

Morphology and Incidence of Torus Palatinus and Mandibularis in Brazilian Indians

JORGE MEMA BERNABA

Department of Morphological Sciences, School of Dentistry, Araçatuba, 16.100, State of São Paulo, Brazil

The incidence and morphology of torus palatinus and mandibularis was verified in 200 Indians, residents of two Brazilian Indian Reserves in São Paulo State, Brazil. A low incidence of both types of exostoses was observed, with torus palatinus occurring more frequently than mandibularis. These structures did not occur in individuals less than 10 years of age. Flattened torus palatinus predominated in relation to the other forms.

The importance of torus palatinus and mandibularis is unquestionable, whether from the restorative or the prosthetic point of view. Torus palatinus may be defined as an exostosis in the region of the median palatine suture and torus mandibularis defined as an exostosis on the lingual portion of the mandible above the mylohyoid line in the region of the premolars, either unilateral or bilateral.

Torus palatinus has long been known to anthropologists. It is more common in some groups (Peruvians, Ainus, and Eskimos) than in others and it has been found in a museum collection of the five Tasmanian and 16 Fuegian skulls. It has been observed in a less prominent form in Europe in 52% of the Italian population.¹

The occurrence of both conditions varies considerably in different races.²⁻⁵ It has not been observed in anthropoids.^{6,7} However, until now, it apparently has not been reported in old prehistoric human remains.¹¹ Although various authors have studied these exostoses,^{8,16} the purpose of the present report is to verify the morphology and incidence of the exostoses, torus palatinus and mandibularis, in Brazilian Indians.

Materials and Methods

In this study, the morphology and incidence of torus palatinus and mandibularis were

studied in 200 Indians (100 males and 100 females) who were residents of the reserves at Icatu and Arariba in São Paulo State, Brazil. The occurrence of the exostoses was determined by careful palpation.

Results

The frequency of occurrence of the two conditions is given in Table 1. Of 13 cases of torus palatinus in males, one of fused form was in the 11- to 20-year-old group and one in the 21- to 30-year-old group; others were of a flattened form. Nevertheless, one patient older than 51 years had a flattened torus palatinus and a simple bilateral torus mandibularis.

Among the seven females, five in the 21- to 50-year-old age bracket had flattened torus palatinus whereas two in the 11- to 20-year-old age group had the fused form. The only simple bilateral torus mandibularis found in this group was in the group between 41 and 50 years of age.

Discussion

The main point of this investigation is to show the general percentage of occurrence of torus palatinus and mandibularis. In addition, form, sex, and age variations have been ana-

TABLE 1
INCIDENCE OF TORUS PALATINUS OF BRAZILIAN INDIANS OF DIFFERENT AGES

(yrs)	No. of Patients		No. Affected	
	Male	Female	Male	Female
≤10	14	18	0	0
11-20	23	30	3	2
21-30	27	21	4	3
31-40	14	17	2	1
41-50	8	4	1	1
≥51	14	10	3	0
Total	100	100	13	7

Received for publication January 12, 1976.

Accepted for publication July 9, 1976.

TABLE 2
RELATIONSHIP BETWEEN SEX AND OCCURRENCE OF TORUS PALATINUS

Groups	Male (%)	Female (%)	Totals	Investigator
Peruvians	37.0	24.0	30.5	Hrdlička ³
American (USA)	16.3	32.3	24.2	Miller and Roth ⁴
Mongolians	44.0	50.0	47.0	Woo ⁷
Eskimos	62.6	69.9	66.0	Woo ⁷
American Indian (USA)	50.0	59.4	55.0	Woo ⁷
White American (USA)	42.4	47.2	45.0	Woo ⁷
Black American (USA)	36.0	40.6	37.0	Woo ⁷
Whites	28.0	47.0	37.5	King and Moore ¹⁷
Black American (USA)	12.9	26.3	19.5	Austin, Radford, and Banks ¹⁸
American (USA)	14.7	26.7	20.9	Kolas et al ¹⁹
American (USA)	...	...	24.0	Krahl ²¹
Southern Thailand	...	...	21.4	Harris ²²
White American (USA)	...	...	28.5	Summers ²³
Brazilians	...	...	20.0	Tamaki, Marzola, and Tamaki ²⁴
Yugoslavians	42.0	57.5	45.5	Vidić ²⁰
Brazilian Indian	13.0	7.0	10.0	Present study

lyzed. Tables 2, 3, and 4 compare the findings of this study with those of other investigators.

A low incidence of these exostoses (torus palatinus and mandibularis) was verified in comparison to observations encountered in the literature (Tables 2, 3, and 4). Regarding age, torus palatinus was not found in any individual of less than 10 years old, a finding that is compatible with other observations.^{3,8,17}

Torus palatinus was not found in the nodular and lobular forms, but the flattened form was predominant. This fact is in agreement with other authors.^{7,18,19}

Hrdlička³ claimed that the frequency of occurrence of torus palatinus is higher in male than in female skulls. This was also found in

this study; however, these findings vary from those of other authors.^{4,7,17-20}

The literature presents several opinions on the etiology of these exostoses. These opinions include masticatory hyperfunction or hyperfunctional stresses,^{2,3} nutritional disturbances,⁴ infections,⁶ evolution,⁷ heredity,^{9,21} and a continued growth process.¹⁴

However, findings of the present study indicate that the low incidence of these exostoses in Brazilian Indians is related to alimentary diet, geographical location, and genetic factors since this investigation found a familial concentration of the trait.^{12,16} Nevertheless, more accurate studies are necessary on the variation in the appearance of genes.

