



Differences in Palatine Rugae Patterns in Proto Malay Sub-Race and Deutro Malay Sub-Race (Study on Batak and Javanese Tribes)

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DOI: 10.31080/ASDS.2025.09.1989

Received: January 28, 2025

Published: March 01, 2025

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Abstract

Background: The pattern of palatine rugae is an anatomical structure located on the anterior third of the palate posterior to the incisival papillae. Palatine rugae pattern can be used in forensic investigation due to its uniqueness, stability, and resistance to decomposition, including in distinguishing tribes from Proto Malay Sub-Race and Deutro Malay Sub-Race.

Purpose: This study aims to decide the differences in rugae patterns in Proto Malay sub-race and Deutro Malay sub-race aims students FKG UPDM(B).

Methods: The research method used was descriptive analysis with purposive sampling. The research was conducted on Pre-Clinical Students of the Faculty of Dentistry, Prof. Dr. Moestopo University with a total sample of 90 people. Data were obtained by molding alginate printing material and casted with gypsum material (dental stone). The model was photographed, digitized, and traced using iPad software to be observed according to Thomas and Kotze's classification.

Results: The Batak tribe and the Javanese tribe show a different picture of the palatine rugae pattern with the wavy shape in the Batak tribe as the dominant pattern, while the circular as the less dominant pattern. The picture of the palatine rugae pattern in the Javanese tribe shows a curve shape as the dominant pattern, while the circular pattern as the less dominant pattern.

Conclusion: Therefore, the description of the palatine rugae pattern shows that each tribe has a different palatine rugae pattern and makes this examination method can be used as a secondary (complementary) identification method.

Keywords: Forensic Odontology; Palatine Rugae Pattern; Deutro Malay Sub Race; Proto Malay Sub Race

Introduction

Indonesia is geographically vulnerable to natural disasters because it is located at the confluence of the world's three major tectonic plates, namely Eurasia, IndoAustralia and the Pacific. As a result, the movement of these plates can trigger earthquakes and tsunamis [1,2]. Not only natural disasters, disasters due to unintentional or intentional human error can occur, including plane crashes, bombings, mistakes in the use of building materials, mass shootings, and fires [3]. The incident can take a large number of

casualties who may not be recognized and have no identity. Victim identification is very necessary and important in every incident with the aim of knowing the causal factors of the incident and determining the exact identity of the victim, in order to fulfill the rights of the corpse, which can be returned to his family and buried according to his beliefs [4].

In performing its duties, the Disaster Victim Identification (DVI) team determines the identification process with two types of means, namely primary identification obtained from dental history, finger-

prints, and DNA (Deoxyribonucleic Acid) and secondary identification obtained from findings on the victim, lip prints (Cheiloscopy), and palatal rugae patterns (Palatoscopy). Secondary identification can be used to help complete primary identification data that cannot be done because the victim has no teeth, the victim is badly burned, and has decayed so that it is difficult to recognize through fingerprints and DNA analysis. One of the secondary identifications that can be used to recognize victims is palatal rugae pattern analysis (Palatoscopy) [5,6].

The palatal rugae pattern, also known as palatal rugoscopy or palatoscopy, is an anatomical structure located in the anterior third of the palate posterior to the incisival papillae. These structures develop from connective tissue during intrauterine weeks 12-14 [7,8]. The length of the palatal rugae pattern may change during growth and development, but its position and shape remain the same for life. The palatal rugae pattern is protected from injury by the surrounding tissues, such as the lips, tongue, bone, and teeth, as well as the buccal fat pad which makes it resistant to disease, chemical aggression, fire, trauma, and decay. Palatal rugae patterns can be used in forensic investigations due to their uniqueness, stability and resistance to decomposition. However, palatoscopy is useful as a secondary (supplementary) means of identification in cases of mass disasters [6,8].

The various ethnicities, cultures, and subraces in the FKG UPDM(B) reflect the diversity that exists in the Unitary State of the Republic of Indonesia. This includes the Proto-Malay and Deutro-Malay sub-races. Through this study, the researchers wanted to know the pattern of palatine rugae in the Proto-Malay sub-race of the Batak tribe and the Deutro-Malay sub-race of the Javanese tribe found in the academic program students of FKG UPDM(B) as a forensic identification method.

