

## A Multi-Ethnic Study to Determine the Prevalence of Bony Exostoses Among Residents in Abuja, North Central Nigeria

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### Abstract

Bony exostoses are non-pathological, asymptomatic bony outgrowths in various parts of the upper and lower jaw within the oral cavity. They are differentiated mainly into two groups: torus mandibularis when found on the mandible and torus palatinus when found on the palate; however significant as they can interfere with the retention of dental prostheses, lead to obstructive sleep apnea, limit tongue movements or be used as a source of autogenous bone graft in Implant Dentistry.

This is a descriptive, cross-sectional epidemiological study carried out among 938 subjects in a multi-ethnic setting, within 12 - 90 years of age,  $37.58 \pm 13.3$  (Mean  $\pm$  SD), aimed to determine the prevalence of these bony outgrowth. Ethical clearance was obtained from the medical ethics and research committee of the federal capital territory, data collection tool was a pre-tested self-administered questionnaires and analysis was done with Statistical package for social science (SPSS) version 22. Frequency distribution tables were obtained, and chi-square test and students' t-test were used to compare differences between the various groups present. Statistical significance was set at  $p < 0.05$ .

A prevalence rate of 15.9% for torus palatinus and 19.3% for torus mandibularis was recorded in this study with torus palatinus being more present in females 20.5% than male 9.6% and this was statistically significant. Also, of statistically significant was torus palatinus for age-group 20 - 29 years of age and torus mandibularis in equally proportion for age- group 30-39 years of age at 22.8% and 40 - 49 years of age at 22.8%. There were no statistically significant relations recorded for torus palatinus or torus mandibularis with the ethnic origin of subjects present in this study.

There are reported studies in Nigeria where statistically significant relationship was established between ethnicity and bony exostosis; however, no such relationship was reported in our multi-ethnic study.

**Keywords:** Torus Palatinus; Torus Mandibularis; North-Central Nigeria

### Introduction

Tori and exostoses can be described as non-pathological, asymptomatic bony outgrowths usually seen in various parts of the upper and lower jaw within the oral cavity. They are also known as oral bony hamartomas, hyperostosis or oral bony outgrowths

(OBOs) [1]. Classification is based on their anatomic location, thus when found in the palate it is known as Torus Palatinus (TP) and when found in the mandible, it is called Torus Mandibularis (TM) [2]. Torus Palatinus are located along the midline of the hard palate and are further divided into flat, spindle and nodular types based

on their shapes [2] while Torus Mandibularis, are usually located in the lower jaw tending to occur bilaterally in the lingual aspect of the mandible above the mylohyoid line, distal to the second mandibular incisors and mesial to the second premolars [3]. Nevertheless, bony exostoses also appear on the labial and vestibular surfaces of jaws (Maxillary or Mandibular exostoses) or on the palatal surface of the maxilla in the molar region unilaterally or bilaterally (Palatal exostoses) [2].

The exact aetiology of these bony masses is unknown and still remains highly controversial [4], however some previous studies have tried to attribute their presence to genetic factors [4,5], functions [6,7] and associated environmental factors [8,9] with none of these statements accepted largely till date [4-9]. Definitive diagnosing of these bony outgrowths involves a combination of both clinical and radiographic examination [10]. These outgrowths typically do not appear in individuals below ten years of age and are associated with slow growth with the outgrowths developing fully in adulthood [11]. Tori and exostoses appear to have the same histologically appearance with normal compact bone which is composed of slightly spongy structure with marrow spaces [1]. The need to determine the histological appearance is typically to differentiate tori from other significant bony lesions such as Osteomas, chondroma, osteoblastoma or osteosarcoma [12].

These clinically asymptomatic bony outgrowths do not usually require any treatment and their presence may be associated with occasional benefits as they serve as a source of autogeneous bone for bone grafting in Implant Dentistry or Periodontal surgery [13]. Some of the situations which warrant their removal include interference with fitting of dental prostheses, limited tongue movements and obstructive sleep apnea [14-15].

The prevalence of Tori in different ethnic groups ranges from 0 - 66% for palatine tori and 0 - 85.7% for mandibular tori with individuals of Asian descent having a higher prevalence rate than both Caucasians and Negros [16,17]. Maduakor, *et al.* in a study conducted in South-Eastern Nigeria, reported an overall prevalence rate of 9.7% with rates of 8.0% and 4.2% for TM and TP respectively [18]. In Southwestern Nigeria, prevalence rates reported by several authors are within the range of 3.7% - 13.6% [19-21].

The primary aim of this study is to add more evidence to the literatures on the prevalence rate of these oral bony outgrowths in Sub-Saharan Africa with focus on a multi-ethnic setting in Abuja,

North Central Nigeria especially since previous studies to the best of our knowledge had concentrated more attention on a single ethnic group in South-Western and South-Eastern regions of Nigeria.

