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DIMENSIONAL AND MORPHOLOGIC VARIATION OF PALATAL RUGAE- A HOSPITAL BASED STUDY AMONG CHENNAI POPULATION

Oral medicine

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ABSTRACT

Introduction: Palatoscopy or Rugoscopy is considered to be a study of irregular fibrous connective tissue ridges located in the anterior part of the hard palate also known as *'plica palatina'*. In Forensic medicine fingers, *'palatoscopy'* is considered to be an alternative to *'dactyloscopy'* during identification of individuals in catastrophic accidents. This is because rugae has a more stable anatomic form and also placed in a more secure position sealed anteriorly by incisors and posteriorly by soft palate and inferiorly by tongue. This facilitates the forensic odontologists to identify the rugae pattern, even in third degree burn individuals.

Aim: The aim of the study is to assess the number of rugae bilaterally present on the primary palate, their patterns, length along with gender differences among patients who visit the outpatient of our hospital

Materials and methods: A total of 100 participants including 50 males and 50 females above the age of 20 years were included in the study .On their maxillary study models; the palatal rugae were assessed for their number , shape and length of rugae on either side of the palate.

Results: The variation in number of rugae among males and females were present. In right side 471 and left side 451 rugae were present .Wavy forms (Female -46.30 %, Male – 36.26%) were seen to predominate other forms of rugae.

Conclusion: Palatal rugae are exclusive for all people hence, palatoscopy is used as an impeccable tool for identification in forensic odontology

KEYWORDS

Palatal Rugae, Palatoscopy, Identification, Forensic Tool.

Introduction:

Forensic odontology is a branch of forensic medicine which plays a vital role in case of identification of individuals in case of catastrophic accidents. Variability, immutability, perennity, practicability and possibility of classification are the requirements to identify them accurately. 'Palatoscopy' a study of palatal rugae fulfils all of them .It is considered as a standard method in identification when the fingers are absent in burnt individuals and severely decomposed bodies .The rugae are considered to be of special interest in edentulous cases. They are extreme relevant tool for identification since they are customized for everyone.

Materials and methods:

The study was conducted among patients who visit the outpatient department of Ragas dental college and Hospital, Chennai which included 100 participants comprising of 50 males and 50 females above the age of 20 years .They were selected on the following criterias

Inclusion criteria:
• Dentulous patients
• Patients without fixed/ removable orthodontic appliances.
• Patients without prosthesis of anterior maxillary teeth.

Exclusion criteria:
• Patients with any chronic / systemic illness.
• Patients who have undergone palatal repair following cleft palate /cleft lip.
• Patients who underwent surgery due to trauma of anterior maxilla.
• Patients with any bony exostoses in maxilla.

The selections of the participants were done and informed consent was obtained from them. Maxillary impressions were made using alginate for the selected subjects and casts were constructed using dental stone. The palatal rugae pattern was marked using pencil and were assessed for number, length, shape[fig.3] .The numbers of rugae on either side

of the palate were counted. The lengths of the rugae were measured using divider and the measurements were converted to millimeters using a metal scale. The gender differences in both the groups were also assessed.The length and shape was determined using **Thomas and Kotze classification (1983)** as follows,

The rugae were classified

Based on their length as:
1) Primary->5mm
2) Secondary- 3 to 5mm
3) Fragmentary-<3 mm
Rugae less than 2 mm were disregarded

Based on their shape as:
Curved: They had a crescent shape and curved gently.
Wavy: If there was a slight curve at the origin or termination of a curved rugae.
Straight: They run directly from their origin to termination.
Circular: Rugae that form a definite continuous ring were classified as circular.
Unification: Rugae are joined at their origin and termination.
Non –specific: Rugae whose shape does not resemble any other shape
The data was obtained and statistical analysis was done and results were derived.

Results:

The results of the study were statistically analyzed and are given here.On comparison of two sides of palate, there were more number of rugae on the right side (471) than the left side (457). Females were observed to have more number of rugae than males. The primary rugae (Total- 791, male- 397, female – 394) were more in number than secondary rugae (Total – 137, male – 69, female- 68)).The most predominant shape of rugae was wavy (Female -46.30 % , Male – 36.26%) followed by curved (Female-21.86%,Males-27.89%)and

straight (Female-19.90%,Males-26.60%).Unification (Female-9.90% ,Male – 6.43%) and circular forms (Female -1.08% , Males- 1.93%) were seen in some of the participants , however non-specific shape (Female -0.86% , Males- 0.85%) was seen only in few people . The wavy shape was more in female than in males On comparison of different parameters like number, length, shape of rugae with one way ANOVA analysis revealed a p-value of < 0.05 which states the difference is statistically significant.

Discussion:
According to the Glossary of Prosthetic Terms (GPT), palatal rugae is defined as " An anatomical fold or wrinkle usually made in plural sense, the irregular fibrous connective tissue ridges located in the anterior third of hard palate known as plica palatinae. Palatal rugae is formed in the 3rd month in utero from the hard connective tissue covering the bone[1]. According to pooja et al, the palatal pattern is oriented between the 12th -14th week intrauterine and persists till the oral mucosa finally degenerates 7 days after death[2]. In a developing human embryo of 32 mm the first rugae is seen adjacent to the incisive papilla which later becomes predominant in adulthood[3].Their growth is effectively controlled by epithelial mesenchymal interaction.

