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Incidental Finding of Torus Palatinus and Mandibularis by CBCT

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Abstract

Background: Torus palatinus and torus mandibularis are benign bony growth or exostosis, localized to the roof of the maxilla and the alveolar surface of the mandible with nodular, flat or pedunculated shape.This study aimed to assess the shape,size, site &location of torus palatinus &torus mandibularis in relation to age& gender among Iraqi sample utilizing cone beam computed tomography.

Materials & methods: retrospective study performed by examination of 2000 CBCT images searching for tori, from the archives of radiology clinic at College of Dentistry / Baghdad University and other private dental center in Baghdad city. Tori shape (lobular or nodular), size (small, medium or large), site (unilateral, bilateral or middle), and location or surface (buccle, lingual or palatal) were evaluated in both male and female with age ranged between (20- 40 and abovey).

Results: Tori were found in 20 patients only, so it regarded to be rare in Iraqi sample, and no statistically significant differences in distribution was found between male and female. Higher percentage of tori was reported in 20-29 age group, with no statistically significant differences appeared between Torus palatinus and Torus mandibularis. No differences in tori shape, and position was found.

Conclusion: Torus palatinus and mandibularis had an impact on occlusal stress, occlusal force, parafunctional habits and temporomandibular joint disorders. It's of great importance to be detected and evaluated before any dental or surgical intervention

Introduction:

Torus palatinus and torus mandibularis are bony exostosis occur asymptomatically in maxilla and/or mandible, buccally, lingually or palatally. [1 & 2] The etiology was unknown, and many theories established the development of the tori, may be environmentalor genetic factors, and sometimes a multifactorial theory. [2& 3] Torus Palatinus (TP) was found in the midline of the hard palate or buccally in posterior maxilla and manifests as a round and symmetrical, sometimes multilobulated nodule can be detected. [4] Torus palatinus varies in size from small to a huge, and varies in location (may be located anterior or posterior), also variation in shape can be seen as nodular or lobular. [5]

Torus mandibularis (TM) is a bony growth or protuberance located on the lingual and/ or buccal to the cortical aspect of the bone and sometimes in the midline lingually.[6 &7]

Tori were frequently discovered by cone beam computed tomography (CBCT) scans, seen as a bone protuberance with a high density similar to that of adjacent compact bone. [8] Cone Beam CT is widely used for the diagnosis of specific conditions (tumors, pathological lesions) or assessment of anatomical structure in maxillofacial region [9], by different images in three plane in addition to 3D view compared to panoramic radiograph. [8]

The incidence of TP and TM is greatly various among races, some populations ranging from (0.4%-66.5%) for TP and (0.5%-63.4%) for TM. [10& 11]

Cone Beam Computed Tomography is preferred imaging modalities for maxillofacial evaluation, widely used nowadays because of high resolution, easy technique, 3D imaging, digital enhancement and calibrations, low dose of radiation and low cost compared to medical CT.[12, 13,14]

This study was aimed to determine the shape, site,location , size of the tori in relation to the gender& age among Iraqi sample by using CBCT.

Material and method

In this retrospective study, up to 2000 CBCT images of Iraqi subject collected from the archives of radiology clinic at College of Dentistry / Baghdad University and private dental center in Baghdad city from 2016 to 2023, the ethical approval had been obtained from the research ethics committee of College of Dentistry / Baghdad University (no. 814 at 18-5-2023). The evaluation of images was performed by a radiologist and cases were selected according to certain criteria.

The inclusion criteria for sample selection were:

1- Images with large FOV involving both jaws.
2- Images with good quality
3- Cases without pathological lesion that affect the examination of torus area.

Three radiologists performed the analysis of the images and the data were re-evaluated by each one after one week to prevent bios.

The sample divided into 3 groups according to the age:

(1) 20-29 years old.
(2) 30-39 years old.
(3) 40y. and above.

The equipment used in this research was Sordex, philiand and for the interpretation of the examinations3D On Demand software was used on a multiplanar reformatting screen.

All the CBCT images were obtained following a standardized protocol for patient positioning and exposure parameter setting(60KvP, 12Ma, 15sec.), and image acquisition at 200 micro voxel size. The examination of tori established in 4veiws (axial, sagittal, coronal and 3D), in which the TM and TP were clearly noticed. The findings will be classified according to tori shape (lobular or nodular), size (small less than 3mm, 3-6mm medium, more than 6 mm large), site (unilateral, bilateral or middle), and location or surface (buccle, lingual or palatal) were evaluated in both male and female.

