Original article

The Role of Palatal Rugae Pattern in Sex Identification in a Sample of Adults in Suez Canal Region, Egypt

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ABSTRACT:

Introduction: Stablishing a person's identity in forensic identification can be a challenging task in mass catastrophic events where bodies are damaged beyond recognition. The most popular procedures employed in this context are dental, finger impressions, and DNA comparisons, which allow for quick and secure personal identification. Sex identification is an important step in personal identification. Palatal rugae are considered an ideal tool for forensic personal identification. They are proved to be population-specific. **Study aim:** To describe the rugae pattern and identify sex differences in rugae pattern in a sample of adults in Suez Canal region**. Materials and methods**: Descriptive study was conducted on 150 anonymous dental casts (75 males and 75 females) in the age group ranging from 18 to 35 years. Palatal rugae pattern based on their number, length, shape, direction, and unification as well as rugae dimensional measurements (transverse and anteroposterior distances on both right and left side) were examined in both sexes. **Results:** Primary rugae was the most frequent category and wavy pattern was most frequently seen. The predominant direction of palatal rugae was the forward direction, and the predominant unification was the converging palatal rugae. There was a significant difference detected between males and females in rugae unification as well as in the second right anterioposterior distance. **Conclusion:** Palatal rugae pattern contributes minimally to sex identification in the studied sample of adults in Suez Canal Region. Conduction of further similar studies with larger sample size, wider age range and in different geographical regions in Egypt is recommended to confirm the results of the present study.

KEYWORD: Palatal rugae patterns, Sex identification, Rugoscopy

I. INTRODUCTION:

Establishing personal identity is an important issue in forensic practice. Several techniques have been used for identification of unknown individuals including DNA, fingerprints and dental analysis (Cerritelli and Anderson, 2018). However, in rare cases, it is necessary to apply uncommon techniques, in order to declare and verify an individual's identity (Bansode and Kulkarni, 2009). Determination of sex is very important step in personal identification; as it narrows the search for missing persons' identity to 50% (Andrade et al., 2019).

Personal identification and sex determination of undetermined human beings is a challenging process especially in mass catastrophic events where bodies are often damaged beyond recognition (Monali et al., 2011, Gupta and Gupta, 2016). In such situations where the conventional methods of identification are of limited utility, palatal rugae can be used successfully for personal identification, even if teeth are lost (Gupta and Gupta, 2016, Pillai et al., 2016, Gupta et al., 2022). Palatal rugae are located inside the oral cavity, in the anterior third of the palate, behind the incisive papillae. They are irregular ridges arranged transversely on either side of median palatine raphae (Gupta and Gupta, 2016, Gupta et al., 2022). Palatal rugae are considered a crucial biometric trait that can be exploited for personal identification because of their stability, uniqueness to individuals and resistance for postmortem changes. As a result, they have been equated with fingerprints (Ibeachu et al., 2014, Shetty et al., 2015, Pillai et al., 2016). The palatal rugae show consistency in their number, shape, direction, and unification throughout life except for the change of the length due to their normal growth (Poojya et al., 2015). Moreover, some studies have proven that rugae pattern does not significantly vary after orthodontic treatment (Pateria and Thakkar, 2011, Gupta et al., 2022). Furthermore, being located in the oral cavity, a protected place, they resist chemical or traumatic destruction, and they are reformed again in the same place and with the same pattern if they are demolished (Caldas et al., 2007, Venegas et al., 2009). They are proved to be population-specific (Thomas and Kotze, 1983, Kapali et al., 1997, Shetty et al., 2005). However, regional variation concerning rugae pattern within the same country were detected (Nayak et al., 2007, Rai and Anand 2007, Sharma et al., 2009). Various methods have been used to describe palatal rugae pattern, however combination of both the morphological pattern and quantitative dimensional measurements of palatal rugae provide more reliable assessment tool for identification (Gupta et al., 2022). Several studies have been conducted to assess gender differences based on palatal rugae pattern, however, the results were inconclusive (Caldas et al., 2007, Pillai et al., 2016, Saadeh et al., 2017, Andrade et al., 2019).