According to Ilma N., *et al*, in her research on differences in the description of palatine rugae patterns in the Minangkabau tribe and the Batak tribe, the results were not much different. This is because the Minangkabau tribe and the Batak tribe belong to one race, namely the Paleo Mongoloid race but different sub-races, because the Minangkabau tribe belongs to the Deutro Malay Sub-race while the Batak tribe belongs to the Proto Malay Sub-race [9].

Therefore, this study aims to find out the differences in the description of the palatine rugae patterns of the Batak tribe and the Javanese tribe.

Materials and Methods

This research method uses descriptive analysis with research sampling using nonprobability techniques, namely purposive sampling. The samples in this study were students of the academic program of the FKG UPDM(B) with Javanese and Batak tribes. This research has received an ethical clearance number No. 20/KEPK/FKGUPDMB/V/2024 and No. 24/KEPK/FKG-UPDMB/ V/2024.

The implementation was carried out in the 3rd floor laboratory room at the FKG UPDM(B) in May 2024. The sample in this study was carried out by fulfilling the criteria: Students of the FKG UPDM(B) in the Proto- Malay sub-race of the Batak tribe and the Deutro-Malay sub-race of the Javanese tribe with the third generation as research subjects. The research subjects had a healthy oral cavity, no abnormalities in the palatine rugae area, and were willing to participate in the study by filling out informed consent. Research tools and materials used in this study, gloves, rubber bowl, spatula, tripod, maxillary printing spoon in various sizes, printing material (alginate), gypsum, water, hexagon base, smartphone, permanent black marker, and ruler.

In practice, molding is done with alginate molding material and cast with gypsum (dental stone). The model was then embedded in seven bases so that it could be placed "flat" on the table. Thus, the photo-taking process can be carried out in the same distance and lighting to obtain the same palatine rugae photo results. The palatine rugae patterns were digitized and then traced using iPad software to be observed according to Thomas and Kotze's classification. Thomas and Kotze's classification divides rugae into six shapes, namely straight, curve, wavy, circular, diverging and converging, then rugae are divided based on size, namely primary, secondary, and fragmentary.

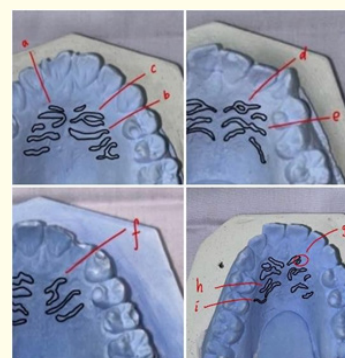


Figure 1: Palatine Rugae Patterns of Javanese Tribe (a), (b) Curve, (c) Diverging, (d) Circular; (e) Wavy, (f) Converging, (g) Fragmentary, (h) Secondary, (i) Primary On the Research Subject (Photo Personal Documentation).

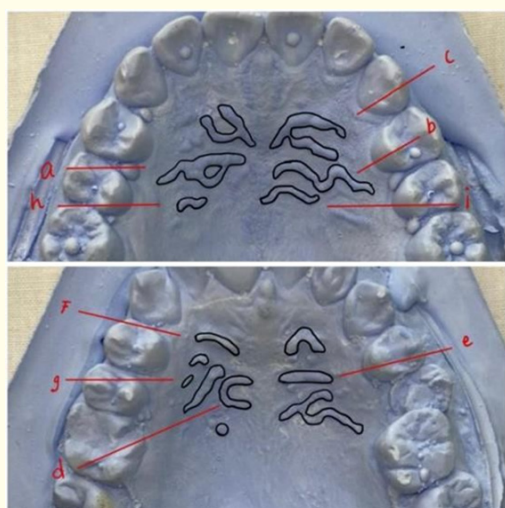


Figure 2: Palatine Rugae Patterns of Batak Tribe (a) Circular, (b) Wavy, (c) Diverging, (d) Converging, (e) Straight, (f) Curve, (g) Fragmentary, (h) Secondary, (i) Primary On the Research Subject (Photo Personal Documentation).

