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Mathematical Model Palatine Rugae Subras Deuteromelayu in Odontology Forensic

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Abstract: A mathematical model is a description of a system that uses mathematical concepts and language. The process of developing a mathematical model called mathematical modeling. Mathematical models are used not only in the natural sciences and engineering disciplines but also in social sciences (such as economics, psychology, sociology and political science, medical and dentistry) used a mathematical model that is most widespread. A model may help to explain the system and to study the effects of different components and to make predictions about the behavior. Mathematical models can take many forms including but not limited to dynamical systems, statistical models, differential equations or game theory models. In general, the mathematical model can include logical models as far as logic is taken as a part of mathematics. This research design a mathematical model of the palatine rugae subras deuteromelayu with a mathematical model approach fingerprints. Rugae palatine is an organ that has the unique properties of each individual person, palatine rugae can be analyzed through the number, length, direction and shape. The uniqueness of every shape and pattern of the palatine rugae can be used as the basis for the identification of individuals.

Key words: Model, fingerprints, rugae palatina, odontology forensic, dentist, direction

INTRODUCTION

Mathematics is the science that can be used to assess the nature around it can be used as a tool for studying various physical phenomena are complex, especially the various natural phenomena were observed, so that the pattern of structure, space and changes as well as the properties of the phenomenon can be approached or expressed in a the formulation of a systematic form and filled with various conventions, symbols and notation. Results formulation that describes the behavior or the physical phenomena is expressed in the form of mathematical models.

Mathematical modeling of a problem is the steps taken to obtain and utilize a mathematical equation or function of a problem. The main requirement is a good model:

- Representative: the model correctly represents something that is represented, more representative, more complex models
- Can be used: the model created should be used (can be solved mathematically) the simpler the more easily resolved

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Previous studies that discuss the science of forensic dentistry including forensic identification by

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Chairani and Auerkari (2008) system analysis in the form of individual identification by Venegas the shape of the palatine rugae Urhobo people in Nigeria by Eboh analysis rugae palatine for identification of the population of India by Bhateja and Arora (2013) and identification fingerprint rugae Palatina Subras Deuteromelayu with approach formula fingerprint as application forensic dentistry by Permatasari have discussed rugae palatine as a means of identification that shows prospects promising because the morphology unique to each individual. Based on the above background, the researchers wanted to examine the formulation formulations palatine rugae prints on subras deutromelayu with formula equation fingerprints in the field of forensic dentistry.

Palatine rugae: Palatine rugae a ridge in the anterior part of the hard palate and slightly protruding section of the incisive papilla and in the anterior palatine raphe of the mucous membrane in the form of irregular, asymmetries and extends laterally. The function of the rugae palatal is to facilitate the transport of food as well as helping mastication of food (Chairani and Auerkari, 2008; Oscandar, 2012) rugae palatine also contribute to the perception of taste, perception of the position of the tongue and also the texture of food because of the rugae receptors gustatory and tactile (Chairani and Auerkari, 2008; Bowers, 2011). Shape, length and the number and orientation of individual setup palatine rugae very different. Anterior palatine rugae are generally more pronounced than the posterior and rugae never crossed the median raphe.

Palatine rugae evolved, since week 12 intra-uterine after fusion between palatal processes is completed. Rugae development and growth is under genetic control. Palatine rugae developing of proliferation and thickening of the epithelium in which fibroblasts and collagen fibers accumulate into a connective tissue found in the bottom layer of epithelial thickening (Sanjaya *et al*., 2012). Once formed palatine rugae, rugae will be amended in line with the growth in the size of the palate but the shape and pattern that is typical of rugae palatine, since birth will be retained.

Classification to assess the palatine rugae has been developed, ranging from simple to complex (Chairani and Auerkari, 2008). This classification was developed to simplify the process of identification of individuals. Research shows palatine rugae can be classified by size, direction and shape (Palatinas and Forma, 2009).

Palatine rugae size can be measured by calculating the length of rugae palatine of the deepest end (closest to the median raphe) palatine rugae palatine rugae to the outer edge. The palatine rugae classification by size can be seen in Table 1. Rugae palatine direction is determined by measuring the angle formed by the line connecting the origin and end of the line perpendicular to the median raphe. The palatine rugae classification is based on the direction presented in Table 2.

Table 1: Classification of palatine rugae by size according to Lyssell

Palatine rugae	Size
Primer	≥5 mm
Seconder	3-5 mm
Fragmented	2-23 mm

Table 2: Classification of palatine rugae based direction according to carrea (Chairani and Auerkari, 2008)

Classification (types)	Characteristics	Description
1	Postero-anterior	Direction
2	Perpendicular	Zero angle
3	Antero-posterior	Negative angle
4	Rugae with various positive angle	

MATERIALS AND METHODS

Mathematical modelling rugae palatina: The countries of the world basically prone to natural disasters so the need to develop and popularize forensic dentistry because in its application, forensic dentistry is very useful to identify unknown victims, especially in the major disaster with mass casualties.

Dentistry forensic science can help facilitate the investigator to identify the victim through dental, rugae palatine and lip prints where this field is an alternative identification of supporting stable and can withstand the confounding factors such as external trauma. Analysis of teeth and other components in the oral cavity such as fingerprints lips (lip print) and palatine rugae in humans can make a real contribution in the process of identification.