Limited studies concerning rugae pattern-based sexual dimorphism were conducted in Egypt (Azab et al., 2016). However, the role of rugae pattern in sex identification showed contradicting results even in different regions within the same country in India (Nayak et al., 2007, Saraf et al., 2011) and in Jordan (Mustafa et al., 2014, El-Banna et al., 2019).

To the best of our knowledge, this is the first study that addresses the role of rugae pattern in sex identification in Suez Canal Region, Egypt. Hence, this study was conducted to describe the rugae pattern and identify sex differences in rugae pattern in a sample of adults in Suez Canal region.

II. MATERIALS AND METHOD:

Descriptive study was conducted on one hundred and fifty dental anonymous casts (75 males and 75 females) which were previously collected from archived dental casts from the private dental center in Ismailia governorate, Egypt. The casts belonged to subjects of Egyptians origin, from Suez Canal Region in the age group of 18 to 35 years. All subjects were healthy, free of congenital abnormalities, inflammation, trauma or orthodontic treatment and with no significant palatal or facial asymmetry or jaw discrepancy. Casts with fissures, air bubbles, voids or other artifacts were excluded.

II.1. Dental Impressions:

For all participants, an irreversible hydrocolloid was employed as an impression substance on a perforated metal tray for the maxillary dental arch. After that, impressions were filled with Type III dental stone. The manufacturer's instructions were followed to the letter, including the water/powder ratio, vacuum mixing, and the use of a vibrator. There were no air bubbles or cavities in any of the castings, notably in the anterior one third of the palate (Saraf et al., 2011) .

II.2. Method of identification:

To examine the casts, one of the research team first photographed the casts with a Fuji FinePix S5100 (Fujifilm Corporation, Tokyo, Japan) digital camera, focusing on the palatal region. In the horizontal plane, the camera was mounted at a distance of 16 cm from the cast then each photograph was adjusted to a 1:1 ratio using Adobe Photoshop CS3 software package after being saved on a computer hard disc.

The research team adopted a method based on usage of Photoshop software for morphological and metric examination instead of the traditional manual examination of palatal rugae. This technique was done in an attempt to decrease human error as much as possible, to improve the resolution of palatal rugae images and for precise calibration. All measurements (in millimeters) were measured using measuring tool in Photoshop software.

II.3. Measurements:

A. Morphology of rugae.
B. Measurements of transverse and anteroposterior distances.

A. Morphology of rugae:

The rugae recording method employed in this study was based on Thomas and Kotze's (Thomas and Kotze, 1983) and Kapali et al·(Kapali et al., 1997).

The rugae were classified according to the number, length, shape, direction, and unification of the rugae.

- Length:
  1. Primary rugae were those with a length of more than 5 mm.
  2. Secondary rugae were defined as those with a length of 3-5 mm
  3. Fragmentary rugae were defined as those with a length of 2-3 mm.

- Shape: all rugae, regardless of length, were considered for the study which were classified into four categories depending on their shape: (Figure 1)
  1. Curved: They were crescent-shaped and softly curved.
  2. Wavy: If the origin or termination of curved rugae had a small curve.
  3. Straight: They follow a straight path from beginning to end.
  4. Circular rugae are those that form a clearly continuous ring.
- Direction of the rugae was established by measuring the angle created by two lines; the line connecting the rugae's origin and termination, and the line perpendicular to the median raph. Rugae were categorized as follows based on their direction: (Figure 2)
  1. Forwardly directed rugae; these are related with positive angles.
  2. Backwardly directed rugae; these are related with negative angles.
  3. Perpendicular rugae; these are rugae that are perpendicular to each other. They are associated with zero angles.
- Unification was occurred when two rugae were joined at their origin or termination. (Figure 3)
  1. Diverging; if two rugae had the same origin from the midline but immediately branched.
  2. Converging; if two rugae had separate origins from midline but united on their lateral portions.

B. Measurements of transverse and anteroposterior distances: (Figures 4&5)

The measurements were taken as described by (Damstra et al., 2009).

- Transvers distance: distance between two medial sides of first right and left rugae.
- Anteroposterior distances on both right and left side:
  1. First anteroposterior distance: distance between the first and second rugae
  2. Second anteroposterior distance: distance between second and third rugae.

To eliminate inter-observer bias, all identification and measurements were completed by a single examiner. The readings for 20 randomly selected castings were determined twice to examine intra-observer variation in interpretation (2 weeks apart). The data gathered was organized and prepared for statistical analysis.

