A comparison of rugae pattern in males and females as a samples of Iraqi population

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Abstract

The palatine rugae are irregular fibrous connective tissue ridges located in the anterior third of hard palate that extends bilaterally from the midline behind the incisive papilla. Rugae patterns play a role as positive identification of individuals in suspected cases in forensic dentistry. The aim of the present study is to identify and compare the rugae pattern in a sample of Iraqi population. Materials and method: 120 samples of maxillary casts were selected for 60 males and 60 females their ages ranging between (22-35) years old by using Thomas & Kotze classification for assessment rugae patterns. As a result of this study shows that rugae patterns has a unique individual imprint, differ in the number, symmetry between right and left sides, shape of rugae lines for each person with no significant differences for both sexes. This work conclude that rugae patterns can be used as additional method for identification as a personal print, and considered a characteristic to discriminate between individuals.

Introductio

Palatine rugae or rugae palatines are asymmetrical irregular raised folds of dense connective tissues in the anterior third of the hard palate, arranged in transverse direction from palatine raphe located in the mid sagittal plane behind incisive papilla. The shape of palatine rugae did not change throughout life and considered a highly individual and no two palates are alike in their shape even between identical twins, like finger prints[1-4].

Application of palatal rugae patterns as individual identification was first suggested by Allen in 1889. Since that time various studies were done to use it as a way in positive identification for individuals in the field of forensic dentistry [5].

Rugae pattern formed in the12th to 14th week of prenatal life and remains stable throughout person's life until the first week after death[6].

In neonates the rugae which usually corrugate the hard palate assist gripping of the nipple when sucking [7].They are also involved in the oral swallowing and help to improve the relationship between food and the taste receptors in the dorsal surface of the tongue[1].

Palatal rugoscopy (the study of the shape of palatine rugae) have a great importance in forensic dentistry, orthodontics, comparative anatomy, as well as genetics and anthropology [8].

Palatal rugae also plays a role in prosthodontics that it is considered a secondary bearing area for maxilla, also it can be used as a landmark related to artificial canine position in arrangement of teeth as well as its importance in pronunciation the palatolingual group of sounds, for that reason rugae pattern carved on the polished surface of the denture in attempt to replicate patients feeling in this area when fabricating the prosthesis[6, 9-13].

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The majority of articles that written in forensic dentistry focus on the importance of palatine rugae as alternative method for identification of individuals as a unique to each person that considered a human's fingerprints and a stable landmark retains its shape throughout life. Also rugae area is well protected from trauma due its position that surrounded by check, lips, tongue and teeth[8, 10-14].

In orthodontics, studies reported the importance of rugae palatine as a stable unique reference landmark for longitudinal cast analysis and measuring tooth movement[6, 15-16].

Some studies mentioned the relation between palatine rugae and ethnic groups depending on the mean number, length and trends of rugae lines as an extra aid in determination the race and sex in anthropology studies [3, 17].

In this work attempt to study the rugae pattern in a sample of Iraqi population and study the variations between males and females and compare these results with other studies for different races as additional method of identification.

Materials and method:

This study was conducted at the department of prosthodontics, college of dentistry, Tikrit University. A total number of 120 dental students and patients visit dental clinic in age ranging between twenty two to thirty five years old. All the individuals were free of any abnormalities that effect on rugae pattern as congenital, acquired or trauma.

An irreversible hydrocolloid impression material and perforated tray was used to make maxillary impressions and stone cast was obtained from these impressions.

The palatal rugae were examined under magnifying lens and then analyzed following the classification of Thomas & Kotze (1983), that include number, length and shape of rugae. The length of rugae were classified to primary if its length was more than (5 mm.) , secondary if its length ranging between (3 - 5 mm.) and fragmentary if its length less than (3 mm.),also the shape were classified to straight, curved, wavy, circular, converge and diverge as shown in figures 1&2.

Results:

A total of 120 maxillary casts obtained from 60 males and 60 females their ages ranging from 22-35 years old were included in this study, showed different shapes of rugae pattern for each individual and no symmetry either in number or shape when compared between both sides.

Number. The average total number of rugae patterns in both sexes and the mean values that shows no significant differences between both sexes although the total number of rugae was slightly higher in male (544) than females(534)that was seen in table 1.

Table 2&3 show the average total numbers of primary and secondary rugae patterns for males and females also shows variations between both sexes with no significant differences.

Shape. The most common shape in our study for the (120) cases was the wavy (37.95), followed the curved (33.56), straight rugae (24.94), circular (2.58) and the angle (1.63) that was seen in table 4.

