

Original Research

Assessment of role of palatal rugoscopy to establish sexual dimorphism as an adjunct in personal identification

¹Nidhi Ghori, ²Chitan Dobariya, ³Tarun Vyas, ⁴Shailaja Sankireddy

^{1,2}Post Graduate Student, ³Reader, ⁴Professor and HOD, Department of Oral Medicine and Radiology, College of Dental Science and Hospital, Amargadh, Gujarat, India

ABSTRACT:

Background: The use of science and technology to crime detection, investigation, and justice administration is the focus of the forensic discipline, which calls for the coordinated efforts of a multidisciplinary team. The present study was conducted to assess role of palatal rugoscopy to establish sexual dimorphism as an adjunct in personal identification. **Materials & Methods:** 120 subjects age ranged 21-35 years of both genders were divided into 3 groups of 40 each. Group I was age group 21-25 years, group II was 26-30 years and group III was 31-35 years. Maxillary impression was made for all the included subjects and casts were poured. The shape of rugae were classified as straight types, curved types, wavy rugae, circular rugae, nonspecific, converging, and diverging. The length was primary, secondary and fragmentary. **Results:** Out of 120 subjects, males were 60 with 1014 rugae and females were 60 with 1032 rugae. The shape in group I, group II and group III was straight in 28%, 29% and 30% respectively. Curved was seen in 55%, 52% and 56%, wavy in 7%, 12% and 10%, circular in 5%, 3% and 3%, nonspecific in 5%, 4% and 1%. Converging in 58%, 55%, and 52% respectively. Diverging in 42%, 45% and 48% in group I, II and III respectively. The difference was significant ($P < 0.05$). The mean length of primary rugae in group I was 8.5 mm, in group II was 8.2 mm and in group III was 8.4 mm. The mean length of secondary rugae was 1.6 mm, 1.3 mm and 1.2 mm. The mean length of fragmentary rugae was 0.24 mm, 0.21 mm and 0.26 mm in group I, II and III respectively. **Conclusion:** In forensic sciences, the rugae pattern could be an extra means of differentiation that helps focus the identification process and yield results when combined with other techniques like fingerprints and dental traits.

Keywords: Rugae, circular, primary

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Corresponding author: Nidhi Ghori, Post Graduate Student, Department of Oral Medicine and Radiology, College of Dental Science and Hospital, Amargadh, Gujarat, India

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INTRODUCTION

The use of science and technology to crime detection, investigation, and justice administration is the focus of the forensic discipline, which calls for the coordinated efforts of a multidisciplinary team. One of the trickiest parts of this approach is identifying humans.¹ There are three categories or phases to the identifying process. When the remains are mostly or entirely skeletonized, an anthropologist will typically provide a general identification. This kind provides a broad overview of the person, including information about their age, race, size, and sex at the time of death.² An unknown person's potential identity may be discovered by police detectives thanks to the information anthropologists supply. Researchers may be led to a presumptive or positive identification by

drawing comparisons between potential identities and the unidentified person. Additionally, facial reconstruction, personal possessions, tattoos, and circumstantial evidence may all be used to make an assumption about someone's identity.³ Although this kind of identification cannot be verified scientifically, it can be regarded as conclusive in cases when there is no suspicion of foul play and no other cause for concern. and the person identified by the antemortem dental records are the same person.⁴ Furthermore, in situations where there are no antemortem records or hints regarding the identity of the deceased, the forensic dentist creates a dental profile after the death that includes details about the deceased that may help focus the search for antemortem materials. This process is known as dental profiling.^{5,6}The present

study was conducted to assess role of palatal rugoscopy to establish sexual dimorphism as an adjunct in personal identification.

MATERIALS & METHODS

The present study consisted of 120 subjects age ranged 21-35 years of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Subjects were divided into 3 groups of 40 each. Group I was age

group 21-25 years, group II was 26-30 years and group III was 31-35 years. Maxillary impression was made for all the included subjects and casts were poured. The shape of rugae were classified as straight types, curved types, wavy rugae, circular rugae, nonspecific, converging, and diverging. The length was primary, secondary and fragmentary. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table: I Distribution of patients

Gender	Male	Female
Number	60	60
Total rugae	1014	1032

Table: I shows that out of 120 subjects, males were 60 with 1014 rugae and females were 60 with 1032 rugae.

