patients.

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Contribution of authors

Mohammed A Alsmael conceived the study, performed data analysis and drafted the manuscript.

Abdulkarem Abdulazeez Muayad: conceived the study, performed data analysis and drafted the manuscript.

Kumail Ihsan Abdullah contributed to data collection and analysis.

Karima Akool Al-Salihi analyzed the data, and contributed to writing and final revision of the manuscript.