ISSN (Print): 2209-2870 ISSN (Online): 2209-2862



International Journal of Medical Science and Current Research (IJMSCR) Available online at: www.ijmscr.com Volume 4, Issue 5, Page No: 291-295 September-October 2021



### Correlation of gingival thickness (GT) with gingival width (GW), probing depth (PD), width of attached gingiva (WAG) and papillary fill (PF) in maxillary anterior teeth region- A cross sectional study

### SANDHYA R<sup>1</sup>, RAJA V MURTHY.K<sup>2</sup> and JHANSI.A\*

<sup>1</sup>Professor. <sup>2</sup>Professor and Head

Department of Periodontics and Oral Implantology, GITAM Dental College and Hospital, Visakhapatnam, Andhra Pradesh, INDIA

> \*Corresponding Author: JHANSI.A

Department of Periodontics and Oral Implantology, GITAM Dental College and Hospital, RUSHIKONDA, Visakhapatnam, Andhra Pradesh

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

#### Abstract

**BACKGROUND:** Periodontal phenotype plays a major role in maintaining periodontal health, with a significant impact on the outcome of restorative therapy.

**AIM:** To correlate gingival thickness (GT) with gingival width (GW), probing depth (PD), width of attached gingiva (WAG) and papillary fill (PF), in the maxillary anterior teeth region.

**METHODS AND MATERIAL:** The study included clinical data on 274 patients (1644 maxillary anterior teeth) who visited the outpatient department of Periodontics in GITAM Dental College and Hospital, Visakhapatnam. GT, GW, WAG, PD and PF were evaluated in all patients. The data obtained was tabulated and subjected to statistical analysis.

**RESULTS:** GT was seen to be directly correlated with PD and PF. Conversely GT could not be correlated with GW and WAG.

**CONCLUSION:** Periodontal phenotype not only varies from person to person, but being a genetically determined characteristic, it also has an influence on other gingival features.

### Keywords: GT; GW; WAG; PD; PF

### INTRODUCTION

Gingival phenotype plays a major role in maintaining periodontal health and it has a significant impact on the outcome of restorative therapy.<sup>1</sup> Ochsenbein and Ross 1969 indicated two types of gingival anatomyflat and scalloped. Seibert and Lindhe classified gingiva as either thin scalloped or thick flat.<sup>2</sup> The thin scalloped gingival phenotype is delicate, more prone to recession, bleeding, and inflammation<sup>3</sup> and most prominent among women. Thick flat gingival phenotype is dense, fibrotic with a wide zone of attachment, making it more resistant to recession<sup>3</sup> and more prominent among men. The prevalence of thin phenotype is around 43% and thick phenotype is 56%.<sup>4</sup> Thick and flat gingiva is more resistant and reverts to its original form and dimension in the healing phase after periodontal therapy.<sup>3</sup> Hence the gingival phenotypes should be evaluated at the start of the treatment plan.

Gingival width (GW)/ Keratinized gingival width is the width of marginal and attached gingiva. Width of attached gingiva (WAG) is the difference of total gingival width and pocket depth.<sup>5</sup>GW and WAG are significant for maintaining good oral hygiene and healthy periodontium.

Open interdental spaces (OIS) are extremely difficult to treat. They cause aesthetic and phonetic difficulties, and food impaction. These OIS/black triangles are caused due to loss of interproximal papilla. Papillary fill (PF) is essential in the aesthetic zone, but due to the limited blood circulation at the papillary tip, papillary regeneration is not so reliable.<sup>3</sup>

Gingival phenotype not only varies from person to person, but also influences other gingival features. Hence, the aim of this study was to correlate gingival thickness (GT) with gingival width (GW), probing depth (PD), papillary fill (PF) and width of attached gingiva (WAG), in the maxillary anterior teeth region.

### Material and methods

### Subjects:

This study included clinical data on 274 patients who visited the outpatient department of Periodontics and Oral Implantology, GITAM Dental College and Hospital, Visakhapatnam. Subjects above the age of 18 years with all maxillary anterior teeth were included in the study.

### **Exclusion criteria:**

- i. Subjects having high frenal attachments
- ii. Individuals with masochistic habits
- iii. Restorations or prosthesis in maxillary anterior teeth region
- iv. Subjects receiving medications known to affect periodontal soft tissues
- v. Subjects undergoing orthodontic treatment
- vi. Subjects who underwent any periodontal surgery in the recent past
- vii. Smokers

GT was evaluated for six anterior teeth and categorized into thick or thin based on the probe transparency method. UNC-15 periodontal probe was inserted into the sulcus at the midfacial aspect of maxillary anteriors. If the outline of the underlying probe could be seen through the gingiva, it was categorized as thin (score 0). If not, it was categorized as thick (score 1).