II.4. Statistical Analysis:

Software used for data analysis was SPSS 20.0 statistical program (SPSS Inc., Chicago, Illinois, U.S.A.). Descriptive statistics were presented in frequency and percentages. Chi-Square test was used for comparison of rugae morphology (length, shape, direction, and unification) between males and females. P value of < 0.05 was considered statistically significant. The statistics significance of parameters in study sample was assessed by one sample t- test. Independent t-test was used for comparison of rugae measurements between both sexes (quantitative variables), and bilateral difference in rugae measurements in both males and females was assessed by paired- t test.

II.5. Ethical consideration:

Ethical approval was obtained from the Research Ethics Committee, Faculty of Medicine, Suez Canal University (Registration code: 4752#).

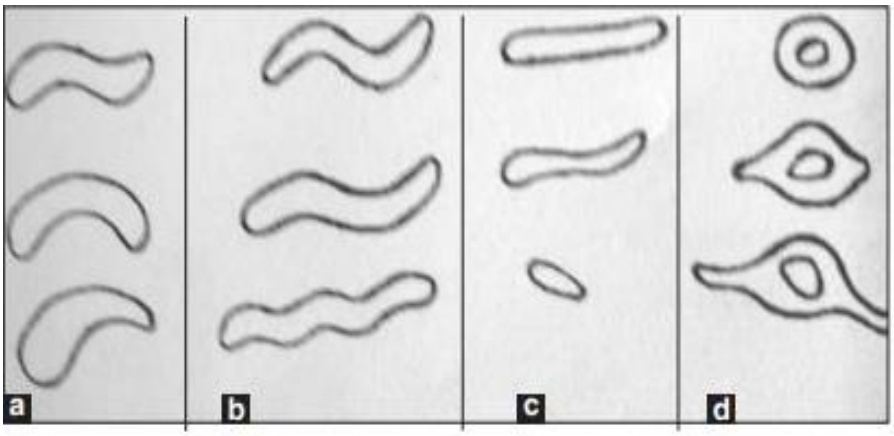

Figure 1: Classification of rugae based on shape; (a) curved, (b) wavy, (c) straight, (d) circular (Paliwal et al., 2010)

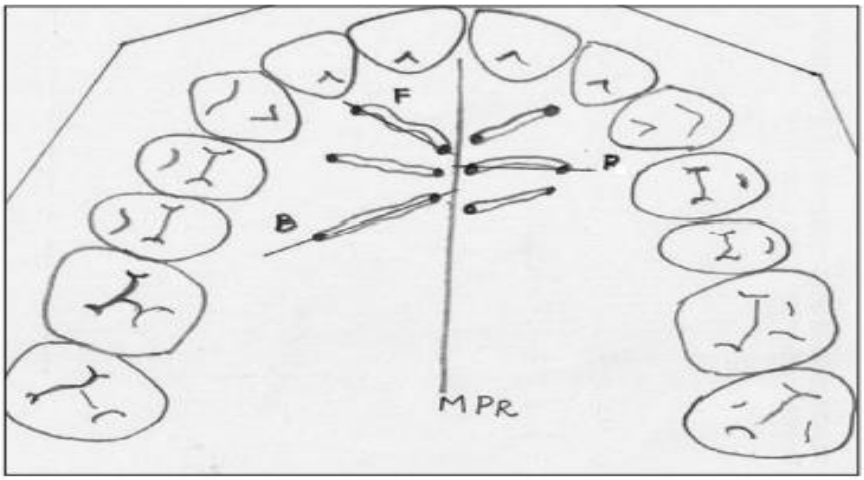

Figure 2: Direction of rugae: F-Forward, B- Backward, P- Perpendicular (Mattoo et al., 2019)

