Research Article

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Correlation between Gingival Biotype and Tooth Form Using Probe Transparency and Transgingival Probing Methods

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ABSTRACT

Aim: To evaluate gingival biotype using two different methods and to assess if gingival biotype is related to tooth form.

Materials and Methods: A total of 100 dental undergraduate subjects in the age range of 18-25 years participated in the study. Two clinical parameters were recorded by one examiner. This included the crown width/length ratio of the two maxillary central incisors & gingival thickness. Gingival thickness was measured by two methods – probe transparency and transgingival probing. The measurements were tabulated and evaluated. Student t test was used to analyse the results.

Results: There was no correlation between gender and gingival biotype. There was a significant correlation between gingival biotype with tooth form.

Conclusion: Thicker biotype was associated with square tooth form and thinner biotype with tapered tooth form. Among the two methods used to measure gingival thickness, transgingival probing was most accurate and reliable method when compared to probe transparency method.

Keywords: Gingival biotype, tooth form, transgingival probing, implant treatment planning.

INTRODUCTION

Clinical appearance of healthy periodontal tissues differs from subject to subject (Olsson & Lindhe 1991). Gingival perspective is important for harmonizing aesthetics along with function.[1] Gingival perspective is concerned with the soft tissue envelope surrounding the teeth. The gingival texture, shape, tooth-tooth progression and its relation to extra-oral tissues is interdependent of many factors. These include anatomy of dentogingival complex, tissue hierarchy, osseous crest considerations, periodontal biotype and bioform, tooth morphology, contact points and tooth position.[2] The term gingival biotype has been used to describe the thickness of the gingiva in the faciopalatal dimension.[3] It has been suggested that a direct correlation exists between gingival biotype and the susceptibility to gingival recession following surgical and restorative procedures.[4] There-fore, an accurate diagnosis of gingival tissue biotype is of utmost importance in devising an

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Fig 1: Measurement of crown length (CL)

Fig 2: Measurement of crown width (CW)

Fig 3: Evaluation of gingival thickness by probe transparency method-thin gingiva.

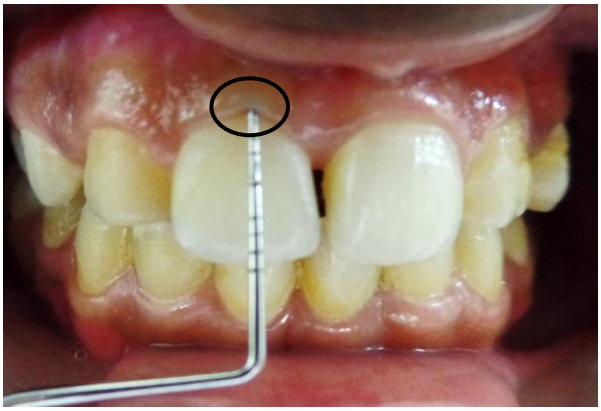


Fig 4: Evaluation of gingival thickness by probe transparency method-thick gingiva.

Fig 5: Evaluation of gingival thickness by transgingival probing method.

Fig. 6. Correlation between gender and tooth form

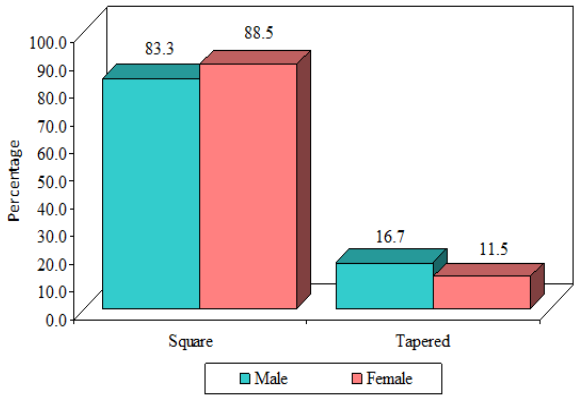


Fig 7: Correlation between gender and gingival biotype.

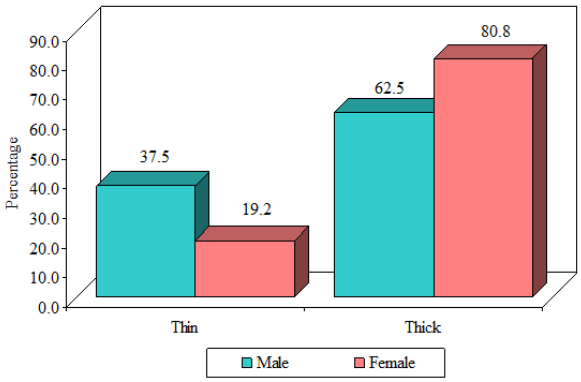


Fig 8: Correlation between gingival biotype determined by probe transparency method and tooth form.

