



Original Article

Prevalence of oral tori and exostosis in Malaysian population – A cross-sectional study



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ABSTRACT

Introduction: Oral tori and exostosis are non-pathological bony protuberances seen on the alveolar surfaces of the jaw bones. These are commonly seen on the palatal surfaces of the maxilla [torus palatinus (TP)] and around the premolars in the lingual surface of the mandible [torus mandibularis (TM)]. The aim of this cross-sectional study was to determine the prevalence of tori/exostosis in the Malaysian population.

Methodology: A total of 2666 patients were examined for the presence of tori and exostosis in the maxilla and mandible and were categorized into TP, TM, and exostosis (facial/labial). Collected data was analysed for obtaining descriptive statistics.

Results: 882 subjects were noticed with oral tori/exostosis among the population studied with a prevalence rate of 33%. TP was seen more in females (35%), compared to males (20%), and this difference was statistically significant (p value < 0.001). Highest prevalence of TP was seen in Malays (43%), followed by Chinese (31%) and Indians (21%), which was statistically significant (p value < 0.00).

Discussion: High prevalence of tori and exostosis was seen in the population studied. Though harmless, in certain circumstances, their presence necessitates changes in the denture design during fabrication of prosthesis, which the dentist should be mindful.

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1. Introduction

Tori and exostosis are non-pathological bony protuberances with unknown etiology seen on the alveolar surfaces of the maxilla and mandible.¹ These are commonly seen on the palatal surfaces of the maxilla [torus palatinus (TP)] and around the premolars in the lingual surface of the mandible [torus mandibularis (TM)].¹ Prevalence of TP and TM varies from 8 to 51% and 6% to 32% respectively in different populations across the globe.^{2–5} The aim of this study was to determine the prevalence of tori and exostosis in the Malaysian population.

2. Material and methods

This cross-sectional study was carried out at SEGi Oral Health Center, Selangor, Malaysia between July 2014–June 2016. Ethical approval for the study was obtained from University Ethics

Committee, SEGi University. Sample size was calculated wherein minimum of 1498 subjects were required to get estimate of prevalence of tori and exostosis by 10% with relative precision of 20% at 1% risk. In the present study, we selected 2666 patients to increase efficiency of study results. Patient's visiting SEGi Oral Health Center were examined for the presence of tori and exostosis in the maxilla and mandible by clinical inspection and palpation. Age, gender, and ethnicity was recorded for each of the patients.

2.1. Statistical analysis

collected data was summarized using descriptive statistics including frequency, percentage and range. Pearson's Chi-square test was applied to check association between presence of exostosis, TM and TP with background variables like gender, age and ethnicity. Data analysis was done using statistical software Stata/IC-13. Significance level was kept at 5% in this study.

3. Results

882 tori were noticed among 2666 patients screened from the year July 2014–June 2016. Overall prevalence of tori and exostosis

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Table 1
showing the distribution of tori and exostosis according to age groups.

Age Group	Exostosis	Torus Mandibularis	Torus Palatinus	Exostosis & TM	Exostosis & TP	TM & TP	Exostosis, TM & TP	Total
11–20	6(4.2)	10(7)	102(71.8)	2(1.4)	2(1.4)	20(14.1)	0(0)	142(100)
21–30	16(4.3)	48(12.9)	225(60.5)	1(0.3)	15(4)	61(16.4)	6(1.6)	372(100)
31–40	4(4.1)	13(13.3)	60(61.2)	1(1)	1(1)	15(15.3)	4(4.1)	98(100)
41–50	1(0.9)	9(8.2)	79(71.8)	1(0.9)	6(5.5)	11(10)	3(2.7)	110(100)
51–60	6(6.7)	8(8.9)	59(65.6)	0(0)	6(6.7)	9(10)	2(2.2)	90(100)
61–70	4(7.5)	2(3.8)	40(75.5)	1(1.9)	1(1.9)	5(9.4)	0(0)	53(100)
71–80	2(15.4)	1(7.7)	7(53.8)	0(0)	1(7.7)	2(15.4)	0(0)	13(100)
81–90	0(0)	2(50)	2(50)	0(0)	0(0)	0(0)	0(0)	4(100)
Total	39(4.4)	93(10.5)	574(65.1)	6(0.7)	32(3.6)	123(13.9)	15(1.7)	882(100)

Table 2
showing the distribution of tori and exostosis according to gender.

