



GINGIVAL BIOTYPE- AN APPRAISAL IN THE ESTHETIC ZONE

Periodontology

Mahesh Chavda	Professor, Department of Periodontology, Government Dental College and Hospital Ahmedabad
Neeta Bhavsar	Professor & HOD, Department of Periodontology, Government Dental College and Hospital Ahmedabad
Rachana Gaonkar*	Post graduate student, Department of Periodontology, Government Dental College and Hospital Ahmedabad *Corresponding Author
Swapna Patki	Post graduate student, Department of Periodontology, Government Dental College and Hospital Ahmedabad
Shreeja Nair	Post graduate student, Department of Periodontology, Government Dental College and Hospital Ahmedabad

ABSTRACT

The interface between the restoration and the gingival tissue seems to have a great influence on the final outcome of various treatments. Therefore, the aim of this study was to evaluate the correlation between different morphometric parameters with the thickness of buccal gingiva at the cemento- enamel junction. In 60 periodontally healthy subjects, the six maxillary anterior teeth were examined. Clinical parameters included the gingival thickness, crown width/crown length ratio (CW/ CL), gingival width (GW), papillary height and transparency of the periodontal probe through the gingival sulcus (TRAN). A positive correlation was found between the gingival thickness (GT) and the crown width/ crown length (CW/CL) ratio as well as the papillary height (PH). A weak negative correlation was found between the transparency of probe TRAN and gingival width (GW) with the gingival thickness (GT). Thus, crown form (CW/CL) and papillary height are helpful indicators to determine the gingival thickness at the cemento- enamel junction. The transparency of probe method is subjective and cannot be relied upon for clinical application.

KEYWORDS

Gingival Biotype, Crown width/length, Papillary height

INTRODUCTION

Most recent studies have been focusing on the relationship of the interface between the restoration and the gingival tissue which seems to have a significant influence on the final outcome of various treatments. Knowing the gingival biotype, gingival architecture, morphologic characteristics of the teeth benefits esthetic restorations as well. Gingival biotype is the thickness of the gingiva in the faciopalatal dimension and is genetically determined in every individual¹.

Patients who have undergone an immediate implant or any restorative or regenerative treatment may be prone to gingival recession or periodontal attachment loss. Proper diagnosis and necessary treatment plan alternations avoids such complications.

As regards with the gingival thickness, various studies have discussed the importance of "thick vs. thin" gingiva in restorative treatment planning. Transparency of the periodontal probe is the most commonly used method³. It is a subjective method and hence is not reliable. Thus, morphometric parameters of the anterior teeth are assessed for this purpose.

MATERIALS AND METHODS

Study design

This study was designed as a cross- sectional study comprising of 60 periodontally healthy subjects in the age group of 18- 25 years from the out- patient department of Government Dental College and Hospital, Ahmedabad. The study protocol was approved by the Ethics Committee of the Gujarat University and written consent was obtained from all subjects before clinical examination.

Exclusion criteria

- Patients with malaligned maxillary anterior teeth.
- Patients who are orthodontically treated.
- Patients with any systemic disease (diabetes, hypertension, thyroid disorders, bleeding disorders).
- Habitual tobacco smokers or alcoholics.

Clinical examination

The six maxillary anterior teeth were examined. Clinical parameters included:

- Gingival thickness (GT): measured after delivery of topical and/or local anaesthetic, an endodontic file (30 K) was inserted transgingivally until contact with the tooth structure was felt (Fig. 1).
- Crown width/crown length ratio (CW/ CL): CL- between the incisal edge of the crown and the free gingival margin and CW- the distance between the proximal tooth surfaces, at the apical contact point (Fig. 4).
- Gingival width (GW): measured by a UNC- 15 probe from the gingival margin to the mucogingival junction after application of Lugol's iodine 2% (Fig. 2).
- Papillary height (PH): measured from the top of the papilla to a line connecting the mid-facial soft tissue margin of the two adjacent teeth (Fig. 5).
- Transparency of the periodontal probe through the gingival sulcus (TRAN): insert a probe into the mid- buccal sulcus of the maxillary central incisor and you can see it through the tissue (Fig. 3).



Fig. 1

Fig. 2

Fig. 3



Fig. 4



Fig. 5

RESULTS

The study comprised of 60 subjects (30 males and 30 females) with a mean age of 21.5 years. Outcome values of all continuous parameters were given as mean and standard deviation (SD) as shown in Table 1. Using the Pearson correlation coefficient with the corresponding 95% confidence interval, correlations of CW/CL, PH and GW with the thickness of the gingiva at the cemento- enamel junction were calculated as shown in Table 2&3.