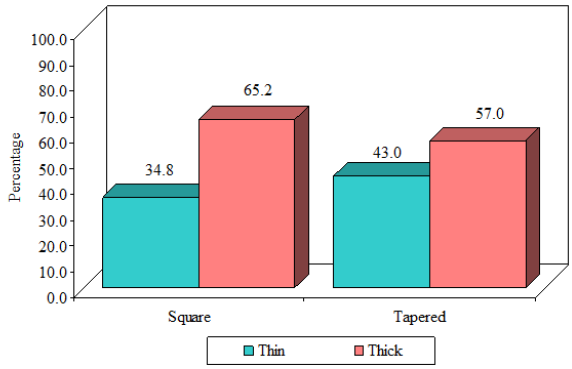
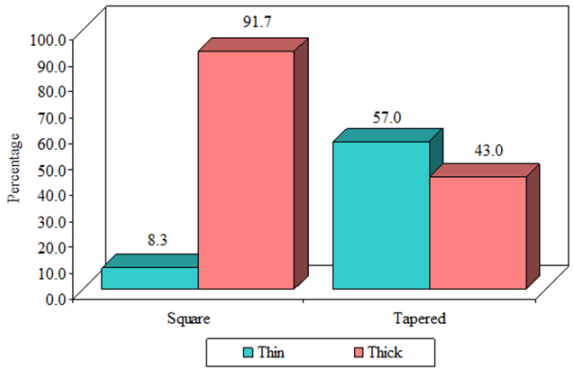


Fig 9: Correlation between gingival biotype determined by transgingival probing method and tooth form.



appropriate treatment plan and achieving a predictable esthetic outcome.

Seibert and Lindhe, classified the gingiva biotype as either thin scalloped or thick-flat.[5] Thick gingival biotype consists of flat soft tissue and thick bony architecture. It is dense, fibrotic with large zone of attachment and more resistant to gingival recession. Therefore it is more conductive for implant placement, resulting in favourable aesthetic outcomes.

The thin gingival biotype is friable, leading to recession following crown preparation and periodontal or implant surgery. This is particularly significant for full coverage crowns for the following reasons. Firstly, the thin gingival margins allow visibility of a metal substructure (either porcelain fused to a metal crown or implant abutment), thereby affecting aesthetics in the anterior regions. Secondly, due to fragility of the thin tissue, delicate management is essential for avoiding recession.

Linkevicius et al., [6] studied the influence of soft tissue thickness on crestal bone changes around implant and documented significant peri-implant bone loss in sites with thin tissue compared to thick tissues. Nisapakultorn et al.[7], documented a thin biotype being significantly associated with increased risk of facial mucosal recession. In addition, a trend towards more gingival recession at immediate single-tooth implant restorations in patients with a thin scalloped biotype was described.

Many methods have been used to evaluate the thickness of facial gingiva. These include conventional histology on cadaver jaws, injection needles, visual inspection, transgingival probing, histologic sections, cephalometric radiographs, probe transparency, ultrasonic devices, and CBCT. Among these methods, use of simple methods such as probe transparency and transgingival probing methods to identify the gingival biotypes can help the clinician with the better treatment planning and definitive treatment outcome.

It has been suggested that morphologic characteristics of the periodontium are partly related to the shape and form of the teeth (Seibert and Lindhe 1989). De Rouck et al.[8] and Eghbali et al.[9] stated that females tend to have long, slender teeth associated with thin gingival biotype and males tend to have square teeth associated with thicker biotype.

So, the aim of this study was to assess gingival biotype using two simple methods, such as

transgingival probing, probe transparency and to correlate if gingival biotype is related to tooth form.

Objectives

- To assess gingival biotype
- To study relation of gingival biotype to gender
- To study relation of gingival biotype to tooth form

MATERIALS AND METHODS

A total of 100 undergraduate students studying at SVS Institute of Dental Sciences of age group between 18-25 years with good oral hygiene and intact maxillary central incisors were included in the study. Among these 100 students – 50 were males and 50 were females.