Gender	Exostosis	Torus Mandibularis	Torus Palatinus	Exostosis & TM	Exostosis & TP	TP & TM	Exostosis, TM & TP	Total
Female	18(3.3)	39(7.1)	397(72.6)	1(0.2)	16(2.9)	67(12.2)	9(1.6)	547(100)
Male	21(6.3)	54(16.1)	177(52.8)	5(1.5)	16(4.8)	56(16.7)	6(1.8)	335(100)
Total	39(4.4)	93(10.5)	574(65.1)	6(0.7)	32(3.6)	123(13.9)	15(1.7)	882(100)

in the Malaysian population was 33%. In the age group of 11–20, 21–30, 31–40, 41–50, 51–60, 61–70, 71–80 and 81–90 the prevalence of tori and exostosis was 29%, 32.5%, 36.7%, 37%, 32.2%, 39.5%, 29.5% and 44% respectively [Table 1 summarizes the distribution of tori and exostosis according to age groups].

Different types of tori and exostosis: Among 882 tori and exostosis, 574(65%) were TP, 123(14%) were TM & TP, 93(10.5%) were TM, 39(4.4%) were exostosis, 32(3.6%) were exostosis & TP, 15(1.7%) were exostosis, and 6(0.8%) were exostosis, TM and TP.

Gender: Out of 2666 patients, 53% (n = 1419) were females and 47% (n = 1247) were males. Out of 882 tori and exostosis, 62% (n = 547) were seen in females and 38% (n = 335) males [Table 2 summarizes the distribution of tori and exostosis according to gender]. Among the 2666 subjects examined, TP was seen more in females (35%), compared to males (20%), and this difference was statistically significant (p value < 0.001) [Table 3 showing association between tori/exostosis with gender].

Ethnic groups: In this study, 2666 subjects were examined. Among these, 1522 were Chinese, 238 were Indians and 432 were Malays. Subjects from other nationalities comprised of 471 subjects. Out of 2666 subjects studied, highest prevalence of TP was seen in Malays (43%), followed by Chinese (31%) and Indians (21%). This difference in the prevalence rates of TP among the ethnicities was statistically significant (p value < 0.00). Highest prevalence of TM was seen in Malays (10.6%), followed by Chinese (10.2%) and Indians (8.8%). This difference in the prevalence rates of TM among the ethnicities was statistically significant (p value < 0.00). With regard to exostosis, highest prevalence was seen in Chinese (5%), followed by Indians (2.5%), and Malays (2.1%). This difference in the prevalence rates of exostosis between ethnicities was also statistically significant (p value 0.00). [Table 4 showing association between tori/exostosis with ethnicity among the total subjects examined.]

Table 3
showing association between tori/exostosis with gender.

Gender	Exostosis	Torus Mandibularis	Torus Palatinus
Female (n = 1419)	44(3.1%)	116(8.2%)	489(34.5%)
Male (n = 1247)	48(3.8%)	121(9.7%)	255(20.4%)
Total (n = 2666)	92(3.5%)	237(8.9%)	744(27.9%)
p-value	0.291	0.166	<0.001

Pearson's Chi-square test p value 0.05

Out of the 882 tori and exostosis, majority (n = 572; 65%) were seen in Chinese ethnics, followed by Malays (n = 200; 23%) and Indians (n = 62; 7%). 47(5.3%) tori were seen in others. Among the Chinese population, TP was seen in 63% (n = 360), TM was seen in 11% (n = 61) and both TM & TP were observed in 13.5% (n = 77). Among Malays, TP was seen in 73.5% (n = 147), TM was seen in 6.5% (n = 13) and both TM and TP were observed in 15.5% (n = 31). In Indians, TP was found in 58% (n = 36), TM was seen in 14.5% (n = 9) and both TM and TP were observed in 17.7% (n = 11) (Table 5 summarizes the distribution of tori and exostosis according to ethnicity).

4. Discussion

Prevalence rates of tori has been studied earlier in different populations. Hiremath et al. reported prevalence rates of TP and TM to be 38–63% and 1–10% respectively in 65 Malays.² They also reported that TP was more common in females, whereas TM showed equal gender distribution. In our study, we found prevalence of TP was 73.5% and TM was 6.5% in the Malay ethnic group. TP was also more commonly observed in females. Sathya et al. reported prevalence rates for TP and TM to be 12% and 2.8% respectively in the Malaysian population.³ Highest frequency of TP (17.9%) and TM (4.6%) was seen in Chinese population.³ In our study, prevalence rates of TP and TM was found to be 65% and 10.5% respectively, which is far higher than reported by Sathya et al.³ Our study reported Chinese population to have highest number of tori, similar to the results of Sathya et al. study. Female predilection was observed in both TP and TM by Sathya et al.³ whereas our study reported female predilection only in relation to the prevalence of TP.