Results

Statistical analysis was performed by using Microsoft excel version 2010 and GraphPad Instant program. A descriptive analysis was performed for tori incidence with age, and gender. Differences between groups were checked using chi- square test and fisher exact test. Two thousand CBCT images had been evaluated searching for the presence of TP and TM. The incidence of TP and TM is 1% (only 20 cases were found). The distribution of tori according to gender is shown in (table 1); it's equally distributed between male and female with non- significant difference tested by fisher exact test.

Discussion

The presence of tori or any bone exostosis must be evaluated clinically and radiographically [11], although modification of dental treatments may be needed sometime to overcome the dimensional changes in bone due to the presence of tori according to tori position and size. That leads to additional overload on the supporting strictures, and affect functions [14]. Study results showed low incidence of tori among Iraqi sample, this disagreed with most previous studies as in Asian population which showed more than 20% in their population[2,3,4,5,6,7,8,11, &16]

Gorsky et al. and Ghayda`a observed the tori are more prevalent in female than in male, while the prevelance is equal as shown in this study with non-significant distribution TP and TM [2,17] ,and others [18, &19] which showed the torus palatinus (TP) is more common in females , while torus mandibularis (TM) is more common in males. This study showed the distribution of tori according to age groups the majority of cases had been found in age group between (20-29 y.), while Ghayda'a Study showed the distribution of tori (TM, TP) and the differences with age that confirmed the hypothesis of dynamic phenomenon, responding during life to environmental, functional factors with the genetic factors [17]

Gorsky et al [2] observed non-significant differences between age groups, Al-Bayaty et al. [3] reported an average age at the onset of TP of 30.7 years.

The study shows a non- significant difference in the shape of tori between the TP and TM, although the most common shape reported was nodular shape for TM, this is in disagreement with Ghayda'a which showed lobular (TP) incidence is less than not lobulated, while Apinhasmit et al reported the lobular (TP) to be rarest type [18] which was disagreed with the current results that found cases as lobulated type. The nodular tori were found to be more than lobulated tori and this is confirmed with Neville et al, and Haugen. [7 &21]

The most common site for TP was middle ,and unilateral for TM are observed in this study, Gorsky et al study showed the most common location was near the molar area[2], Pechenkina et al. [22]

This unique study that observed an obvious difference in size of tori between male and female, there was a significant difference between them and larger size was reported in male patients, Gorsky et al study showed The prevalence large tori (more than 2.0 cm) was greater among older patients.[2]

These bony exostosis can found anywhere, maxilla or mandible, anterior or posterior, male or female, at any size and may increase in size with age or environmental factors, each researcher has his own research in such subject, the results are varies from study to other depending on sample size, area under examination, and race.

Conclusions:

Radiographical assessment of the incidence,location and size of torus palatinus and torus mandibularis is important to differentiate between the bony exostosis (which don't need treatment) and pathological condition (which need treatments) with no effect of gender on their distribution. There are great differences in their location, size and shape among different races, depending on environmental factors and genetic factors. CBCT is a useful imaging modality in establishing diagnostic information about tori.

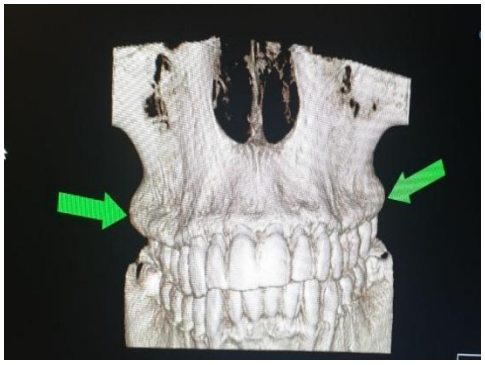

Figure 1: Maxillary bilateral buccal tori in 3D view.