## Methodology

This is a descriptive, cross-sectional study involving 938 subjects attending the Dental and Maxillofacial facility of the State House Clinic, Abuja as well as four randomly selected private dental clinics within a 1 year period. Subjects included in this study were 12 years old and above who gave consent themselves as adults and parents granted consent for those below 16years of age. Ethical approval was obtained and convenience, non-probability sampling method was used to select these subjects. Those subjects who did not wish to participate in this study after the purpose was explained to them were excluded and their exclusion had no negative consequence on their treatment in these facilities. Data was collected with the aid of self-administered questionnaires which was divided into two sections:

- **Section A:** Socio-demographic Information of subjects: Clinician noted the age, sex, ethnic background of patients in a Case file. Then he took accurate history of the time of occurrence of tori and noted if there was any associated pain, bleeding, interference with mastication and if any patient had dentures. Also noted was if there had been any decision to remove tori or any psychological challenges occurring as a result of the presence of tori in the patient.
- **Section B:** Clinical examination of any bony oral outgrowths: Using a dental mouth mirror, each patient was examined by the clinician who had surgical gloves and face mask. Patient was seated in an upright position on the dental chair under the light of the dental chair; site and number of bony oral outgrowth was noted and recorded on a chart.

Data collected were analyzed using Statistical Package for the Social Sciences version 22 (SPSS Inc, USA). Frequency distribution tables were obtained, and chi-square test, students' t-test and ANOVA test were used to compare differences between the groups present. Statistical significance was set at  $p < 0.05$ .

## Results

$\beta$  the age-group 30 - 39years of age where highest in this study and the female population in this group were also the highest in the study. This could be as a result of female being more conscious of their dental condition which results to increases in dental attendance to the dental clinics. Please note that the numbers in parenthesis represent the standard deviation as calculated. While the

total number of subjects was nine hundred and twenty-eight (928), and South-south Nigeria and finally the third group Northern Nigeria. this was divided into subjects from Southwest Nigeria, South-east

Variable	Male (n=397)	Female (n=541)	Total
Age group (Years)			
<20	22(5.5)	34(6.3)	56(6.0)
20-29	44(11.1)	155(28.7)	199(21.2)
30-39 <sup>β</sup>	147(37.0)	160(29.6)	307(32.7)
40-49	97(24.4)	92(17.0)	189(20.1)
50-59	75(18.9)	51(9.4)	126(13.4)
60-69	7(1.8)	40(7.4)	47(5.0)
≥90	5(1.3)	9(1.7)	14(1.5)
Mean±SD	38.96±11.8	36.56±14.2	37.58±13.3
Ancestral origin		(928)	19.1%
Southwest		179	44.1%
South east/south		414	36.8%
North		345	

**Table 1:** Age and gender distribution of subjects with Ancestral origin.

β the age-group 30-39years of age where highest in this study and the female population in this group were also the highest in the study. This could be as a result of female being more conscious of their dental condition which results to increases in dental attendance to the dental clinics. Please note that the numbers in parenthesis represent the standard deviation as calculated. While the total number of subjects was nine hundred and twenty-eight (928), this was divided into subjects from Southwest Nigeria, South-east and South-south Nigeria and finally the third group Northern Nigeria.

	Palatal torus		Total	p-value
	Yes	No		
Gender				<0.001*
Male	38(9.6)	359(90.4)	397(100.0)	
Female <sup>§</sup>	111(20.5)	430(79.5)	541(100.0)	
Age group (Years)				<0.001*
<20	0(0.0)	56(100.0)	56(100.0)	
20-29 <sup>¶</sup>	61(30.7)	138(69.3)	199(100.0)	
30-39	58(18.9)	249(81.1)	37(100.0)	
40-49	18(9.5)	171(90.5)	189(100.0)	
50-59	6(4.8)	120(95.2)	126(100.0)	
60-69	6(12.8)	41(87.2)	47(100.0)	
≥90	0(0.0)	14(100.0)	14(100.0)	
Ancestral origin				0.492
Southwest	24(13.4)	155(86.6)	179(100.0)	
South east/south	65(15.7)	349(84.3)	414(100.0)	
North	60(17.4)	285(82.6)	345(100.0)	

**Table 2:** Association between Torus Palatinus and socio-demographic characteristics.

§The association of Palatal Torus with socio-demographic characteristics was statistically significant with females having more than males.

¶ Also of statistically significant was the relationship of Palatal torus with the age group 20-29years of age.

There was no notable significance in the relationship of Palatal torus with ancestral origin.