Exclusion criteria

1. Restorations in anterior maxillary teeth
2. Gingivitis
3. Periodontitis
4. Gingival recession
5. Malaligned teeth

Clinical procedure

After selection of subjects, a written informed consent was taken from the subjects to participate in the study. Two clinical parameters were assessed by one examiner to avoid bias. First Crown width / Crown length ratio (CW/CL) ratio of the maxillary right central incisor was measured according to Olsson and Lindhe.[10] The assessment of crown width and length were recorded to the nearest of 0.1 mm with a digital caliper. The crown length was measured between the incisal edge of the crown and the free gingival margin (Fig. 1). The length of the crown was divided into three equal portions of equal height. Crown width, i.e. the distance between the approximal tooth surfaces, was recorded at the border between the middle and the cervical portion. A tooth with a CW/CL ratio of 1 or close to 1 represents a short and wide crown form, while a low CW/CL value corresponds to a long and narrow crown (Fig. 2).

Gingival thickness was assessed by two methods

Probe transparency method - Gingival thickness was evaluated and categorized into thick or thin. This evaluation was based on the transparency of the periodontal probe through the gingival margin while probing the sulcus at the mid-facial aspect of right maxillary central incisor (Kan et al. 2003).[11] If the outline of the underlying periodontal probe could be seen through the gingiva , it was categorized as thin (Fig. 3); if not, it was categorized as thick (Fig. 4).

Transgingival probing method – Facial gingiva was anesthetised with lignocaine topical spray and if required, local infiltration was given. Gingival thickness was assessed mid-buccally in the attached gingiva, half way between the mucogingival junction and free gingival groove, using a periodontal probe which was pointed at the tip. On measuring if the gingival thickness is ≥1.5 mm, it is considered to be thick gingival biotype; if it is <1.5mm, it is a thin gingival biotype.[12] (Fig. 5).

RESULTS

Student t test was used to compare the results. Out of 100 subjects included in the study, 50 were males, 50 were females. Among males, prevalence of square tooth form was 83.3 % and tapered tooth form was 16.7 %. Among females, prevalence of square tooth form was 88.5 % and tapered tooth form was 11.5%. (Fig. 6). Among males, prevalence of thick gingival biotype was 62.5% and thin form was 37.5%. Among females, prevalence of thick gingival biotype was 80.8% and thin form was 19.2% (Fig. 7).

Association between gingival biotype determined by probe transparency and tooth form: Among square teeth, prevalence of thick gingival biotype was observed to be 65.2%; where as thin gingival biotype to be 34.8%. Even among tapered teeth, thick gingival biotype was observed to be more prevalent when compared to thin biotype. The p value was 0.2612, which states that there was no significant correlation between gingival biotype and tooth form with this method (Fig. 8).

Association between gingival biotype determined by transgingival probing and tooth form: Among square teeth, thick gingival biotype accounted for 91.7%, while thin biotype to be 8.3%. Among tapered teeth, thick biotype accounted for

43%, while 57% to be of thin biotype. The p value was 0.04*, stating that there was a significant correlation between gingival biotype to tooth form with this method (Fig. 9).

DISCUSSION

Harmony and symmetry of a restoration with the surrounding soft tissues may be most challenging and is considered to be the ultimate goal in terms of esthetics. So, it is important to have an insight into the morphological appearance of the periodontal structures and teeth to accomplish this goal in a predictable way. Tooth form was assessed according to Olsson and Lindhe, where CW/CL ratio of 1 or close to 1 was considered to be a square tooth form and CW/CL ratio of less than 1 was considered to be a tapered tooth. Out of 100 subjects, 86% accounted for square teeth and remaining 14% were tapered teeth.

Relating gender to tooth form, De Rouck et al.,and Eghbali et al., in their study of a white population stated that females tend to have long, slender teeth associated with thin gingival biotype and males tend to have square teeth associated with thick biotype. In contrast to previous studies, in the present study gender was neither related to tooth form nor the gingival biotype and interestingly it was found that females had a little higher prevalence for square teeth and thicker gingival biotype contrary to popular belief.

Assessment of gingival biotype can be done by both invasive and non-invasive methods such as simple visual assessment, transgingival probing, probe transparency, ultrasonic device and CBCT imaging. Simple visual evaluation may not be considered a reliable method, as it cannot be used to assess the degree of gingival thickness. In this study, probe transparency and transgingival probing methods were used to assess gingival thickness as both were simple methods, inexpensive and can be easily carried out. Probe transparency method - The gingival tissue's ability to cover any underlying material's color is necessary for achieving esthetic results, especially in cases of implant and restorative dentistry, where sub-gingival alloys are used. Using a metal periodontal probe in the sulcus to evaluate gingival tissue thickness is the simplest and minimally invasive method to determine gingival biotype. Based on the visibility of the outline of the probe, biotype is classified as thick or thin. Kan et al., in their study concluded that the gingival biotype identification with periodontal probe and direct measurement is not statistically different and is adequately reliable and objective.

