Original Research

Rugae pattern: Effects on masculine and feminine Character

Rajat R. Khajuria[1]

[1]Registrar, Dept. of Prosthodontics and Dental Materials, Indira Gandhi Govt. Dental College, Jammu

ARTICLE INFO

ABSTRACT

Rugae are classified according to shape, size, number and length in three main types: Primary Rugae (5-10mm), Secondary Rugae (3-5 mm) and Fragmentary rugae (less than 3 mm). Shape is classified into Straight that runs from origin to termination, curvy that is crescent shape, circular that is continuous ring formation and wavy that is serpentile formation. The increased interest of dentists in palatal rugae is due to their capability to resist decomposition even under stress or thermal injury. The aim of the present study is to find out any effect of gender on pattern of rugae.

Materials & method

50 students of Jammu region, out of which 25 males and 25 females participated in the study. Alginate was mixed and maxillary impression of the subjects was taken. Impressions were poured in dental stone and Casts were checked for any air inclusions or any abnormalities. A graphite pencil was used to mark the rugae patterns precisely. A single observer was used to mark and record the shape and size of rugae to avoid any discrimination from observer's side. The number of rugae on either side of midline was counted and analyzed using Thomas and Klutz classification[4]. Recorded data was collected and analyzed using analysis of variance and student t test.

Result

Among all the subjects tested, group 1 (6.04 ± 0.745)mm recorded more rugae length as compared to group 2 (5.85 ±0.433)mm. Also, it was found that in group 1, 19 subjects (76%) had straight pattern, 4(16%) had curved pattern and 2 (8%) had crescent pattern. In group 2, 21 subjects (84%) had straight pattern and 4 subjects (16%) had curved pattern.

Conclusion

Within the limitations of the present study, Males have more prominent and large palatal rugae than females. Straight types of palatal rugae were found to be maximum followed by curved pattern in both males and females of Jammu population.

INTRODUCTION

According to glossary of prosthodontic terms[1], palatal rugae is defined as an anatomical fold or wrinkle usually made in the plural sense; the irregular fibrous connective tissue ridges located in the anterior third of the hard palate. New developments in medical field have led to development of new avenues and rugoscopy is no different from it. Palatal Rugoscopy was first proposed by Trobo Hermosa in 1932.[2]The analysis of palatal rugae was first proposed by Allen in 1889.[3]Rugoscopy is useful in mass disasters where conventional methods are not feasible. Thomas[4] et al classified rugae according to shape, size, number and length in three main types: Primary Rugae (5-10mm), Secondary Rugae (3-5 mm) and Fragmentary rugae (less than 3 mm). Shape is classified into Straight that runs from origin to termination, curvy that is crescent shape, circular that is continuous ring formation and wavy that is serpentile formation. The increased interest of dentists in palatal rugae is due to their capability to resist decomposition

** Corresponding author: **Dr. Rajat R. Khajuria**, REGISTRAR, DEPTT OF PROSTHODONTICS AND DENTAL MATERIALS, INDIRA GANDHI GOVT. DENTAL COLLEGE, JAMMU*

even under stress or thermal injury.[5] Studies[6-8] has shown unchanged behavior of palatal rugae even after death. The aim of the present study is to find out any effect of gender on pattern of rugae. Null hypothesis state no discrimination in rugae patterning in male and female population in Jammu city.

Materials & method

Subject Selection

50 students of Jammu region belonging to a high school, out of which 25 males and 25 females participated in the study. Inclusion criteria were followed and patient's verbal consent was taken for the study. (TABLE 1)

Impression making of the subjects.

The patients were made to rinse with chlorhexidine mouth wash (Hexidine) just prior to impression making in order to get cleared of any food debris or halitosis. Stainless steel perforated tray was selected and alginate (Tropicalgin) was mixed using a water powder ratio of 40 ml of water in 100 gms of powder. Alginate was loaded in the tray and maxillary impression of the subjects was taken. Impressions were poured in dental stone under vibrator and casts were recovered. Casts were checked for any air inclusions or any abnormalities.