GW was measured from crest of the marginal gingiva to mucogingival junction. PD was the distance from the free gingival margin to the base of the gingival sulcus. GW and PD were measured at the midfacial aspect of maxillary anteriors with a UNC-15 probe to the nearest millimetre. WAG was calculated by subtracting pocket depth from GW.

PF was evaluated based on Jemt's index. Score 0 was assigned for absent papilla, Score 1 for papilla occupying less than half the distance from its contact point to base, Score 2 for papilla occupying more than half the distance from its contact point to base and Score 3 for interproximal space completely occupied by papilla.

All the clinical parameters were recorded on six maxillary anterior teeth and subjected to statistical analysis using Students 't' test and Chi square test. P < 0.05 was considered statistically significant.

### Results

The number of teeth examined were 1644. Of these, 1051 teeth showed the presence of thick gingival phenotype and 593 teeth showed thin gingival phenotype.

# Correlation between gingival thickness and width of attached gingiva

The mean WAG in thin gingival phenotype was  $2.97\pm1.04$  mm whereas the mean WAG in thick gingival phenotype was  $2.92\pm1.07$  mm. On comparison, WAG did not differ significantly (p=0.58) between the two gingival phenotypes. (Table-1)

## Correlation between gingival thickness and gingival width

The mean GW in thin gingival phenotype was  $4.97\pm0.69$  mm and was  $5.02\pm0.75$ mm in the thick gingival phenotype. The p value = 0.42 showed no significant difference in the GW between the two groups. (Table-1)

# Correlation between gingival thickness and probing depth

The mean probing depth of teeth with thin gingival phenotype was  $2.00\pm0.86$ mm and the mean probing depth of teeth with thick gingival phenotype was  $2.21\pm1.21$ mm. PD was significantly higher in thick gingival phenotype compared to thin gingival phenotype (p=0.02). (Table-1)

# Correlation between gingival thickness and papillary fill

Volume 4, Issue 5; September-October 2021; Page No 291-295 © 2021 IJMSCR. All Rights Reserved

When papillary fill was compared between the two gingival phenotypes, 0.7% of thick gingival phenotype showed absence of papilla (score 0) as compared to 0.5% in thin gingival phenotype. The difference was (p=0.69) not statistically significant. (Table-2)

10.4% of thick gingival phenotype and 13.2% of thin gingival phenotype showed papilla occupying less than half the distance from base to contact point (score1). The difference (p=0.09) was not statistically significant. (Table-2)

A significantly higher percentage 34.9% of papilla with thin gingival phenotype occupied an apical position that was more than half the distance from the contact point to the base of the papilla (score 2) as compared to 29.8% of thick gingival phenotype (p<0.03). (Table-2)

Thick gingival phenotype showed significantly (p<0.01) greater percentage (59.2%) of complete papilla fill (score 3) as compared to thin gingival phenotype (51.4%). (Table-2)

### Discussion

Gingival phenotypes can affect the results of periodontal therapy, root coverage procedures, and implant placement.<sup>2</sup> Evaluation of gingival phenotype helps in the prediction of treatment outcomes; stability of osseous crest and position of free gingival margin are directly proportional to thickness of bone and gingival tissue.<sup>3,6</sup> In patients with thin gingival phenotype, more gingival recession was observed following nonsurgical periodontal therapy compared to thick gingival phenotypes.

There are various methods to evaluate the thickness of gingiva like transgingival probing, conventional histology on cadaver jaws, injection needles, histologic sections, probe transparency, ultrasonic devices and cone-beam computed tomography (CBCT).<sup>3,2</sup>

In this study, probe transparency method described by Kan et al. in 2003 was used. De Rouck et al. in 2009 found this method to have high reproducibility, showing 85% interexaminer repeatability.<sup>3,1</sup> In this study 63.9% of teeth showed thick gingival phenotype and 36.07% of teeth showed thin gingival phenotype.

Gingival width was more in thick gingival phenotype  $(5.02\pm0.75$ mm) compared to thin gingival phenotype  $(4.97\pm0.69$  mm) in the present study. This result was in accordance with studies conducted by Olsson et al. in 1993 and Zeinab Rezaei Esfahrood et al. in 2012. Cook et al. in 2011 conducted a CT study and demonstrated a partial positive correlation between periodontal thickness and width of keratinized tissue. It was shown that thin phenotype showed narrower zone of keratinized tissue as compared to thick phenotype. It has been suggested that thick gingiva is more resistant to physical trauma and gingival recession, and allows better tissue management<sup>3,7</sup> compared to thin gingiva.