Discussion:

In our study dental casts were obtained to study the rugae patterns for individuals as a simple, inexpensive, and reliable method which giving the shape of rugae pattern in three dimensions in the exact size with minimum errors obtained in comparison with other methods like digital photography that needs a high skilled operator, a specific angulation and position to get a good dependable photograph [5, 17, 19].

Palatal rugae considered a stable unique landmark for each individual and there is no two persons have a duplicate shape of rugae patterns even between two identical twins and these results agree with Eboh[7] and Indera et al[8],that they found no two palates shows the same arrangement of palatal rugae and strongly agree with the suggestion of the uniqueneess of the palatal rugae pattern, Indera et al[14],Pateria & Thakkar [15] and Shetty & Premalatha [18]in their conclusion record that rugae shapes were distinct and

unique to each individual, and no bilateral symmetry was observed for each individual.

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 agree with Saraf et al, Fahmi et al and Kapali et al [3,4&20].

The primary rugae for females were higher in number than in maleswith no significant difference and this result agree with Shetty &Premalatha and Bharath et al [18-19].

The present study found the mean number of rugae was slightly higher in left side compare with the right side but the difference($p < 0.05$),this result agree with Eboh[7] on his study on palatal rugae patterns but in adverse side in their study in south-southern Nigeria that he found the mean number of rugae pattern in the right side was slightly higher than left side with no significant differences between them.

As a shape of rugae ,in this study the total of wavy and curved shaped rugae were the most common representing 71.51% of the total samples of the present study and these results agree with previous studies done by Venegas et al and Indera et al [1,8].The most common type is the wavy shaped and this result agree with Jawad[9] and disagree with Indera et al[14] that they found the most common is the curve, and this may be due to the different regional or race samples.

In our study the converge shape rugae was more in male than in female and this result agree with result of Shetty and Premalatha[18] in their study of palatal rugae pattern among the student population in Mangalore and disagree with Fahmi et al [4]they found that the converge type of rugae area higher in females with high significant of difference and the cause may be due to ethnicity.

Also in this study found the circular type was higher in males than in females but statically not significant, this finding agree with the result of Shetty and Premalatha[18], also our finding coincide with Indera et al [8], but their result was with significant difference .

Conclusion:

The rugae pattern can be used among its characteristics as additional method for identification as a reliable guide for personal print and considered a characteristic to discriminate among individuals and emerge as one of the tools for personal identification in forensic science.
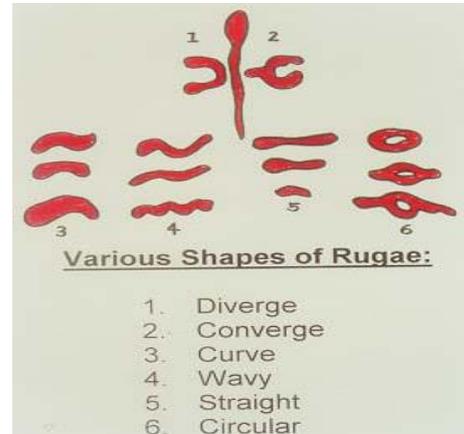

figure No 1: different shapes of rugae area

figure No 2.Various shapes of rugae pattrens

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

Sex	Number	Total No. of rugae	Mean± SD
Male	60	544	9.066± 1.287
Female	60	534	8.9±1.217

Table 2 :Total number of subjects and the mean value of primary rugae in males and females.

Sex	Number	No. of primary rugae	Mean± SD
Male	60	422	7.033± 1.088
Female	60	437	7.283± 0.993

Table 3:Distribution of length of rugae in male and female.

Type	Sex	No.	Mean± SD
Primary	M	422	7.033± 1.088
	F	437	7.283± 0.993
Secondary	M	122	2.033± 1.234
	F	97	1.616± 0.903
Total primary & secondary	M	544	*(P< 0.05)
	F	534	

Table 4: Descriptive statistics of different types of rugae categorized by sex.

Rugae type	Sex	%	Mean± SD	M&F %	P value
Curve	M	34.60	2.433± 1.063	33.56	P < 0.05
	F	32.49	2.366± 0.901		
Angle	M	1.42	0.1± 0.302	1.63	P < 0.05
	F	1.83	0.133± 0.342		
Wavy	M	35.31	2.488± 1.268	37.95	P < 0.05
	F	40.50	2.95± 1.015		
Straight	M	26.30	1.85± 1.783	24.94	P < 0.05
	F	23.57	1.716± 1.090		
Circular	M	3.32	0.233± 0.464	2.58	P < 0.05
	F	1.83	0.133± 0.389		
Converge	M	9.00	0.633± 0.780	7.82	P < 0.05
	F	6.64	0.483± 0.747		
Diverge	M	1.66	0.116± 0.323	1.06	P < 0.05
	F	0.46	0.033± 0.181		

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