Marking of Rugae

A graphite pencil was used to mark the rugae patterns precisely. A single observer was used to mark and record the shape and size of rugae to avoid any discrimination from observer's side. The number of rugae on either side of midline was counted and analyzed using Thomas and Klutz classification[4]. (Figure 1) Recorded data was collected and analyzed using analysis of variance and student t test. (Figure 2,3)

Result

Among all the subjects tested, group 1 (6.04 ± 0.745)mm recorded more rugae length as compared to group 2 (5.85 ±0.433)mm. Also, it was found that in group 1, 19 subjects (76%) had straight pattern, 4(16%) had curved pattern and 2 (8%) had crescent pattern. In group 2, 21 subjects (84%) had straight pattern and 4 subjects (16%) had curved pattern. (TABLE 2)

Table 1: Inclusion criteria.

| S NO.	Inclusion criteria
1	Absence of missing maxillary anterior teeth.
2	Absence of congenital defects.
3	Absence of macro or micro dontia
4	Absence of supernumery tooth.
5	Absence of spacing or midline diastema
6	Absence of maxillo facial defects.
7	Absence of crowding
8	Absence of medical history.
9	Absence of Orthodontic treatment.
10	Absence of Abrasion, Erosion and Attrition.

Table 2: Mean values recorded in Group 1 and Group 2

S NO.	Group number	No. of Subjects	Mean value	Standard deviation
1.	Group 1	25	6.04 ± 0.745	0.257
2.	Group 2	25	5.85 ±0.433	0.631

$P < 0.001$.

Table 3: Observations recorded in study.

SNO.	Shape of rugae	Group1	Percentage %	Group 2	Percentage %	Total
1.	Straight	19	76%	21	84%	40
2.	Curvy	4	16%	4	16%	8
3.	Circular	2	08%	0		02
4.	Any other	0		0		00
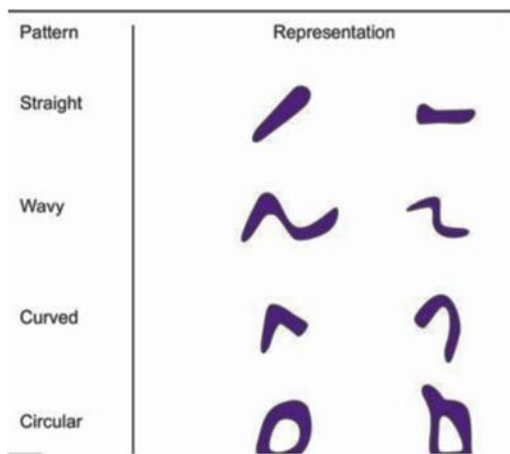
Fig 1: Different types of Rugae (Thomas and Krutz classification)

Discussion

New Human identification methods are blooming in the market and identification with the help of palatal rugae are no different. The increased interest in ruage is their resistance to decomposition even under immense thermal or physical shocks. Also, the force applied in rugae area is perpendicular to the occlusal forces making it a secondary stress bearing area in complete dentures.[9]

Palatal rugae are basically mucosal folds that have been documented to resist decomposition even after death for 2-3 weeks.[8] These classical features make us to study the rugae patterns among males and females in Jammu population. Null hypothesis that no discrimination between males and females on basis of palatal rugae patterning stands rejected as a positive interaction was found between gender and rugae patterning with both considered as independent variables. 50 students of a school with 25 males and 25 females were selected for the study to check out any regional discrimination between males and females in rugae patterning. All the patterns were marked with the pencil and counted by the single observer to avoid any chances of bias. Thomas and Klutz[4] classification was used to identify and differentiate rugae shapes which is a standard protocol used in forensics. In intergroup comparison between males and females, male group (6.04 ± 0.745)mm recorded more rugae length and number as compared to female group (5.85 ± 0.433)mm. This indicates that males have more intense and large rugae as compared to females in Jammu population. This result is similar to the study conducted by Bharath et al, [10] Dohke and Osato[11] conducted a study to measure number of palatal rugae and reported that among the Japanese, females have lesser number of rugae than males. Kamal et al[12] study conducted that the average size of rugae pattern was seen to be 10.05 ± 1.51 in both males and females with no significant difference on the right and left side of the palate. These findings confirm racial and gender differences in rugae patterns. Selvamani et al[13] also conducted similar study and found that there was no statistically significant difference in the length of palatal rugae between males and females of Kerala state. In intragroup comparison in male and female population, straight pattern is the most common in both groups

followed by curved pattern in both the groups. (TABLE 3) These findings confirms with the findings of a study conducted by Ibeachu et al[14] in Ikwerre ethnic group of Nigeria. A study conducted by Paliwal et al[15] and Kallianpur et al[16] stated that the predominant shape was wavy. Gautam N et al[17] conducted similar study to study shape of rugae patterns and revealed that the curved type was more among males and the wavy type higher in females. This suggests that race and region do affect the palatal rugae shape, number and length. English et al[18] conducted a study to identify individuals undergoing orthodontic treatment and they concluded that the palatal rugae pattern is characteristic enough to differentiate among individuals. Limson[19] also studied palatal rugae on dental casts and concluded that they present the advantages of simple analysis, reduced cost and easy achievement in any laboratory which can lead them to the test of choice in forensics. The limitations of the study include reduced sample size and more ethnic samples could have been selected. Future ventures include inter ethnic comparisons and conducting study in large numbers to establish a correlation between the race and rugae.