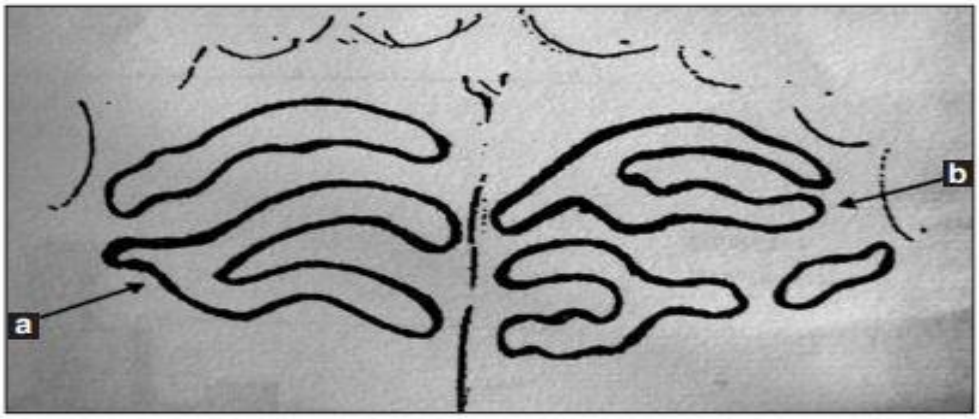

Figure 3: Classification of rugae based on unification; (a) converging, (b) diverging (Paliwal et al., 2010)

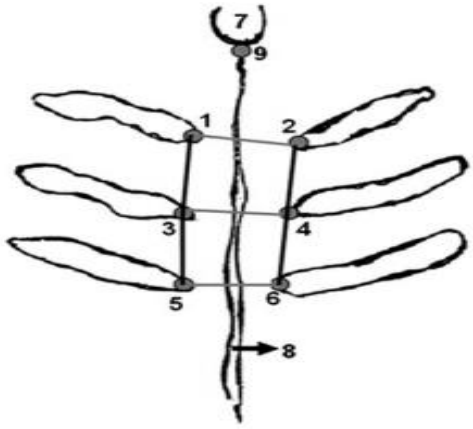

Figure 4: Landmarks on the dental cast. 1 and 2, most medial points on the first rugae; 3 and 4, most medial points on the second rugae; 5 and 6, most medial points on the third rugae; 7, the incisive papilla; 8, the palatal raphe; and 9, the anterior raphe point where the palatal raphe and incisive papilla intersect. First anteroposterior distances (1-3) (2-4) and Second anteroposterior distances (3-5) (4-6).Transverse distance TM1 (1-2), TM2 (3-4) and TM2 (5-6) (Damstra et al., 2009)

