Original Article

Distinctiveness of palatal rugae : A potential tool in sex identification

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Abstract

Background: Everyone has certain characteristics that set them apart from others. Variations in the palatal rugae pattern is one such feature which stay consistent throughout one's life specially edentulous patients. So, this rapidly emerging branch of forensic odontology can be taken as an adjuvant in investigation of criminals which has immense significance in giving more accuracy.

Aim: The current study aims to compare distinctiveness of the palatal rugae in gender of various age and to investigate if the specific palatal rugae pattern may be utilised as a strategy for sex estimation.

Methods: Model casts of 200 people were created, segregated & the prominent elevations on both the sides of median palatal raphae was analysed. The statistical analysis to compare the proportions was presented. Result: Wavy rugae patterns are more prevalent in males whereas curved rugae patterns in females.

Conclusion: Association of palatal rugae behold the potential key in establishing the person's sex which is crucially importance.

Keywords: Forensic odontology, Palatal rugoscopy, Sex investigating.

INTRODUCTION

N Forensic Odontology is one of the rapidly emerging branch specialised for criminal investigations, recognition of unknown person and also in identifying missing person in various disaster conditions.1 Most important tool needed for such investigation are biological evidences which sometime get deteriorated and degraded particularly when they are not collected, dispatched or stored appropriately.2 In such cases, palatoscopy is a vital technique which is comprised of personal identification established on the anatomical and morphological feature of hard-palate mucosa.3 Furthermore, the palate form certain patterns as it has many ridges and depressions of mucous membrane which is the unique characteristic mark and remain uniform over the course of life known as palatal rugae.4 It is an antero-posterior narrow central groove that is surrounded on either side by a ridge in the hard epithelial palate.

This study thoroughly reveals the gender differences and individual peculiarity in rugae patterns. Moreover, DNA fingerprinting is reliable yet costly and time-consuming technique if used on massive populations.5 It can be used successfully as a tool of identification for gender determination, additionally it has low utilization cost, reliability and simple to investigate.6

MATERIAL AND METHOD

In our study, transverse rugae patterns on mucosa of 200 people were visualised and arranged in the Department of Oral and Maxillofacial Pathology and Oral Microbiology of Santosh Dental College, Ghaziabad, Uttar Pradesh. A total of 200 maxillary dental casts, constituting of 100 men and 100 women in the age group of 20- 50 years belonging to Ghaziabad were randomly analysed. A consent was received preliminary of taking their impression and all participants were uprised about the study's purpose and objective.

People with surgical history of alveolus & cleft palate, denture wearer, braces or any other active inflammation at that location were eliminated from the study. Whereas, people without braces or any other significant abnormalities were omitted as sample. The essential equipment for recording impressions covered irreversible hydrocolloid impression material (alginate), cotton, dental stone, maxillary impression tray, bowl, metallic blending spatula, patient drape and a sharp lead pencil for interpretating various elevations in the anterior third of the palate.(Figure 1)

Figure 1: Photograph showing instruments.

Figure 2: Photograph presenting elevations on cast.

Firstly, a properly fitting maxillary tray was chosen and paste is made by mixing irreversible hydrocolloid i.e alginate in a water with appropriate ratio in the suitable sized rubber bowl. Subsequently, the paste was instantly introduced in the oral cavity without any motion for approximately 2 minutes and then delicately separated. Furthermore, model casts of 200 people were created and segregated. Lastly, the prominent elevations on both the sides of median palatal raphae were well demarcated by application of lead pencil and analysed.(Figure 2) Each prominent elevation on mucosa was arranged into 4 types by their shapes from its origin to terminating point and counted according to classification assigned by Thomas et al., and Kapali et

al.(1983)7(Figure 3) (Figure 4) The Chi-square test was used during the statistical analysis to compare the proportions of the following percentage-based data.