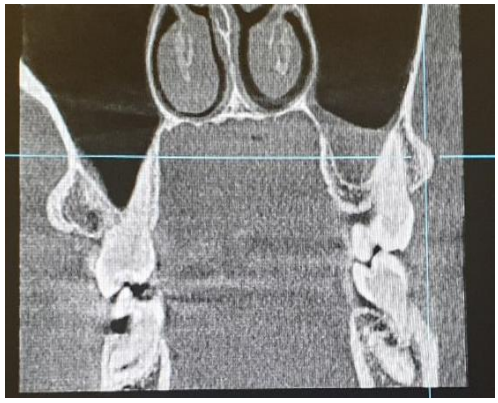

Figure2: Appearance of maxillary bilateral buccal tori in coronal view

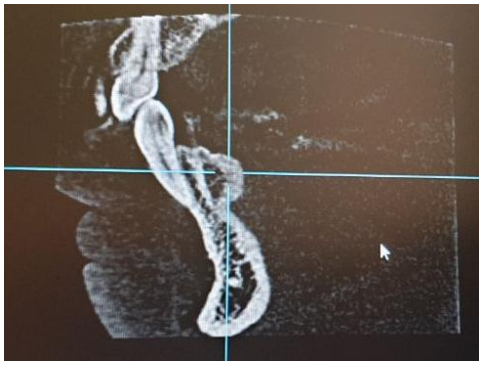

Figure 3: Mandibular middle lingual positioned torus

Table 1: Distribution of TP and TM according to gender

	MALE		FEMALE		TOTAL		p- value
	N	%	N	%	N	%	1.00
TP	4	20	6	30	10	50	NS
TM	3	15	7	35	10	50	
Total	7	35	13	65	20	100	

*NS non- significant (Fisher exact test)

The distribution of tori according to age groups is shown in (table 2); demonstrating that the majority of cases had been found in age group between (20-29 y.) counting 60 % of the cases but with non- significant difference.

Table 2: Distribution of TP and TM according to age

	TP		TM		TOTAL		p- value
	N	%	N	%	N	%	0.6
20-29	7	35	5	25	12	60	NS
30-39	1	5	2	10	3	15	
40- above	2	10	3	15	5	25	
Total	10	50	10	50	20	100	

*NS non- significant (Chi- square test)

Table 3 shows a non- significant difference in the shape of tori between the TP and TM, although the most common shape reported was nodular shape for TM.

Table 3: Distribution of TP and TM according to shape

	TP		TM		TOTAL		p- value
	N	%	N	%	N	%	1
Lobular	5	25	4	20	9	45	NS
Nodular	5	25	6	30	11	55	
Total	10	50	10	50	20	100	

*NS non- significant (Fisher exact test)

By comparing the site of occurrence for TP and TM whether it's unilateral, bilateral or middle; the most common site for TP was middle (4 cases from 10), and unilateral for TM (8 cases from 10) but with no significant difference shown by chi- square test (P- value= 0.103). As shown in table 4

Table 4: Distribution of TP and TM according to site

	TP		TM		TOTAL		p- value
	N	%	N	%	N	%	0.103
Unilateral	4	20	8	40	12	60	NS
Bilateral	3	15	2	10	5	25	
Middle	3	15	0	0	3	15	
Total	10	50	10	50	20	100	

*NS non- significant (chi- square test)

Table 5 revealed an obvious difference in size of tori between male and female, there was a significant difference between them and larger size was reported in male patients (p- value = 0.005)

Table 5: Distribution of tori in male and female in relation to size

	Male		female		TOTAL		p- value
	N	%	N	%	N	%	0.005
Small	1	5	7	35	8	40	S
Medium	2	10	6	30	8	40	
Large	4	20	0	0	4	20	
Total	7	35	13	65	20	100	

*S significant ((chi- square test)

Table 6 recorded a non- significant difference in diagnosis of tori between male and female whether it was diagnosed during routine radiographic examination or due to swelling as a chief complain.

Table 6: Distribution of tori in male and female in relation to diagnostic method

	Male		female		TOTAL		p- value
	N	%	N	%	N	%	0. 5
Routine	7	35	10	50	17	85	NS
Swelling	0	0	3	15	3	15	
Total	7	35	13	65	20	100	

*NS non- significant (Fisher exact-test)

There were some cases of tori positioned buccally represented as bone exostosis counting 15% for upper arch and 5% for lower arch with non-significant difference shown by fisher exact test(as shown in table 7).

Table 7: Distribution of tori according to surfaces in arches

	TP		TM		TOTAL		p- value
	N	%	N	%	N	%	0.25
Buccal	3	15	1	5	4	20	NS
Lingual or palatal	7	35	9	45	16	80	
Total	10	50	10	50	20	100	

*NS non- significant (fisher exact test)

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