Conclusion

Within the limitations of the present study, Males have more prominent and large palatal rugae than females. Straight types of palatal rugae were found to be maximum followed by curved pattern in both males and females of Jammu population.

References

1. The Glossary of Prosthodontic terms. J Prosthet Dent. 2005; 94:10-92.

2. Pueyo VM, Garrido BR, Sánchez JAS. Odontología Legal y Forense. Barcelona, Masson. 1994, 277-92.

3. English WR, Robison SF, Summitt JB, Oesterle LJ, Brannon RB, Morlang WM. Individuality of human palatal rugae. J Forensic Sci. 1988; 33:718-26.

4. Thomas CJ, Kotze TJ. The palatal rugae pattern in six Southern African human populations, part I: A description of the populations and a method for its investigation. J Dent Assoc S Afr. 1983; 38:547-53.

5. Limson KS, Julian R. Computerized recording of the palatal rugae pattern and an evaluation of its application in forensic identification. J Forensic Odontostomatol. 2004 Jun; 22(1):1-4.

6. Wichnieski C, Franco A, Ignácio SA, Batista PS. Comparative analysis between dactyloscopy and rugoscopy. J Morphol Sci. 2012; 29(3):174-177.

7. Robison WR, Summitt SF, Oesterle JB, Brannon LJ, Morlang RB. Individuality of human palatal rugae. J Forensic Sci. 1988; 33:718-26.

8. Allen H. The palatal rugae in man. Dental Cosmos 1889; 31:66-80.

9. Nallaswamy D. Textbook of Prosthodontics. 1st ed. New Delhi: Jaypee Brothers, Medical Publication. 2003, 226.

10. Bharath ST, Kumar GR, Dhanapal R, Saraswathi T. Sex determination by discriminant function analysis of palatal rugae from a population of coastal Andhra. J Forensic Dent Sci. 2011 Jul; 3(2):58-62.

11. Dohke M, Osato S. Morphological study of the palatal rugae in Japanese. I. Bilateral differences in the regressive evaluation of the palatal rugae. Jpn J Oral Biol. 1994 Jan; 36(2):125-140.

12. Kamala R, Gupta N, Bansal A, Sinha A. Palatal Rugae Pattern as an Aid for Personal Identification: A Forensic Study. Indian Acad Oral Med & Radiology. 2011; 23:173-8.

13. Selvamani M, Hosallimath S, Madhushankari, Basandi PS, Yamunadevi A. Dimensional and

morphological analysis of various rugae patterns in Kerala (South India) sample population: a cross-sectional study. J Nat Sci Biol. Med 2015, Jul-Dec; 6(2):306-309.

14. Ibeachu PC, Didia BC, Arigbede AO. A Comparative Study of Palatal Rugae Patterns among Igbo and Ikwerre Ethnic Groups of Nigeria: A University of Port Harcourt Study. Anat Res Int. 2014; 2014:1-8.

15. Paliwal A, Wanjari S, Parwani R. Palatal rugoscopy: establishing identity. J Forensic Dent Sci. 2010 Jan; 2(1):27-31.

16. Kallianpur S, Desai A, Kasetty S, Sudheendra U, Joshi P. An anthropometric analysis of facial height, arch length, and palatal rugae in the Indian and Nepalese population. J Forensic Dent Sci. 2011 Jan; 3(1):33-37.

17. Gautam N, Patil S, Krishna G, Agastya H, Mushtaq L, Kumar V. J contemp Dent. Prac. 2017; 18(6):470-473.

18. English WR, Robison SF, Summitt JB, Oesterle LJ, Brannon RB, Morlang WM. Individuality of human palatal rugae. J Forensic Sci. 1988; 33:718-26.

19. Limsom KS, Thomas CJ, Kotze TJ. Computerized recording of thepalatal rugae pattern and evaluation of its application in forensic identification. J Forensic Odonto-Stomatol. 2004; 22.31.