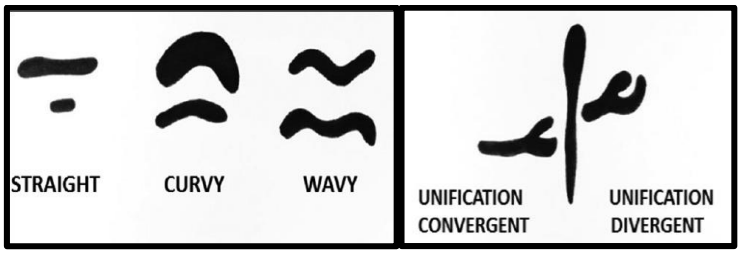

Figure 3: Photograph showing Thomas and Kotze classification

Figure 4: Photograph demonstrating palatal rugae

RESULTS

On analysis of all the transverse patterns on both the sides of diseased free palate mucosa, the most common pattern was found to be 'wavy' pattern (48 percent) presented in males whereas in females the common pattern was curved (47 percent). The second most common pattern in males was curved (27 percent) followed by straight(14 percent).

Table 1

Associated Palatal Rugae Pattern

Rugae Pattern	Male	Female	Total
Curved	27 percent	47 percent	37 percent
Straight	14 percent	16 percent	15 percent
Unification	11 percent	5 percent	8 percent
Wavy	48 percent	32 percent	40 percent
Total	100 percent	100 percent	

Figure 5: Correlation between associated Palatal Rugae Pattern & Gender

In females the next common pattern after curved was found to be wavy (32 percent) & straight(16 percent) in study group. The unification pattern was uncommon but more frequent in men than in females. These observations were shown in both tabular and a bar graph.(Figure 5) (Figure 6)

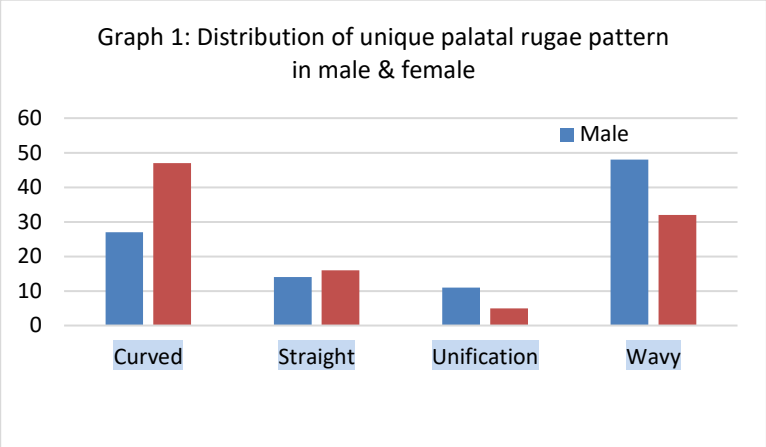

Figure 6: Graphical representation of Palatal Rugae Pattern & Gender

DISCUSSION

In Forensic Odontological investigations the valuable weapon for personal identification are the characteristic features on palatal rugae and the pattern generated. It don't reflect aging-related changes because of their special anatomical location and shielding them from destruction by two fleshy parts. Palatoscopy is an emerging field available to the forensic expert for identification.8

According to a histopathological evaluation of the palatal rugae in mice, they begin to form even before the palatal shelves are raised as isolated areas of epithelial multiplication and thicken. So, it may be utilised efficiently in forensic sciences for criminal identification along with its consistent architecture throughout life.9

The current study revealed positive association between the unique rugae of on palate and subsequent recognizing the gender of the individuals. Compared to other techniques, Kapali et al. was one classification for interpretation of pattern.10 Also, it was considered to an uncomplicated and simple technique which can be straightforwardly used practically.

According to this study's analysis of the frequency distribution of various rugae forms in the male group at the palatal site, "wavy" type rugae patterns were more frequently seen and then curved type.

Nayak et al. also widely said that wavy and curved forms made up more than 65 percent of all rugae shapes that were appreciated, which is somewhat greater than the almost 77 percent that made up the majority of rugae shapes in our study.11 Another study presented by Sharma et al., showed similar outcome with predominant pattern in males and females was wavy and curved, followed by the straight pattern.12 This result contrasted from the results of Fahmi et al. but was in line with those of Kapali et al. and Kamala et al.. (2001)13

Past research has shown and statistically demonstrated that there are racial and gender variances as well as a high degree of individualism in rugae patterns. Moreover, this study concluded that this is frequently employed for individuals who are edentulous and cannot be identified by their teeth as well as those whose other body parts have been destroyed and degraded.14

CONCLUSION

According to the findings of this research, wavy rugae patterns are more prevalent in males whereas curved rugae patterns in females. Also, this article is presenting a study to correspond different rugae patterns of a representative sample of people to establish it’s relation with particular sex group.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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