TABLE 3
RELATIONSHIP BETWEEN SEX AND OCCURRENCE OF TORUS MANDIBULARIS

Groups	Male (%)	Female (%)	Totals	Investigator
Aleuts	51.6	32.7	63.4	Hrdlička ³
Islandic	...	...	67.5	Hooton ²
Hottentot	...	...	10.0	Drennan ⁹
Bushmen	...	...	26.9	Drennan ⁹
Black American (USA)	5.3	10.9	8.2	Austin, Radford, and Banks ¹⁸
Ohio Whites and Blacks	3.0	...	7.7	Kolas et al ¹⁹
American (USA)	...	...	11.0	Krahl ²¹
White American (USA)	7.5	...	15.9	Summers ²³
Brazilians	...	...	12.0	Tamaki, Marzola, and Tomaki ²⁴
Aleuts	...	...	35.0	Moorrees, Osborne, and Wilde ²⁵
Eskimos	...	...	38.5	Mayhall and Mayhall ²⁸
Brazilian Indian	0.5	0.5	0.5	Present study

TABLE 4
OCCURRENCE OF BOTH TORUS PALATINUS AND MANDIBULARIS

Groups	% of Incidence	Investigator
Black American (USA)	4.2	Austin, Radford, and Banks ¹⁸
Ohio Whites and Blacks (USA)	3.0	Kolas et al ¹⁹
American (USA)	15.0	Krahl ²¹
White American (USA)	7.5	Summers ²³
Brazilians	3.0	Tamaki, Marzola, and Tamaki ²⁴
Brazilian Indian	1.0	Present study

Conclusions

In studies of 200 Brazilian Indians, a relatively low occurrence of torus palatinus and mandibularis was noted, the incidence of the former being greater than that of the latter. The flattened form was more general. Finally, these exostoses were not found in individuals less than 10 years old.

References

1. COCCHI, A.: Ricerche antropologiche sul torus palatinus, *Arch Anthropol Etnol* 22: 281-290, 1892.
2. HOOTON, E.A.: On Certain Eskimoid Characters in Icelandic Skulls, *Am J Phys Anthropol* 1:53-76, 1918.
3. HRDLIČKA, A.: Mandibular and Maxillary Hyperostoses, *Am J Phys Anthropol* 27:1-55, 1940.
4. MILLER, S.C., and ROTH, H.: Torus Palatinus: A Statistical Study, *JADA* 27:1950-1957, 1940.
5. MOORREES, C.F.A.: The Dentition as a Criterion of Race with Special Reference to the Aleut, *J Dent Res* 30:815-821, 1951.
6. GODLEE, R.J.: The Torus Palatinus, *Proc Roy Soc Med (London)* 2:175-196, 1909.
7. WOO, J.K.: Torus Palatinus, *Am J Phys Anthropol* 8:81-111, 1950.
8. DORRANCE, G.M.: Torus Palatinus, *Dent Cosmos* 71:275-285, 1929.
9. DRENNAN, M.R.: The Torus Mandibularis in the Bushman, *J Anat* 72:66-70, 1937.
10. MARTIN, R.: Nouvelle classification du torus palatinus, *Inform Dent* 16:23-29, 1973.
11. SERGI, S.; ASCENZI, A.; and BONUCCI, E.: Torus Palatinus in the Neanderthal Circeo I Skull: A Histologic, Microradiographic and Electron Microscopic Investigation, *Am J Phys* 36:189-198, 1972.
12. SUZUKI, M., and SAKAI, T.: A Familial Study of Torus Palatinus and Torus Mandibularis, *Am J Phys Anthropol* 18:263-272, 1960.
13. TAYLOR, R.M.S.: The Human Palate, *Acta Anat* 49: Suppl 43: 1962.
14. THOMA, K.H., and GOLDMAN, H.M.: *Oral Pathology*, St. Louis: C. V. Mosby Co., 1960.
15. VIDIĆ, B.: The Structure of the Palatum Osseum and Its Toral Overgrowths, *Acta Anat* 71:94-99, 1968.
16. BERNABA, J.M., and CASTRO, A.L.: Toro mandibular e sua relação à genética, *An Desarr* 18:113-116, 1974.
17. KING, D.R., and MOORE, G.E.: The Prevalence of Torus Palatinus, *J Oral Med* 26: 113-115, 1971.
18. AUSTIN, J.E.; RADFORD, G.H.; and BANKS, S.O., JR.: Palatal and Mandibular Tori in the Negro, *NY State Dent J* 31:187-191, 1965.
19. KOLAS, S.; HALPERIN, V.; JEFFERIS, K.; HUDDLESTON, S.; and ROBINSON, H.B.G.: The Occurrence of Torus Palatinus and Torus Mandibularis in 2,478 Dental Patients, *Oral Surg* 6:1134-1141, 1953.
20. VIDIĆ, B.: Incidence of Torus Palatinus in Yugoslav Skulls, *J Dent Res* 45:1511-1515, 1966.
21. KRAHL, V.E.: A Familial Study of the Palatine and Mandibular Tori, abstracted, *Anat Rec* 103:477, 1949.
22. HARRIS, R.: Torus Palatinus in a Group of Asiatic Children, *Oral Surg* 15:1244-1249, 1962.
23. SUMMERS, C.J.: Prevalence of Tori, *J Oral Surg* 26:718-720, 1968.
24. TAMAKI, S.T.; MARZOLA, C.; and TAMAKI, T.: Incidência de "Torus palatinus e mandibularis", *Arq Cent Est Fac Odont* 8:153-164, 1971.
25. MOORREES, C.F.A.; OSBORNE, R.H.; and WILDE, E.: Torus Mandibularis: Its Occurrence in Aleut Children and Its Genetic Determinants, *Am J Phys Anthropol* 10:319-329, 1952.
26. MAYHALL, J.T., and MAYHALL, M.F.: Torus Mandibularis in Two Northwest Territories Villages, *Am J Phys Anthropol* 34:143-148, 1971.