



ASSOCIATION BETWEEN RUGAE PATTERN AND PERIODONTAL DISEASES – A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Forensic sciences, a well-established branch in the field of medicine and dentistry always aids in revealing person identity by various methods. Each person has unique set palatal rugae patterns which is characteristic and may be used to identify them. Periodontal disease initiation and propagation is through an imbalance of the commensal oral micro biota but can also occur due to environmental factors as well as due to genetic susceptibility of the individual. **Aim:** To evaluate the association between rugae pattern and periodontal diseases. **Materials & Methods:** 120 patients with age group between 20-50 years were equally divided into 4 groups of 30 patients each. Groups were characterized based on diagnosis of Group 1: periodontally healthy group, Group 2: gingivitis, Group 3: chronic periodontitis. Maxillary impressions cast were made in dental stone and palatal rugae pattern were then evaluated on maxillary casts. **Results:** The most prevalent rugae shape among group 1 was point followed by curve. Whereas in group 2 and group 3, the most prevalent was sinuous. **Conclusion:** Within the limitations of the study, it was found that sinuous rugae pattern were in greater frequency in chronic periodontitis and gingivitis patients. However, further studies with larger sample size are required to derive association between rugoscopy and chronic periodontitis.

KEYWORDS : Forensic science, Rugoscopy, Palatal Rugae, Periodontal disease

INTRODUCTION

Periodontal diseases are multifactorial in nature which is influenced by environmental and genetic factors. Genetic factors may play an important role in etiology of periodontal diseases and determining the nature of the host response.

A twin study was conducted by Michalowicz et al. 1991 on dizygous twins reared together (dizygous T) and apart (dizygous A) and monozygous twins reared together (monozygous T) and apart (monozygous A). They concluded that genetics seems to form the basis for the familial aggregation of periodontitis. Hassell & Harris 1995 conducted German studies of familial nature and it was seen to have aggregation of chronic forms of periodontitis in families which strongly suggests genetic predisposition [1].

Human identification an important part in forensic science. Various procedures have been collectively used for identifying an individual [2]. Most common include visual identification, use of dental records, fingerprints, and DNA comparisons.

Palatal rugae are transversely running folds of mucosa on hard palate. They are formed in the third month in utero from the hard connective tissue covering bone. The pattern orientation is formed by about 12th to 14th week of prenatal life. [3]

Filho et al (2009) stated that the rugae patters are unique to humans and it retain its shape throughout life, so can be useful for forensic identification [4]

So, this study was carried out to evaluate the association between rugae pattern and periodontal disease.

MATERIAL AND METHODS:

120 patients (60 males and 60 females) with age group between 20-50 years reporting to the outpatient Department of Periodontics, were equally divided into 3 groups of 40 patients each. Groups were characterised based on diagnosis as:
Group 1: Periodontally healthy group
Group 2: Gingivitis
Group 3: Chronic periodontitis

The approval for the study had been obtained from Institutional Review Board. All subjects were informed about the nature of the study and their informed consent was taken.

The subjects were selected based on the following inclusion and exclusion criteria. The inclusion criteria included subjects of age group 20-50 years, with minimum of 20 teeth present, and systemically healthy co-operative subjects. Subjects with history of antibiotic and/or anti-inflammatory drugs within previous 6 months, presence of fixed partial dentures or removable partial dentures or any orthodontic appliances, medically compromised subjects, pregnant women, women on oral contraceptive medication and lactating mothers, subjects who were smokers and/or tobacco chewers, subjects who had undergone any periodontal therapy in past 6 months were excluded.

Alginate impressions of the maxillary arch of the selected subjects were made in stock trays and poured in Type III dental stone according to the manufacturer's instructions.

The rugae seen as elevated impressions were marked on these casts using a fine lead pencil. The rugae pattern was classified according to Trobo classification [3] for shape analysis as follows:

Classification	Rugae type	Shape
Type A	Point	
Type B	Line	
Type C	Curve	
Type D	Angle	
Type E	Sinuous	

Figure 1: Trobo classification [3]
The data thus collected was subjected to statistical analysis.