Table: II Assessment of shape

Shape	Group I	Group II	Group III	P value
straight	28%	29%	30%	0.05
Curved	55%	52%	56%	
wavy	7%	12%	10%	
Circular	5%	3%	3%	
nonspecific	5%	4%	1%	
converging	58%	55%	52%	
diverging	42%	45%	48%	

Table I, graph I shows that shape in group I, group II and group III was straight in 28%, 29% and 30% respectively. Curved was seen in 55%, 52% and 56%, wavy in 7%, 12% and 10%, circular in 5%, 3% and 3%, nonspecific in 5%, 4% and 1%. Converging in 58%, 55%, and 52% respectively. Diverging in 42%, 45% and 48% in group I, II and III respectively. The difference was significant (P< 0.05).

Graph: I Assessment of shape

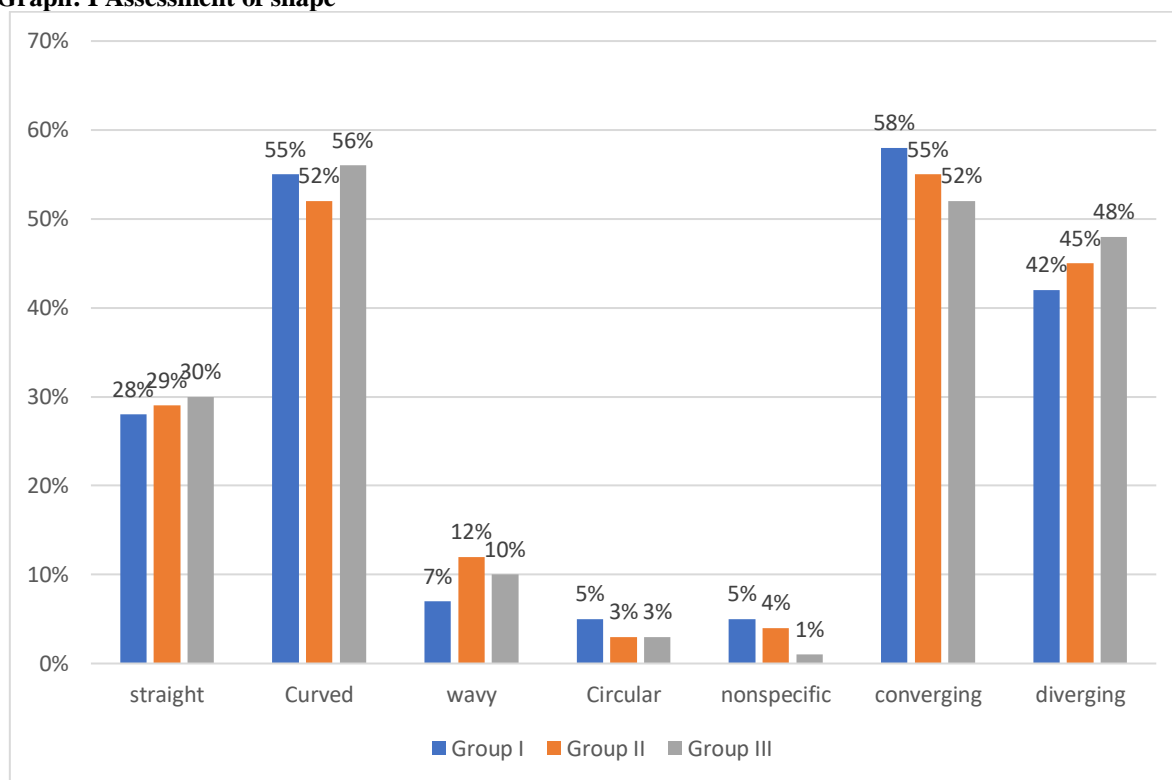
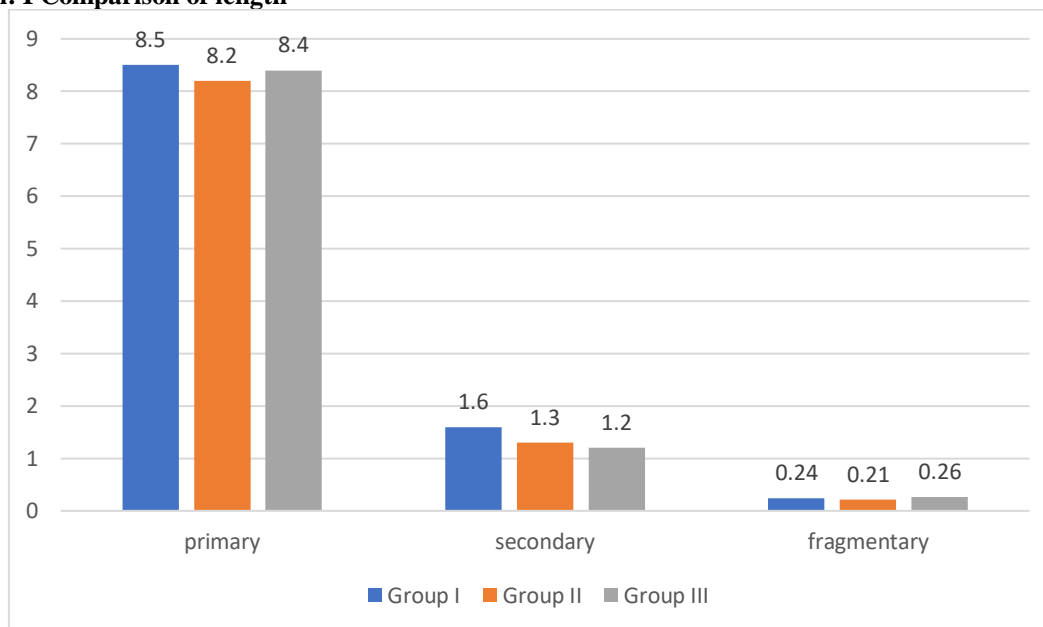