Table 1 Clinical measurements

		Mean +/- SD (%)	Range
Gingival thickness (GT)	Central incisor	1.55 +/- 0.23	1.32- 1.78
	Lateral incisor	1.22 +/- 0.21	1.01 - 1.43
	Canine	1.14 +/- 0.2	0.94 - 1.34

Crown width/crown length ratio (CW/CL)	Central incisor	0.84 +/- 0.13	0.71- 0.97
	Lateral incisor	0.83 +/- 0.1	0.73- 0.93
	Canine	0.9 +/- 0.13	0.77- 0.91
Gingival width (GW)	Central incisor	5 +/- 0.01	4.99- 5.01
	Lateral incisor	5 +/- 0.01	4.99- 5.01
	Canine	5 +/- 0.01	4.99- 5.01
Papillary height(PH)	CI-CI	2.8 +/- 0.041	2.75- 2.84
	CI-LI	2.69 +/- 0.04	2.65- 2.73
	LI-C	2.59 +/- 0.041	2.54- 2.63
Transparency of the periodontal probe (TRAN)	Central incisor	26(43.3%)	
	Lateral incisor	35(58.3%)	
	Canine	28(46.7%)	

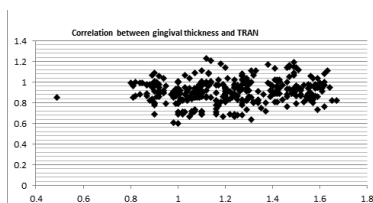
Table 2
Independent Samples T-Test

	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	P Value
Gingival thickness(mm)	360	1.22	.23	.012	-2.73	<0.001
Papillary length (mm)	300	3.95	.81	.047		

Table 3
Paired T-test

	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P Value
Gingival thickness(mm)	1.22	360	.23	.012	-3.24	<0.001
Gingival width (mm)	4.47	360	.51	.027		
Gingival thickness(mm)	1.22	360	.23	.012	0.32	<0.001
CW/CL	0.91	360	.11	.006		

The relationship between TRAN and gingival thickness was evaluated with the point biserial correlation.



DISCUSSION

In a study by Ochsensbein and Miller², they discussed the importance of "thick vs. thin" gingiva in restorative treatment planning. One of the most frequently used methods for identifying gingival thickness was the transparency of the periodontal probe 4,5,6,7. However, probe transparency has not always been correlated with measurements of the gingival thickness. 4,5,8 According to a study done by Stein 2013, crown width/crown length ratio and gingival width could represent surrogate parameters to anticipate the gingival thickness at the cemento-enamel junction, whereas CW/CL might also be an indicator for alveolar bone crest thickness¹¹.

Gingival thickness is significant in the development of mucogingival problems, in the success of periodontal surgery and also in anterior implant procedures.

Different parameters have been used to assess the gingival thickness or the so-called gingival biotype. However, there is no precise definition of how thick a thick biotype should be compared to a thin one. One of the reasons may be seen in the fact that thickness of the gingiva has been assessed at different vertical levels^{6,7,9}.

Different methods used for assessing the gingival thickness are direct measurements¹², visual examination, probe transparency, ultrasonic devices¹³ and CBCT. Each of the techniques mentioned above have their own benefits and limitations. The technique used in this study to determine the gingival biotype is by using the morphometric parameters of the esthetic zone which is more feasible, inexpensive and less time consuming.

One of the main results of this study was the positive correlation of gingival thickness at CEJ level with CW/CL ratio and papillary height. Furthermore, data from the present investigation demonstrates a weak negative correlation of the gingival thickness with gingival width and transparency of the probe.

Considering the growing attention paid to anterior aesthetics by both patients and clinicians, such findings can help enhance the knowledge of the morphologic and anatomic form of the gingiva, which can be utilized as a guide to achieve optimal soft-tissue aesthetics. A thorough understanding of the biotype form of the gingival tissue is mandatory, for a clinician so as to predict the tissue response to various pathologies as well as before treatment planning, to optimize the final outcome of the periodontal therapy.

Within the limits of the current investigation, the existence and correlation of different gingival biotypes and dentopapillary complex dimension has been confirmed. The result of the present study showed that there was highly significant correlation between gingival biotype and crown length and area of papilla. These findings can be utilized as objective guidelines for determining the biotype and response of gingiva to many dental operative procedures. But further long-term studies should be carried on with large sample size to ascertain these findings.

CONCLUSION

From this study, it can be concluded that a clear distinction between a thin and a thick gingival biotype is very difficult. Our findings suggest that crown form (CW/CL) and papillary height (PH) are helpful indicators for the thickness of the gingiva over the cemento-enamel junction. Whereas, transparency of the periodontal probe was negatively correlated with thickness of gingiva and had only minimal prognostic value for the gingival thickness. However, due to the limited sample size the results should not be generalized. Therefore, it is recommended future studies conducted may be more meaningful to verify the predictive potential of crown form and papillary height on gingival tissue thickness by using a cone beam computed tomography (CBCT).

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