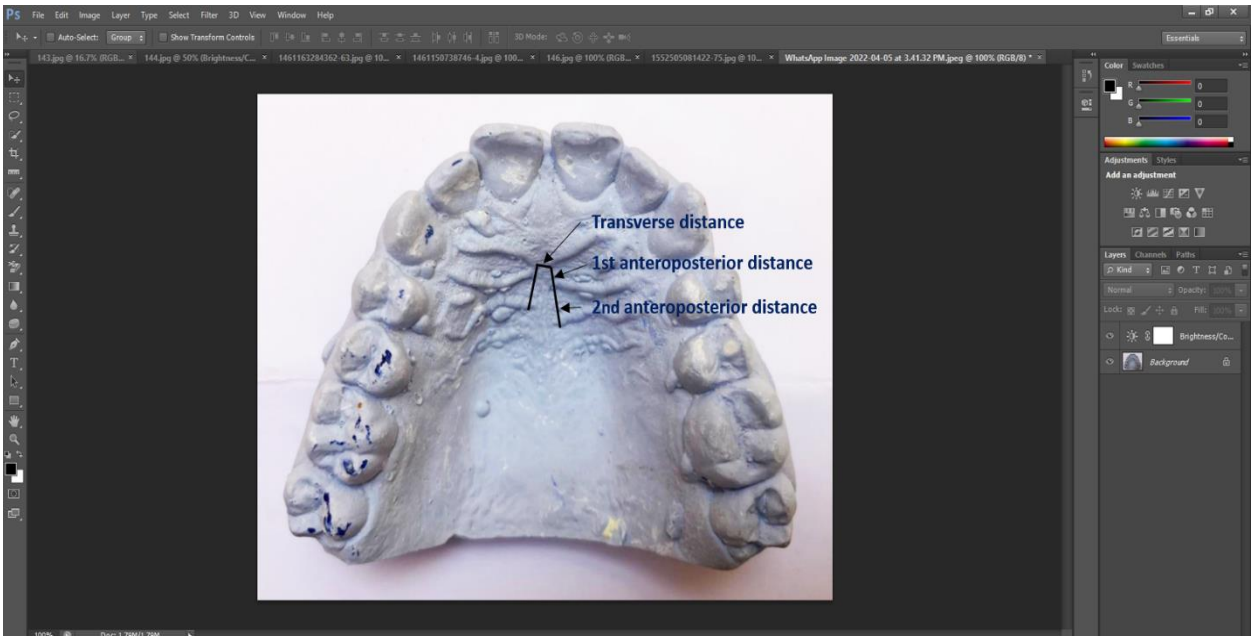

Figure 5: Landmarks on the dental cast: show Transverse distance, First anteroposterior distances, and Second anteroposterior distances. Quoted from work station

III. RESULTS:

Because the proportion of concordance between repeat observations was found to be greater than 95%, the intra-observer error was found to be minimal.

The descriptive statistics of the palatal rugae morphology between males and females is shown in Table (1). Regarding the length, primary rugae was the most frequent category (70.9%, 74.4% in males and females, respectively). Of all the shape patterns, wavy pattern was the most frequently seen, and it was higher in females (32.9%) than in males (31.3%), followed by the straight pattern which was higher in males (30.9%) than in females (26.7%). The predominant direction of palatal rugae was the forward direction, and the predominant unification was the converging pattern. Chi-square analysis showed significant difference of the unification of rugae between males and females ($p < 0.05$), while other parameters did not show any significant difference between males and females ($p > 0.05$).

Descriptive statistics of first and second anteroposterior distances, and transverse distances measurements in the study sample are shown in Table (2). It shows a statistical significance in all measurements on both sides ($p < 0.05$).

Table (3) shows descriptive statistics and sexual dimorphism of first and second anteroposterior distances measurements on both sides and transverse distances measurements. It is apparent that mean values of males are higher than those of females in most measurements. It is also evident that the mean length of the 2nd anteroposterior rugae distance on the right side is found to be statistically significant between both sexes ($p < 0.05$).

Tables (4&5) show the bilateral difference for first and second anteroposterior measurements in male and female. It is observed that there is bilateral significant difference in the first anteroposterior distance in both male and female ($p < 0.05$).

Table (1): Comparison of the palatal rugae morphology between male and female casts (n=450 rugae/sex)

Rugae Morphology		Gender		p value *
		Male (450 rugae) Frequency %	**Female (450 rugae) Frequency %**	
Rugae Length	Primary (n=654)	319 70.9%	335 74.4%	0.39
	Secondary (n=170)	93 20.7%	77 17.1%	
	Fragmentary (n=67)	38 8.4%	38 8.4%	
Rugae shape	Straight (n=259)	139 30.9%	120 26.7%	0.58
	Curved (n=244)	118 26.2%	126 28.0%	
	Wavy (n=289)	141 31.3%	148 32.9%	
	Circular (n=108)	52 11.6%	56 12.4%	
Rugae direction	Forwardly (n=335)	158 35.1%	177 39.3%	0.11
	Backwardly (n=286)	138 30.7%	148 32.9%	
	Perpendicular (n=279)	154 34.2%	125 27.8%	
Unification	Diverging (n=101)	60 [a] 45.1%	41[b] 33.1%	0.04*
	Converging (n=156)	73[a] 54.9%	83[b] 66.9%	

*Significance of Chi-Square Test; * p<0.05*

[a] *: total number of rugae with unifications in males= 133*

[b] *: total number of rugae with unifications in females=124*

Table (2): Comparison of Transverse distances, Rt side 1st and 2nd anteroposterior rugae distances measurements and Lt side 1st and 2nd anteroposterior rugae distances measurements (N=150 casts)

Measurements	Mean	SD	Std. Error Mean	t-value	p value
Transverse	0.85	0.58	0.047	17.94	0.000*
Rt side 1st anteroposterior rugae	15.62	3.16	0.26	60.55	0.000*
Rt side 2nd anteroposterior rugae	14.74	2.84	0.23	63.54	0.000*
Lt side 1st anteroposterior rugae	14.42	2.90	0.24	60.92	0.000*
Lt side 2nd anteroposterior rugae	14.94	5.48	0.45	33.41	0.000*

*Estimable units are represented in mm, Rt: right, Lt: left Significant by one sample t- test * p<0.05 level.*