Table 4
showing association between tori/exostosis with ethnicity among the total subjects examined.

Ethnicity	Exostosis	Torus Mandibularis	Torus Palatinus
Chinese (n = 1522)	74(4.9%)	156(10.2%)	474(31.1%)
Indian (n = 238)	6(2.5%)	21(8.8%)	50(21.0%)
Malay (n = 432)	9(2.1%)	46(10.6%)	184(42.6%)
Others (n = 471)	3(0.6%)	13(2.8%)	36(7.6%)
Total (n = 2666)	92(3.5%)	237(8.9%)	744(27.9%)
p-value	0.004	0.001	<0.001

Pearson's Chi-square test p value 0.05

Table 5
showing the distribution of tori and exostosis according to ethnicity.

Ethnicity	Exostosis	TM	TP	Exostosis & TM	Exostosis & TP	TM & TP	Exostosis, TM & TP	Total
Chinese	31(5.4)	61(10.7)	360(62.9)	6(1)	25(4.4)	77(13.5)	12(2.1)	572(100)
Indian	3(4.8)	9(14.5)	36(58.1)	0(0)	2(3.2)	11(17.7)	1(1.6)	62(100)
Malay	3(1.5)	13(6.5)	147(73.5)	0(0)	4(2)	31(15.5)	2(1)	200(100)
Maldives	0(0)	1(100)	0(0)	0(0)	0(0)	0(0)	0(0)	1(100)
Others	2(4.3)	9(19.1)	31(66)	0(0)	1(2.1)	4(8.5)	0(0)	47(100)
Total	39(4.4)	93(10.5)	574(65.1)	6(0.7)	32(3.6)	123(13.9)	15(1.7)	882(100)

Jainkittivong et al. reported prevalence rates of TP and TM to be 61% and 32% respectively among 1520 Thai dental patients.⁴ Al Zarea et al., studied 847 edentulous subjects in Saudi population aged between 51 and 79 years and reported 8% subjects had TP, whereas 10% had TM. In our study in the age group of 51–79 years, prevalence of TP was 23% and TM was 2.4%. We studied both the edentulous and dentulous patients, whereas Al Zarea et al. studied only edentulous subjects.⁵

Studies have been conducted to evaluate the influence of hyperparathyroidism on the formation of oral tori.^{6,7} Hsu et al. studied 134 peritoneal dialysis patients for the prevalence of oral tori.⁶ Hematological, biochemical, and dialysis-related data were also obtained. The prevalence of oral tori was 42.5% and most patients with oral tori were females (61.4%).⁶ However, no correlation was noticed between secondary hyperparathyroidism and formation of tori in peritoneal dialysis patients. Similar results were found in a study by Chao et al.⁷ Our study showed overall tori prevalence of 33% and were seen more in females (53%). Our study did not evaluate parameters related to hyperparathyroidism. Studies in this direction are suggested.

Sawair et al. reported the prevalence of oral tori and exostosis was 38.7% in Jordanian dental patients.⁸ They suggested presence of tori should be considered during planning of periodontal surgeries and prosthodontic treatment.^{8,9} Even, dentists in Malaysia should be mindful about the presence of tori during treatment planning due to their high prevalence rate (33%). With dental implant and ridge augmentation procedures being routinely carried out, tori can serve as source of autogenous bone grafts. Simunković et al., reported prevalence rate of TP and TM was 42.9% and 12.6% respectively among 1679 Croatian subjects.¹⁰ The results showed significantly higher prevalence of TP and TM in males.¹⁰ In our study, higher prevalence rates were seen in females. Sisman et al., reported low prevalence (4.1%) of TP among 2660 Turkish dental patients.¹¹ This is in contrast to the high prevalence rate of 65% seen in our study. Yoshinaka et al., evaluated the relationship of occlusal force and TM among elderly Japanese patients.¹² Occlusal force was measured using pressure-sensitive sheet. Among 197 subjects, prevalence rate of TM was 30%. Authors suggested a relationship between TM and occlusal force.¹² Relationship between TM and concentration of mechanical stress due to parafunctional activity was also suggested by Cortes et al.¹³

5. Conclusion

High prevalence of tori and exostosis was seen in the population studied. Though harmless, in certain circumstances, their presence necessitates changes in the denture design during fabrication of prosthesis, which the dentist should be mindful.

Conflict of interest

None.

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