	Exostosis		Total	p-value
	Yes	No		
Gender				
Male	67(16.9)	330(83.1)	397(100.0)	0.108
Female	114(21.1)	427(78.9)	541(100.0)	
Age group (Years)				
<20	0(0.0)	56(100.0)	56(100.0)	0.002*
20-29	41(20.6)	158(79.4)	199(100.0)	
30-39†	7(22.8)	237(77.2)	37(100.0)	
40-49	43(22.8)	146(77.2)	189(100.0)	
50-59	19(15.1)	107(84.9)	126(100.0)	
60-69	5(10.6)	42(89.4)	47(100.0)	
≥90	3(21.4)	11(78.9)	14(100.0)	
Ancestral origin				
Southwest	35(19.6)	144(80.4)	179(100.0)	0.223
South east/south	89(21.5)	325(78.5)	414(100.0)	
North	57(16.5)	288(83.5)	345(100.0)	

**Table 3:** Association between Torus Mandibularis and socio-demographic characteristics.

† The association of Mandibular Torus and socio-demographic characteristics had no significance with gender but this was statistically significant with the age group 30-39years of age. There was also no notable significance with ancestral origin.

### Discussion

This study was to determine the prevalence of bony exostosis in 928 multi-ethnic subjects residing in Abuja, north central Nigeria. Although, previous studies have suggested tori to have been more commonly seen in the mongoloids than in the Caucasians [19,22] this present study reported a high prevalence of 15.9% for Torus Palatinus (TP) and 19.3% for Torus Mandibularis (TM) which is at variance from previous Nigerian study by Adeyemo, *et al.* [20] who reported a low prevalence of 8.8% for TM, 7.2% for TP in the south-western Nigeria and Agbaje, *et al.* [21] who also reported a lower prevalence of 1.8% for TP and 2.5% for TM in another city in south-western Nigeria. However, a study conducted in South-eastern Nigeria, reported a prevalence rates of 8.0% for TM and 4.2% for TP [18]. A low prevalence of 4.1% was reported in a different study conducted in Turkey and this study suggested that the diets with the ethnic groups of subjects were possible reasons for low prevalence of tori [17]. On the other hand, high prevalence of 21.0% was reported for an Israelis population [23], 20.9% in a United States' population [24] and 32.7% in a study done in Norway [25], and

**Figure 1:** Prevalence of Palatal torus and Mandibular torus (exostosis).

The prevalence of Palatal torus and Mandibular torus in our present study were 15.9% and 19.3% respectively.

these were attributed to environmental, genetic and other practical factors such as masticatory forces as possible reasons for the high presence of tori.

Furthermore, results from this present study indicated that TP were more common in females 20.5% than male 9.6% and this was statistically significant. While the report from the study done in Lagos [20], Nigeria stated that there was no difference of tori in male and female, results from Ibadan [21], south-west Nigeria showed a pattern of higher TM more common in females, though not at significant level. Our result here is consistent with the Turkish study [17] where TP prevalence was statistically significantly higher in females (5.7%) than in males (1.8%) and these two results are in consonance with other studies [9,17,23,25-27]. While there is no clear reason for the higher TM in females than males, Hamasha, *et al.* reported that females brush their teeth more than males, smoke less and have a higher dental attendance than male [28], hence their higher population in this study might be a factor.

Also, of statistical significance was that TP was more common in the second decade of life while TM was more common at equal proportion at the third and fourth decades of life. This agrees with the report of Adeyemo, *et al.* [20], who reported that tori were more at the third and fourth decade of life, although, this is at variance with Agbaje, *et al.* [21] who reported a peak at the fifth decade of life. Yildiz, *et al.* [17], gave a closely similar report of the occurrence of tori at peak level at the sixth decade of life.

Ethnicity may have a role to play in the development of tori, this was not clearly established in this study since the dominant ethnic group which is from the north had the largest number of TP at 17.4% and a combination of south-east/south-south had 21.5% TM. Also, the study by Adeyemo, *et al.* [20] and Agbaje, *et al.* [21] were both conducted in south-western Nigeria and both gave different prevalence that were not closely related. Nevertheless, nutritional factors such as the peculiar diet of an ethnic group [17,25] and genetic factors [17,23] may have a role to play in the formation of tori. It is our opinion that further studies with a larger population could clarify the relationship of tori with ethnicity, diet and hereditary.

## Conclusion

Bony exostosis which is divided into TP and TM has been found to be present in a multi-ethnic population in Abuja, north central Nigeria. The prevalence of tori has been reported to be different

among similar ethnic groups living in different geographical areas or different ethnic groups living in the same areas. The inconsistent results of various authors in Nigeria could be due to researching in different geographical locations, using different sample sizes or working with different parameters. Further studies to establish the relationship of sex, diet, genetics and ethnicity to tori is encouraged.

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