Table (3): Comparison of transverse and anteroposterior distances between male and female (N=150 casts) by Independent t-test

Measurements (mean ± SD)	Male (n=75)	Female (n=75)	Independent t-test	
			t-value	p-value(2-tailed)
Transverse	0.90 ± 0.411	0.80 ±0.71	1.066	0.29
Rt side 1st anteroposterior rugae	15.67 ± 3.52	15.57±2.77	0.20	0.84
Rt side 2nd anteroposterior rugae	15.47± 2.95	14.01±2.54	3.24	0.001*
Lt side 1st anteroposterior rugae	14.35 ±3.21	14.49± 2.57	-0.28	0.77
Lt side 2nd anteroposterior rugae	15.50± 3.17	14.38 ± 7.05	1.25	0.21

*Estimable units are represented in mm, Rt: right, Lt: left, SD: standard deviation * Significantly different at the p<0.05 level.*

Table (4): Bilateral difference for 1st and 2nd anteroposterior rugae distances measurements in male (N= 75 casts) by Paired t-test

	Paired t test		
	Correlation	**t**	**p value**
Rt & Lt 1st anteroposterior rugae	0.30	2.84	0.006*
Rt & Lt 2nd anteroposterior rugae	0.41	-0.09	0.93

*Rt: right, Lt: left * Significantly different at the p<0.05 level.*

Table (5): Bilateral difference for 1st and 2nd anteroposterior rugae distances measurements in female (N= 75 casts) by Paired t-test

	Paired t test		
	Correlation	**t**	**p value**
Rt & Lt 1st anteroposterior rugae	0.56	3.72	0.000*
Rt & Lt 2nd anteroposterior rugae	0.01	-0.43	0.67

*Rt: right, Lt: left * Significantly different at the p<0.05 level.*

IV. DISCUSSION:

Sex determination is the key analysis that forensic investigators use to develop and restrict the biological profile for unidentified human remains (Shanbhag, 2016, Ostovar et al., 2020). The accuracy and reliability of the identification methods will determine the outcome of the investigation and subsequent legal decisions (Williams and Rogers, 2006). Palatal rugae have shown significant results regarding individuality and personal identification (Gupta et al., 2022). Hence, the present study aimed to describe the rugae pattern and identify sex differences in rugae pattern in a sample of adults in Suez Canal region. In the present study, we depended on casts of the palatine region to examine rugae pattern. Using casts for the examination of rugae pattern is considered easy, rapid, accurate method and does not require sophisticated instruments (Poojya et al., 2015, Malekzadeh et al., 2018).

It was found in the present study that, primary rugae was the most frequent category, which was consistent with the findings of studies conducted on Egyptian population from different regions (Azab et al., 2016, Elgazzar et al., 2021, Hussein and Rady, 2021).

Furthermore, it was consistent with findings detected in other populations, and reported in other studies (Gondivkar et al., 2011, Surekha et al., 2012, Ahmed and Hamid, 2015, Pillai et al., 2016, Malekzadeh et al., 2018, El-Banna et al., 2019) .

In the present study, the wavy pattern was the prevalent pattern. This result was consistent with study that investigated the palatine rugae pattern in the Egyptian population by (Azab et al., 2016).

In addition, it was also consistent with the results of a study conducted on Upper Egyptians (Farghaly et al., 2017). However, it was inconsistent with the results of some other Egyptian studies which reported that straight shaped rugae were the most frequently detected (Sherif et al., 2018) and the curved shape was prevailing in another (Hussein and Rady, 2021). It seems that variations in rugae pattern exist among various subgroups in Egypt. On comparison with other populations, the results of the present study were in accordance with the results observed in the Indian population (Nayak et al., 2007), Nigerian population (Ibeachu et al., 2014), Jordanian population (Mustafa et al., 2014) , Sudanese population (Ahmed and Hamid, 2015) , Iranian population (Malekzadeh et al., 2018) and Turkish population (Kutalmiş et al., 2019).

These result was found to be in contrast to what was reported by (Santos and Caldas, 2012, Pillai et al., 2016) who found that the straight shape was the commonest palatal rugae shape in Portuguese and Gujarati populations respectively.