The rugae due to the presence of gustatory and tactile receptors aids in swallowing and gestation. They also help in speech and to establish suction in children.Palatal rugoscopy was proposed by Trolia Hemarosa in 1932. Analysis of palatal rugae was given by Allen in 1889.Patil M.S, Hemanth et al, have mentioned that anatomically secure position of the palate by tongue inferiorly, upper lip anteriorly and the buccal pad of fat in the cheek region on either sides have always protected the rugae from any traumatic or thermal injuries[4] .They were preserved even in third degree burn individuals.

Thomas and Katz et al demonstrated difference in rugae pattern among South African population of different genetic origin.The rugae pattern remains constant, whereas the length of rugae is said to vary in response to normal growth rate of the person In people with extensive finger sucking habit in infancy and persistent pressure due to orthodontic forces or prolonged denture wearers the rugae pattern is subjected to changes. Limsom et al, have used dental casts for the evaluation of rugae patterns and have called it a reliable technique to achieve the data with simple analysis and reduced cost.

The present study reveals that the predominant shape was wavy(Female-46.30% , Male – 36.26%) followed by curved(Female-21.86% , Males - 27.89%) and straight (Female -19.90% , Males-26.60%) .Unification (Female-9.90% ,Male – 6.43%) and circular forms (Female -1.08% , Males- 1.93%) were seen in some of the participants , however non-specific shape (Female -0.86% , Males- 0.85%) was seen only in few people [figure 1 and figure 2] .According to a study by *Shekon et al* , in which shape of rugae were recorded for biometric characterstics of palatal rugae revealed a predominant wavy form (44.9%) followed by curvy (41.8 %)[2]. Another study by *Manickam selvamani et al*, in which the shape of rugae were assessed among Kerala population again stated a predominance in wavy form (Male – 45% Female – 38 %) followed by curvy (Male – 29%, Female – 35 %) and circular (Male – 16 % Female – 19 %), whereas circular forms (Male – 1% Female - 0.3 %) were few in number this was in line with our study[5]. *Shewta et al* , study on rugae patterns in north and south Indian population figured out wavy form (Male – 17 0.96 , Female - 18 2.18) to be dominating in the south Indian population which stood by our study[6].

The number of rugae were found to be more in males (466) compared to female (462) The right side (male- 234 , female – 237) also had more rugaes compared with the left side (male – 232 , female – 225) . In a study by *Valeria et al* the number of rugae on male patients (737) were more than female (724) which supports our study.*Shailesh et al* in his study has said that the number of rugae was found to be more in female (498) than male (402) which was contradicting our study[7].*Senad et al* study on the number of rugae on male patients (737) was found to be more than female patients (724) which was same as that of our study.

On analyzing the length of rugae the primary rugae was found to be more in number (Total- 791, male- 397, female – 394) than the secondary rugae (Total – 137, male – 69, female- 68). In a study by *Manickam selvamani et al* primary rugae (male – 323, female – 496) were more than secondary rugae (male – 49, female- 75) which was similar to our study[5]. In a study of rugae pattern among western Indians by Shailesh et al, the primary rugae were more in number (male -297, female – 368) than secondary rugae (male – 98, female – 120). *Subha et al* in her study on comparison between north Indian and south Indian population has also stated that the number of primary rugae (

north Indians 1536, south Indians- 1542) had a greater count compared to the secondary rugae (north Indians – 48 ,south Indians- 44)[8],thus all the above studies revealed similar results justifying our outputs.

Conclusion:
Thus the rugae due to its morphological, stability, resistance and uniqueness for each and every individual have made it the most reliable tool for identification of corpses in case of majar accidents by forensic odontologists.

Source of support: Nil
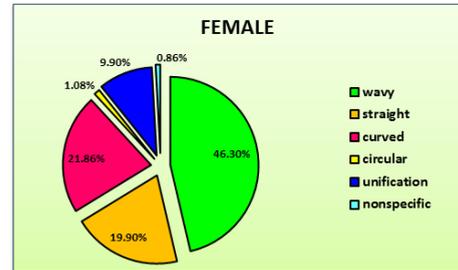**Conflict of interest :** None declared.

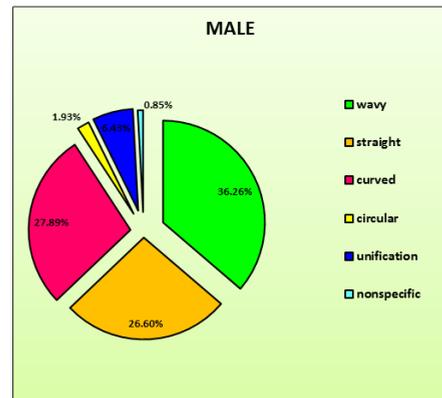**Figure -1: Distribution of various shapes of rugae in female group**

Figure -2: Distribution of various shapes of rugae in male group

Figure 3 :

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