According to this study the probing depth was significantly higher (p=0.02) in thick gingival phenotype  $(2.21\pm1.21$ mm) compared to thin gingival phenotype  $(2.00\pm0.86\text{mm})$ . Goaslind et al. in 1977 and Muller et al. in 2000 made similar observations. De Rouck et al. in 2009 stated that significant distinction in phenotype to pocket depth could not be found as periodontally healthy subjects were included in their study. Thin gingival phenotype is associated with more gingival recession hence resulting in reduced probing depth as observed in this study.<sup>3,6,8</sup>

A significantly (p<0.001) higher percentage of complete papilla fill (Score-3) was observed in thick gingival phenotype (59.2%) as compared to thin gingival phenotype (51.4%). A study done by Kan et al. in 2010 stated that gingival phenotype was not found to have any effect on interdental papilla. Another study done by Romeo et al. stated that the presence of papilla between immediate single implant and adjacent teeth was found to be significantly correlated to thick peri-implant mucosa. Thin phenotype is associated with higher risk of recession in buccal area, hence must have contributed to lesser percentage of complete papilla fill as observed in this study.<sup>3,9</sup>

To conclude, the present study confirmed a positive correlation between gingival thickness and probing depth and between gingival thickness and papillary fill. A weak correlation was found between gingival thickness and gingival width and between gingival thickness and width of attached gingiva. The main limitation of this study was the small sample size.

### **CONCLUSION**

Gingival phenotype plays a key role in the outcome and effects of periodontal and peri-implant surgery. As Page 2 this study showed that GW, WAG have weak

 $\mathbf{m}$ 

σ

correlation with GT, long-term randomized control trials with a larger sample size should be undertaken

in the future, to establish their correlation with gingival phenotypes.

#### **TABLES**

	Thin		Th	P-value	
	Mean	SD	Mean	SD	
WAG	2.97	1.04	2.92	1.07	0.58
GW	4.97	0.69	5.02	0.75	0.42
PD	2.00	0.86	2.21	1.21	0.02*

Table 1- Correlation of gingival thickness with width of attached gingiva, gingival width and probingdepth.

		GT						
PF	Thick (n=1051 (63.9%))		Thin (n=593 (36.07%))	P-value				
	Count	%	Count	%				
Absent papilla	7	0.7%	3	0.5%	0.69			
Less than half distance	109	10.4%	78	13.2%	0.09			
More than half distance	313	29.8%	207	34.9%	0.03*			
Completely occupied	622	59.2%	305	51.4%	<0.01*			
Total	1051	100.0%	593	00.0%				
Chi-square value = 9.93 Df = 3 P-value < 0.01*								

Table 2- Correlation between gingival thickness and papillary fill.

#### References

- 1. De Rouck T, Eghbali R, Collys K, De Bruyn H, Cosyn J. The gingival biotype revisited: Transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva. J Clin Periodontol 2009; 36:428-33.
- Zeinab R, Mahdi K, Mohammad RT. Gingival biotype: A review. Acad Gen Dent 2003; 17:14-7.
- Singh J, Rathod VJ, Rao PR, Patil AA, Langade DG, Singh RK. Correlation of gingival thickness with gingival width, probing depth, and papillary fill in maxillary anterior teeth in students of a dental college in Navi Mumbai. Contemp Clin Dent. 2016;7(4):535-538.

JHANSI.A al International Journal of Medical Science and Current Research (IJMSCR)

- Shah R, Sowmya N K, Thomas R, Mehta DS. Periodontal biotype: Basics and clinical considerations. J Interdiscip Dentistry 2016; 6:44-9.
- 5. Muller HP, Schaller N, Eger T, Heinecke A. Thickness of masticatory mucosa. J Clin Periodontol 2000; 27:431-6.
- 6. Maynard JG Jr., Wilson RD. Physiologic dimensions of the periodontium significant to the restorative dentist. J Periodontol 1979; 50:170-4.
- 7. Chow YC, Eber RM, Tsao YP, Shotwell JL, Wang HL. Factors associated with the appearance of gingival papillae. J Clin Periodontol 2010; 37:719-27.

- Baldi C, Pini-Prato G, Pagliaro U, Nieri M, Saletta D, Muzzi L, et al. Coronally advanced flap procedure for root coverage. Is flap thickness a relevant predictor to achieve root coverage? A 19-case series. J Periodontol 1999; 70:1077-84.
- 9. Souza OM, Neri JF, Topazio L, Donadone RC, Freitas AC, Barreto MA. Influence of tissue biotype in the morpho-esthetic-functional behavior of the peri-implant tissue: A literature review. Dental Press Implantol 2012; 6:56-66.
- 10. Vandana KL, Savitha B. Thickness of gingiva in association with age, gender and dental arch location. J Clin Periodontol 2005; 32:828-30