

Analysis of palatal rugae in males and females of Saudi Arabian population (Makkah province)

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Keywords:

Individual identification, rugae pattern, sex determination

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Received: 02 August 2018;

Accepted: 12 September 2018

doi: 10.15713/ins.jcri.233

Abstract

Background: It is a well-known fact that teeth are considered crucial in identification; in edentulous cases, palatal rugae are handy in individual identification. There are evidences proved that there are gender related and geographic variation in palatal rugae pattern. Hence, the purpose of this study was to figure out the role of palatal rugae in differentiation between sexes of Saudi Arabian population.

Materials and Methods: A total of 50 maxillary dental stone cast were prepared comprised both male and female samples of same age group, casts were looked for rugae shape such as straight, wavy, curved, unification, and circular and their percentage recorded.

Results: The average number of rugae patterns in both sexes in total and the mean values that show no significant differences between both sexes although the number of rugae was slightly higher in male than females in total.

Conclusion: This work concludes that rugae patterns can be used as additional method for identification as a personal print and considered a characteristic to discriminate between individuals.

Introduction

It is a well-known fact since the past few decades that teeth can be used for postmortem identification. Postmortem identification is yet impossible in the teeth less people and palatal rugae can become handy in such instances.^[1]

The palatine rugae are elevations which are situated in the former part of the palatal mucosa on either side of the midpalatal raphe and behind the incisive papilla which are formed in the 3rd month of utero from the connective tissue covering the bone. Due to the stability of the palatal rugae, they are considered suitable for human identification. Palatal rugae are corresponding to the fingerprint which is unique for each person. In 1889, Allen suggested that palatal rugae can be used in the identification of an individual, and in 1955, Lysell recommended that the palatine rugae acquire exclusive characteristics that could be used in identification.^[2]

Many researchers have popularized different methods of classification and analysis of palatal rugae since then. Thomas *et al.*^[3] categorized rugae as “branches” or “unification” depending on the length of their origin; unifications further

classified as converging or diverging, depending on the type of origin. Based on the length, primary rugae: 5 mm or more, secondary rugae: 3–5 mm, and fragmentary rugae: <3 mm. Then, a classification was given by Kapali *et al.* which were less specific and categorized rugae shape as straight, wavy, curve, and circular.^[4]

Thomas and van Wyk^[5] identified a severely burnt body who was edentulous, using the rugae to those on the victim's old denture indicating, among other things, that rugae are firm in adult life. Thus, palatal rugae appear to possess the features of an optimal forensic identification parameter uniqueness, postmortem resistance, and stability. Hence, when antemortem records are available which can be used in postmortem identification.^[6] Absolutely differences in rugae pattern have been found in comparably same populace groups. Racial profiling using intraoral features other than the teeth may have relevance in odontostomatological identification.^[7] Henceforth, the present investigation has embraced palatal rugae shape in a limited sample of Saudi Arabian population, with the objectives of providing possible differences in rugae shape between males and females of Saudi Arabia.

Materials and Methods

The sample comprised of two groups (males and females) all subjects of the study belonged to Makkah province, Saudi Arabia. The sample included 25 dental stone casts from each group, considering the lack of consensus on rugae stability with respect to aging, the study casts were derived from individuals between 18 and 23 years. The casts were free of all the defects such as voids and bubbles. Dental stone casts were made after the verbal informed consent from undergraduate students of the dentistry program. A sharp pencil was used to mark palatal rugae and studied under adequate light and magnification [Figure 1] and recorded according to the classification given by Kapali *et al.* Rugae were categorized as straight, wavy, curved, and circular. The present study has, however, categorized all forms of unified and branched rugae - irrespective of length and origin - as "unification." Besides, all rugae were considered for the study, regardless of their length.

Results

A total of 50 maxillary casts obtained from 25 males and 25 females with ages ranging from 18 to 23 years old were



Figure 1: The shape of palatal rugae

Table 1: Total number of subjects and the mean value of rugae in males and females

| Sex | n | Total number of rugae | Mean±SD |
|--------|----|-----------------------|-------------|
| Male | 25 | 226 | 9.022±1.135 |
| Female | 25 | 206 | 8.4±1.112 |

Table 2: Frequency of different rugae shapes in males and females

| Rugae shape | Males n=25 (%) | Females n=25 (%) | Male and female n=50 (%) | P value |
|--------------------|----------------|------------------|--------------------------|---------|
| Straight | 27.45 | 24.43 | 25.94 | <0.05 |
| Wavy | 34.67 | 39.50 | 37.08 | <0.05 |
| Curved | 34.54 | 32.57 | 33.55 | <0.05 |
| Unification | 1.66 | 0.46 | 1.06 | <0.05 |
| Circular | 4.01 | 2.10 | 3.05 | <0.05 |
| Non-specific rugae | 3.12 | 2.21 | 2.66 | <0.05 |

included in the present study, casts of an each individual showed different types of palatal rugae in relation to the size, shape and number.

The average total number of rugae patterns in both males and females and the mean values that show no significant differences between both sexes although the total number of rugae was slightly higher in male than female that was seen in Table 1. The most common shape in our study for the cases was the wavy, followed the curved, straight rugae, and circular [Table 2].

Discussion

Palatoscopy is the study of the identification of persons based on the configuration of their palatal rugae by Caldas *et al.* This is based on the fact of the stable shape of the palatal rugae. Evidence revealed that the palatal rugae can withstand the thermal and chemical changes and once formed, they remain in the same position and even if they are destroyed, are reproduced exactly at their original site, only change that occurs for the palatal rugae is in its length that is why palatal rugae are considered as the important source of forensic identification.^[7] Palatal rugae can be analyzed by inspection, casts prepared from the impression, photography, and recent advances like digital scanning. Nonetheless, in the present study, impressions method was used to analyze the palatal rugae.^[8] When palatal rugae have anomalies and abnormalities, there are considered as reflection of abnormal growth those could be the source of forensic identification.^[1]

Concerning the gender, in this study, the total number of rugae was slightly fewer in females than in males, but statically not significant, this result agrees with Saraf *et al.*,^[9] Fahmi *et al.*,^[10] and Kapali *et al.*^[4]

As a shape of rugae, in this study, the total of wavy and curve-shaped rugae was the most common representing 70.63% of the total samples of the present study and these results agree with previous studies done by Venegas *et al.*^[11] and Indira *et al.*^[12] The most common type is the wavy shaped and this result agrees with Jawad^[13] and disagrees with Indira *et al.*^[12] that they found the most common is the curve, and this may be due to the different regional or race samples.

Conclusion

The rugae pattern can be used among its characteristics as supplementary method for identification and in an individual

showed a promising uniqueness. The males show significant more rugae than the females with the most common pattern of palatal rugae are the wavy shape then curved and straight pattern. No statistically significant difference in palatal rugae pattern between males and females was revealed.

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How to cite this article: Alhejoury HA, Chandrappa PR, Aljehani DK, Abuzenada BMM. Analysis of palatal rugae in males and females of Saudi Arabian population (Makkah province). *J Adv Clin Res Insights* 2018; 5: 151-153.

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