Table: II Comparison of length

Rugae	Group I	Group II	Group III	P value
primary	8.5	8.2	8.4	0.13
secondary	1.6	1.3	1.2	0.09
fragmentary	0.24	0.21	0.26	0.24

Table: II, graph II shows that the mean length of primary rugae in group I was 8.5 mm, in group II was 8.2 mm and in group III was 8.4 mm. The mean length of secondary rugae was 1.6 mm, 1.3 mm and 1.2 mm. The mean length of fragmentary rugae was 0.24 mm, 0.21 mm and 0.26 mm in group I, II and III respectively.

Graph: I Comparison of length

DISCUSSION

Corpus identification is in which a relative or close friend identifies the individual by viewing the body, is also accepted as positive identification.^{7,8} However, corpus identification is not beyond human error and is not possible when the body is in advanced stages of decomposition or severely damaged by trauma such as fire or mutilation.⁹ Positive identification is scientifically proven, usually through DNA matching, fingerprinting or dental comparison.^{10,11} The present study was conducted to assess role of palatal rugoscopy to establish sexual dimorphism as an adjunct in personal identification. We found that out of 120 subjects, males were 60 with 1014 rugae and females were 60 with 1032 rugae. Kumar et al¹² in their study two hundred subjects were divided into 4 groups, each of the four groups included 50 participants, consisting of 25 males and 25 females. Maxillary impression was made for all the included subjects and casts were poured and analysed. A total of 2104 palatal rugae were observed in 200 subjects. When types of rugae based on length were compared between males and females on each side of the palate, primary type, secondary type and fragmentary type were observed in a mean number of 4.19, 0.78 & 0.18 in males and 4.20, 0.81 and 0.16 in females respectively on the right side. Whereas on the left side, primary type, secondary type and fragmentary type were found in a mean number of