Results and Discussion

Results

The frequency of research respondents based on the Proto-Malay sub-race of the Batak tribe out of 42 respondents was obtained

Based on the distribution of palatine rugae patterns of respondents from Batak tribes, it shows a curve pattern of 96 (36%), straight 30 (11%), wavy pattern 23 (9%), circular pattern 10 (4%), diverging pattern 103 (38%), converging 5 (2%), primary pattern 34 (76%), secondary pattern 47 (18%), and fragmentary pattern 16 (6%).

Shape	Frequency (f)	Percentage (%)
Straight Curve Wavy	30	11
Circular Diverging Converging	96	36
Total	23	9
	10	4
	103	38
	5	2
	267	100

Table a

Length	Frequency (f)	Percentage (%)
Primary Secondary	24	76
Fragmentary Total	47	18
	16	6
	87	100

Table b

The frequency of research respondents based on the Deutro-Malay sub-race of the Javanese tribe out of 48 respondents was obtained (Table c, d).

Shape	Frequency (f)	Percentage (%)
Straight Curve Wavy	115	25
Circular Diverging Converging	170	36
Total	94	20
	15	3
	60	13
	13	3
	467	100

Table c

Length	Frequency (f)	Percentage (%)
Primary Secondary	323	69
Fragmentary Total	112	23
	32	6
	467	100

Table d

Based on the distribution of palatine rugae patterns of respondents from Javanese tribes, it shows a curve pattern of 170 (36%), straight 115 (25%), wavy pattern 94 (20%), circular pattern 15 (3%), diverging pattern 60 (13%), converging 13 (3%), primary pattern 323 (69%), secondary pattern 112 (23%) and fragmentary pattern 32 (6%).

Discussion

The implementation of this study was carried out to determine the description of palatine rugae patterns in the Proto-Malay sub-race of the Batak tribe and the Deutro-Malay sub-race of the Java-

nese tribe in Pre-Clinical Students of FKG UPDM(B) which showed the results of the frequency of forms in the Proto-Malay sub-race of the Batak tribe which was dominated by wavy and diverging forms, while the less dominant forms were dominated by circular and converging. The results of the calculation of palatine rugae in the Deutro-Malay sub-race of the Javanese tribe are dominated by curve and diverging shapes, while circular and converging shapes are less dominant patterns.

The results of the research conducted are similar to the results of research by Ilma NM., *et al.* (2017) conducted on the Batak tribe showing that the wavy and diverging patterns as the dominant pattern, while the circular and converging patterns as the less dominant pattern [9]. Another study by Ramadhan MW (2024) on the Banjar tribe found wavy and diverging patterns as dominant patterns, while circular and converging patterns as less dominant patterns [10]. Based on these two studies, the results are the same even though they are from different tribes in one Proto-Malay sub-race.

Research by Prakoeswa., *et al.* (2021) conducted on the Deutro-Malay sub-race of Javanese tribes found the wavy pattern as the dominant pattern, while the circular pattern was less dominant. This study was conducted in Kayukebek Village, Pasuruan, East Java. However, this study focused on the Tengger tribe in the Java region which geographically includes various sub-regions, while the researcher used Javanese respondents at large [6].

Given the fact that populations of the Batak Proto-Malay sub-race and the Javanese DeutroMalay sub-race are scattered in various countries, as well as the fact that there are many mixed marriages, it is difficult to find pure populations of the Batak Proto-Malay sub-race and the Javanese DeutroMalay sub-race.

Conclusion

The Batak tribe and the Javanese tribe show a different picture of the palatine rugae pattern with the wavy shape in the Batak tribe as the dominant pattern, while the circular as the less dominant pattern. The picture of the palatine rugae pattern in the Javanese tribe shows a curve shape as the dominant pattern, while the circular pattern as the less dominant pattern. Therefore, the description of the palatine rugae pattern shows that each tribe has a different palatine rugae pattern and makes this examination method can be used as a secondary (complementary) identification method.

Acknowledgements

The researcher would like to express a gratitude to all respondents who have participated in this study.

Conflict of Interest

There is no conflict of interest from any side.

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