One of the organs of the human body which have unique properties and individualized to each person and can be used for individual identification purposes (Prasad *et al*., 2012). Palatine rugae also protected by trauma due to its position located in the head and protected from high temperatures by the fat pads on part of the buccal mucosa (Bowers, 2011). Palatine rugae can be learned through the number, length, location and shape. Due to its uniqueness, rugae palatine everyone may have the potential to become a means of individual identification. The more specific the uniqueness is on a means of identification will further minimize the chance similarity palatine rugae which may occur in some people and the availability of reliable (Chairani and Auerkari, 2008).

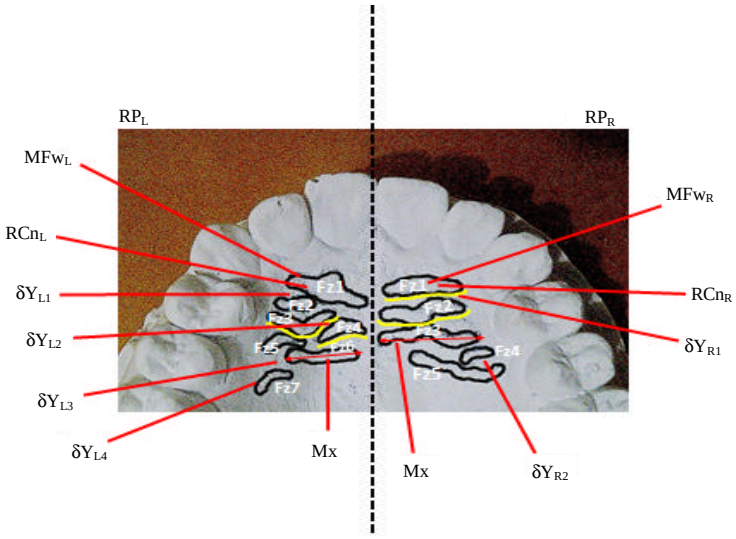

Fig. 1: Form rugae palatine

Each rugae palatine also has some peculiarities such as the shape, size, direction and number of ridge that is analogous to the characteristics possessed by fingerprint (Fig. 1). In certain circumstances, fingerprints as a means of self-identification does not another can be determined and will be difficult for example in case of fire. Fingerprints have a vulnerable and unprotected position that allows patterns and characteristics of the fingerprint is damaged so it can no longer be used as a means of identification. Based on these descriptions with mathematical modeling methods based on fingerprints (Babatunde *et al*., 2012) can be performed mathematical modeling fingerprints palatine rugae.

RESULTS AND DISCUSSION

Operational definitions and parameterization: Parameterization used in the search for fingerprints formula the palatine rugae include primary rugae, rugae counting, tracing rugae and the size of each rugae palatine with the notation:

- MFW: rugae primary (main form)
- RCN: rugae counting
- δy: rugae tracing
- Mx: size of each rugae palatine (measurement)

Tools and materials: Tools and materials used in this study is a positive mold of the upper jaw, jagka tipped needle, metal ruler, labels study and stationery. Data collection and analysis. The research data which contains information on the shape, number, size and direction of the palatine rugae analyzed to make prints formula the palatine rugae. Then, all the data from every rugae palatine each mold of the upper jaw is inserted into the formula the palatine rugae fingerprints that have been there. Then, viewed the specifications and the chance appearance of the palatine rugae same formulations using fingerprint formula rugae.

CONCLUSION

Palatine rugae is an organ that has the unique properties of each individual person, palatine rugae can be analyzed through the number, length, direction and shape. The uniqueness of every shape and pattern of the palatine rugae can be used as the basis for the identification of individuals.

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REFERENCES

Babatunde, I.G., A.O. Charles and O. Olatunbosun, 2012. A mathematical modeling method for fingerprint ridge segmentation and normalization. Intl. J. Comput. Sci. Inf. Technol. Secur., 2: 263-267.

Bhateja, S. and G. Arora, 2013. Analysis of palatal rugae for human identification in Indian (mathura) population. Indian J. Dent. Sci., 5: 24-27.

Bowers, C.M., 2011. Forensic Dental Evidence. 2nd Edn., Elsevier, Amsterdam, Netherlands,.

Chairani, S. and E.I. Auerkari, 2008. Palatal ruga utilization for forensic identification. Indonesian J. Dent., 15: 261-269.Eboh, D.E., 2012. Palatal rugae patterns of urhobos in abraka, South-Southern Nigeria. Intl. J. Morphol., 30: 709-713.

Oscandar, F., 2012. [Fahmi Oscandar, drg, Kes Want to Achieve Program Specialist Forensic Dentistry in Indonesia]. Padjadjaran University, Indonesia, (In Indonesian).

Palatinas, R. and S.D.A.D.S. Forma, 2009. Palatal rugae: Systematic analysis of its shape and dimensions for use in human identification. Intl. J. Morphol, 27: 819-825.

Prasad, S., G. Sujatha, G. Sivakumar and J. Muruganandhan, 2012. Forensic dentistry-what a dentist should know. Indian J. Multi. Dent., 2: 443-447.

Sanjaya, P.R., S. Gokul, K.J. Prithviraj and S. Rajendra, 2012. Significance of palatal rugae. Intl. J. Dent. Update, 2: 74-78.