Inter-racial genetic differences have been blamed for the differences in rugae pattern observed in different racial groups. Rugae morphology is mostly determined by genetics, despite the influence of environmental conditions. Several genes, regulate the direction of collagen fibers inside rugae connective tissue throughout embryogenesis and postnatal growth, and so govern rugae pattern in diverse racial groups.

According to various studies, the palatal rugae not only have diverse presenting patterns in different racial groupings, but also even within subsets of a single race (Nayak et al., 2007, Venegas et al., 2009, Sheikhi et al., 2018). For example, the wavy and curved shapes were predominant in some studies on Indian population (Nayak et al., 2007, Sharma et al., 2009), however the straight pattern was predominant in another subgroup of Indian population (Rai and Anand 2007).

In the present study, the predominant direction of palatal rugae was the forward direction, which agrees with the finding reported in a previous studies in Egypt (Azab et al., 2016, Sherif et al., 2018, Elgazzar et al., 2021, Hussein and Rady, 2021). This finding is also in congruence with the results obtained from studies conducted on Jordanian and Sudanese populations (Mustafa et al., 2014, Ahmed and Hamid, 2015). However, this is in contrast to study in the Indian population that reported the backward direction was the predominant direction (Shubha et al., 2013). This observed discrepancy might be attributed to various factors as sample size and methodological differences between the previous studies. Moreover, to racial and geographical variations among the studied populations (Pillai et al., 2016).

Concerning unification, converging unification was prevailing in this study. This result supports the finding reported by (Azab et al., 2016). This is also consistent with the findings of (Abdellatif et al., 2011) who investigated the unification forms of palatal rugae in Egyptian and Saudi children and found that converging rugae were more common in Egyptians, while diverging rugae were more common in Saudis.

Also, these findings concur with (Ahmed and Hamid, 2015) who reported that the converging rugae were more frequent than the divergent type in Sudanese population and with a study that concluded that the diverging type was the least commonly found in both the sexes on the Indian population (Saraf et al., 2011). In contrast to present result, divergent unification prevailed in some other studies conducted in Egypt (Sherif et al., 2018, Hussein and Rady, 2021) and various population (Thabitha et al., 2015, Pillai et al., 2016, Malekzadeh et al., 2018, El-Banna et al., 2019). Whereas, other studies reported that unification of rugae was very rare and did not show any specific trend (Shetty et al., 2005, Nayak et al., 2007, Shetty and Premalatha, 2011, Surekha et al., 2012).

Regarding the role of rugae pattern in sex identification, the current data underscored the variability of the palatal rugae and their potential use for sex determination. The only morphological pattern that showed a statistically significant relation with sex was unification, while length, shape and direction of rugae did not show any significant difference between males and females. In comparison with another Egyptian study, the only parameter that showed a significant difference between males and females was shape (Azab et al., 2016). In the same context, another study reported that rugae shape played a role in sex differentiation in Upper Egyptians (Farghaly et al., 2017).

On other hand, (Hussein and Rady, 2021) in their study which conducted to compare the role of palatal rugae in sex identification between Egyptian and Malaysian populations, significant difference was found regarding the rugae length in relation to sex in both populations. However, there was no significant difference between both sexes regarding the direction and shape.

However, (Abdellatif et al., 2011) when examined rugae pattern as an identification tool for gender and population in both Egyptian and Saudi populations, did not find significant relation between rugae shape and unification and gender in both populations. Furthermore, researchers did not find significant difference between sex and rugae shape, direction or unification in their study on Egyptian population (Sherif et al., 2018). The partial variation in results between the present study and the previously mentioned Egyptian studies might be attributed to the smaller sample size, and different statistical analysis methods in those previously mentioned studies, and perhaps to the different geographical regions in which those studies were conducted. However, a study on Indian population concluded that, wavy, curved and circular rugae patterns besides unification exhibited sexual dimorphism. Furthermore, a study reported that rugae shapes could successfully predict sex with (>99%) accuracy (Saraf et al., 2011).

Supporting the role of palatal rugae in sex identification, (El-Banna et al., 2019) reported that palatal rugae pattern could successfully discriminated sex in Jordanian population with 91.67% accuracy. However, Their result contradicts the results of another study on Jordanian population that detected that only rugae orientation exhibited gender difference (Mustafa et al., 2014).