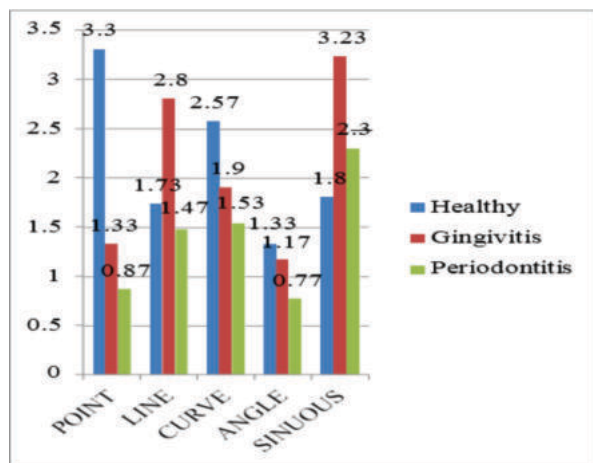
Statistical Analysis:

Data obtained was compiled on a MS Office Excel Sheet (v 2019, Microsoft Redmond Campus, Redmond, Washington, United States). Data was subjected to statistical analysis

using Statistical package for social sciences (SPSS v 26.0, IBM). Descriptive statistics like Mean & SD for numerical data has been depicted. Inter group comparison (>2 groups) was done using one way ANOVA followed by pair wise comparison using post hoc test. For all the statistical tests, $p < 0.05$ was considered to be statistically significant, keeping α error at 5% and β error at 20%, thus giving a power to the study as 80%.

RESULTS:

Point rugae type was most common in healthy group followed by curve and angle rugae type. There was a statistically highly significant difference seen for the values between the groups ($p < 0.01$) for line rugae type followed by sinuous rugae type with higher values in gingivitis group. Sinuous rugae pattern was most common in periodontitis group.



Graph - 1 Inter Group Comparison With Patterns

Table - 1 Inter Group Comparison With Patterns

		N	Mean	Std. Deviation	p value of one way ANOVA
POINT	Healthy	30	3.30	.877	
	Gingivitis	30	1.33	1.124	.000**
	Periodontitis	30	.87	.860	
LINE	Healthy	30	1.73	.785	
	Gingivitis	30	2.80	.961	.000**
	Periodontitis	30	1.47	.900	
CURVE	Healthy	30	2.57	.679	
	Gingivitis	30	1.90	1.125	.001**
	Periodontitis	30	1.53	1.137	
ANGLE	Healthy	30	1.33	.758	
	Gingivitis	30	1.17	.834	.033*
	Periodontitis	30	.77	.935	
SINUOUS	Healthy	30	1.80	.847	
	Gingivitis	30	3.23	.971	.000**
	Periodontitis	30	2.30	1.343	

DISCUSSION

Periodontitis is multifactorial disease one of the factors being genetic factors.

Rugae patterns are unique to individuals like fingerprints. There are many classifications of rugae patterns which are based on shape, size, and length. The most simple and reliable method for classification of palatal rugae is the one based on its shape. It does not involve the use of complex instruments. So, this classification based on the shape was used for the study.

Rugoscopy is economical and non-invasive procedure. Also, the diagnostic casts used in rugoscopy can serve as long term records for future references. So, the present study

was carried out to evaluate the association between rugae pattern and periodontal diseases. According to the present study, there was increased sinuous rugae pattern in patients with gingivitis and chronic periodontitis. This is in accordance to the study conducted by Abrol S et al [5], Hermosilla et al [6] and Jindal V et al 2016.[7]

The present study revealed higher prevalence of point pattern of rugae in periodontally healthy patients. This was in accordance to the study done by Jindal et al [7] where point pattern of rugae were found in periodontally healthy patients.

The participants of the healthy group who showed similar rugae patterns as that of patients with periodontal disease can be considered susceptible to the disease in the future. So, in such patients preventive measures can be taken.

Peavy and Kendrick [1967] stated that no significant changes in form and layout of palatal rugae had been observed either by the eruption of the teeth or by their loss [8]. On the contrary, Limson and Julian stated that extraction would lead to change in the direction of palatal rugae [9]. So, there can be change in rugae pattern following extractions in patients with chronic and aggressive periodontitis. This could possibly be the reason for change in rugae shape.

CONCLUSIONS

Within the limitations of the study, it was found that sinuous rugae pattern were in greater frequency in chronic periodontitis and gingivitis patients. However, further studies with larger sample size are required to derive association between rugoscopy and chronic periodontitis. This could probably be used as a preventive tool in future but is still in its infancy.

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