4.59, 0.83 & 0.09 in males and 4.40, 0.78 & 0.07 in females respectively. We found shape in group I, group II and group III was straight in 28%, 29% and 30% respectively. Curved was seen in 55%, 52% and 56%, wavy in 7%, 12% and 10%, circular in 5%, 3% and 3%, nonspecific in 5%, 4% and 1%. Converging in 58%, 55%, and 52% respectively. Diverging in 42%, 45% and 48% in group I, II and III respectively. Dwivedi et al¹³ analyzed the morphological study of palatal rugae pattern in a central Indian population. The study involved 250 males and 250 females. Males showed more number of rugae than females [P = 0.00 (≤ 0.001)]. Males had more number of wavy rugae pattern whereas females showed more number of straight rugae patterns [P = 0.00 (≤ 0.001)]. Males showed more backwardly directed rugae whereas females showed more forwardly directed rugae [P = 0.00 (≤ 0.001)]. The unification did not show any significant difference. We found the mean length of primary rugae in group I was 8.5 mm, in group II was 8.2 mm and in group III was 8.4 mm. The mean length of secondary rugae was 1.6 mm, 1.3 mm and 1.2 mm. The mean length of fragmentary rugae was 0.24 mm, 0.21 mm and 0.26 mm in group I, II and III respectively. Saini et al¹⁴ assessed the different patterns and number of rugae. The sample size of the study includes 120 students aged 18–24 years and was divided into two groups comprising sixty north Indian and sixty North-East

Indian students, respectively, based on population, with equal gender (thirty males and thirty females in each group) distribution. The results of the present study show that there was a significant difference present in the number of rugae in north and North-East Indian populations. The predominant shape observed was sinusoidal which was significantly higher in North-East Indian population comparative to North Indian population.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that in forensic sciences, the rugae pattern could be an extra means of differentiation that helps focus the identification process and yield results when combined with other techniques like fingerprints and dental traits.

REFERENCES

1. Byatnal A, Byatnal A, Kiran AR, Samata Y, Guruprasad Y, Telagi N. Palatoscopy: An adjunct to forensic odontology: A comparative study among five different populations of India. *J Nat Sci Biol Med.* 2014; 5(1):52-5.
2. Rath R, Reginald BA. Palatal rugae: An effective marker in population differentiation. *J Forensic Dent Sci.* 2014; 6(1):46-50.
3. Fahmi FM, Al-Shamrani SM, Talic YF. Rugae pattern in a Saudi population sample of males and Females. *Saudi Dent J.* 2001; 13:92-5.
4. Nayar A, Singh HP, Leekha S. Pulp tissue in sex determination: A fluorescent microscopic study. *J Forensic Dent Sci* 2014;6:77-80
5. Surekha R, Anila K, Reddy VS, Hunasgi S, Ravikumar S, Ramesh N. Assessment of palatal rugae patterns in Manipuri and Kerala population. *J Forensic Dent Sci.* 2012; 4(2):93-6.
6. Shetty DK, Machale PS, Savant SC, Taqi SA. Comparison of palatal rugae patterns in Kodava and Malayalee populations of South India. *J Forensic Dent Sci.* 2013; 5(2):85-9.
7. Bhagwath S, Chandra L. Rugae pattern in a sample of population of Meerut- An institutional study. *J Forensic Dent Sci.* 2014; 6:122-5.
8. Paliwal A, Wanjari S, Parwani R. Palatal rugoscopy: Establishing identity. *J Forensic Dent Sci.* 2010; 2(1):27-31.
9. Bharath ST, Kumar GR, Dhanapal R, Saraswathi TR. Sex determination by discriminant function analysis of palatal rugae from a population of coastal Andhra. *J Forensic Dent Sci.* 2011; 3(2):58-62.
10. Gondivkar SM, Patel S, Gadbail AR, Gaikwad RN, Chole R, Parikh RV. Morphological study of the palatal rugae in western Indian population. *J Forensic Leg Med.* 2011; 18:310- 2.
11. Rajguru JP, Somayaji NS, Babu NA, Masthan KMK, Khare P. Study of palatal rugae pattern (rugoscopy) in Chennai population. *Indian J Forensic Odontol.* 2012; 5(3):93-6.
12. Kumar T. Role of Palatal Rugoscopy to Establish Sexual Dimorphism as an Adjunct in Personal Identification: A Forensic Study. *J Forensic Dent Sci.* 2021; 13(2):84-96.
13. Dwivedi N, Nagarajappa AK. Morphological analysis of palatal rugae pattern in central Indian population. *Journal of International Society of Preventive and Community Dentistry.* 2016 Sep 1;6(5):417-22.
14. Saini A, Garg A. A demographic study of palatal rugae patterns among North and North East Indian populations. *International Journal of Forensic Odontology.* 2018 Jul 1; 1. 3(2):90.