In Sudanese population, the forward direction was the only variable that showed a statistically significant difference between

males and females, while the length, shape and unification did not show any statistical differences between both sexes (Ahmed and Hamid, 2015) .

In the same context, rugae pattern was reported to lack any significant difference in Gujarati population (Pillai et al., 2016). Others attributed the absence of a defined pattern for either sex-related or ethnicity-related differences based on palatal rugae worldwide to the individuality of palatal rugae (Mustafa et al., 2014). The present study showed that among the transverse, first and second anteroposterior rugae measurements, only the second right anteroposterior distance showed a statistically significant difference between males and females. This finding partially agrees with (Saadeh et al., 2017) who examined palatal rugae measurements in Lebanese population and reported that first and second anterioposterior rugae medial distance on both sides exhibited significant differences between both sexes. In the current study, a bilateral significant difference was found in the 1st anteroposterior rugae distance in both males and females, which also, agrees with the finding detected by (Saadeh et al., 2017).

V. CONCLUSION:

The present study showed a significant difference of rugae unification as well as the second right anteroposterior distance between males and females, while other parameters did not show any significant difference between males and females. Therefore, according to the present study, the rugae pattern might contribute minimally to the sex identification. However, it is not a reliable factor for sex identification. In conclusion, palatal rugoscopy was not a reliable method to identify the sex of an individual in the current study.

VI. RECOMMENDATIONS:

Conduction of further studies, with a larger sample size, a wider age range, in different geographical regions in Egypt and with different methods is recommended to confirm the findings of the present study.

VII. Limitations:

The small sample size, as well as the narrow age range, are considered the main limitations in the present study.

VIII. Acknowledgment:

The authors would like to express their gratitude to Dr. Tarek Abdel Hamid (Lecturer, faculty of Dentistry, Suez Canal University, Egypt) for providing the dental casts used in the present study from his private dental center.

IX. Conflict of interest:

The author declared that there was no conflict of interest.

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الملخص العربى

دور نمط الغضون الحنكية في الاستعراف على الجنس في عينة من البالغين في منطقة قناة السويس، مصر

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المقدمة: يعد تحديد هوية الشخص مهمة صعبة فى علم الطب الشرعى في الأحداث الكارثية الجماعية حيث تتلف الجثث بشكل يتعذر التعرف عليه. من الوسائل الأكثر شيوعًا المستخدمة في هذا السياق هي مقارنات الأسنان وبصمات الأصابع والحامض النووي، والتي تتيح الاستعراف على الأشخاص بشكل سريع وآمن. يعد تحديد الجنس خطوة هامة في الاستعراف على الأشخاص. تعتبر الغضون الحنكى أداة مثالية لتحديد هوية الشخص من الوجهة الطبية الشرعية. كما ثبت أنها خاصة بكل كتلة سكانية. **هدف الدراسة:** وصف نمط الغضون الحنكى وتحديد الفروق بين الجنسين في نمط الغضون الحنكى في عينة من البالغين في منطقة قناة السويس. **طريقة الدراسة:** أجريت دراسة وصفية على 150 قالب أسنان مجهول الهوية (75 ذكر و 75 أنثى) في الفئة العمرية من 18 إلى 35 سنة. تم فحص نمط الغضون الحنكي بناءً على عددها وطولها وشكلها واتجاهها وتوحيدها وكذلك قياسات أبعادها في كلا الجنسين. **النتائج:** يعد الغضون الأولي هي الفئة الأكثر شيوعًا وكان النمط المتموج هو الأكثر شيوعا. يعد الاتجاه السائد للغضون الحنكي هو الاتجاه الأمامي، وكان التوحيد السائد في الغضون الحنكي هو المتقارب. قد وجدت فروق ذات دلالة إحصائية بين الذكور والإناث في توحيد الغضون الحنكي وفي المسافة الأمامية الخلفية الثانية اليمنى. **الخلاصة:**. قد وجد ان نمط الغضون الحنكي يساهم بشكل ضئيل في تحديد الجنس في العينة المدروسة من البالغين في منطقة قناة السويس. يوصى بإجراء دراسات مماثلة باستخدام عينة دراسة أكبر، نطاق عمري أوسع، وفي مناطق جغرافية مختلفة في مصر لتأكيد نتائج هذه الدراسة.