Transgingival probing method – Though invasive, this method gives accurate measurements. However, such measurements may be affected by the precision of the probe, the angulation of the probe, and the distortion of the tissue during probing.[13] The frequency distribution of the prevalence of gingival biotype assessed with probe transparency method in relation to tooth form states that, in both square and tapered tooth forms, thick gingival biotype was more prevalent. And there was no statistically significant correlation between gingival biotype and tooth form when probe transparency method was used to asses gingival biotype. Though simple, probe transparency method is highly unreliable in assessing gingival thickness, as the outline of the probe could not be appreciated clearly to determine the type of the gingival biotype and led to inconsistent results.

The frequency distribution of the prevalence of gingival biotype assessed with transgingival probing method in relation to tooth form states that, square teeth are associated with thick gingival biotype while tapered teeth are associated with thin gingival biotype. And there was a statistically significant correlation between gingival biotype and tooth form. This method was more accurate and reliable when compared to probe transparency method, as gingival thickness can be measured with precision. This result was consistent with previous studies by Oschbein and Ross, Morris and Lindhe,[14] where they have stated that individuals with tapered tooth form have a thinner biotype and individuals with square tooth form have thick biotype.

Assessing gingival biotype is important especially in restorative and implant dentistry as thick gingival biotype prevents mucosal recession, hides the restorative margins, and also reduces crestal bone resorption around implants. In contrast, thin gingiva is more prone for recession and bone resorption. So, additional measures have

to be taken to prevent these problems in patients with thin gingival biotype.

CONCLUSION

Within the limitations of the present study, gender was neither related to tooth form nor the gingival biotype. Thick gingival biotype is associated with square tooth form and thin gingival biotype with tapered tooth form. Among probe transparency and transgingival probing methods to assess gingival biotype, transgingival probing method was more reliable and accurate.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Ahmad L. Anterior dental esthetics: The gingival perspective. Br Dent J. 2005; 199: 195-202.

2. Fu J, Lee A, Wang H. Influence of tissue biotype on implant esthetics. Int J Oral Maxillofac Implants. 2011; 26:499-508.

3. Kois JC. Predictable single tooth peri-implant aesthetics. Five diagnostic keys. Compend Contin Edu Dent. 2004; 25:895-900

4. Evans CD, Chen ST. Esthetic outcomes of immediate implant placements. Clin Oral Implants Res. 2008; 19:73-80

5. Seibert J, Lindhe J. Esthetics and periodontal therapy. In: Lindhe J (ed). Textbook of Clinical Periodontology, ed 2. Copenhagen: Munksgaard. 1989:477–514.

6. Linkevicius T, Apse P, Grybauskar S, Puisy A. The influence of soft tissue thickness on creastal bone changes around implants: A one year prospective controlled clinical trial. Int J Oral Maxillofac implants. 2009; 24:712-9.

7. Nisapakultorn K, Suphanantachat S, Silkosessak O, Ratanamongkolgul S. Factors affecting soft tissues level around anterior maxillary single tooth implants. Clin Oral Implants Res. 2010; 21:662-70.

8. De Rouck T, Eghbali R, Collys K, De Bruyn H, Cosyn J. The gingival biotype revisited: Transparency of the periodontal probe through gingival margin as a method to discriminate thin from thick gingival. J Clin Periodontol. 2009; 36:428-33.

9. Eghbali A, DeRouck T, Bruyn H, Cosyn J. The gingival biotype assessed by experienced and inexperienced clinicians. J Clin Periodontol. 2009; 36:958-63.

10. Olsson M, Lindle J. Periodontal characteristics in individuals with varying form of upper central incisors. J Clin Periodontol. 1991; 18:78-82.

11. Kan JY, Morimoto T, Rungcharassaeng K, Roe P, Smith DH. Gingival biotype assessment is esthetic zone: Visual versus direct measurement. Int J Periodontics Restorative Dent. 2010; 30:237-43.

12. Greenberg J, Laster J, Lisgarten MA. Transgingival probing as a potential estimator of alveolar bone level. J Periodontol. 1976; 47(9):514-517

13. Fu JH, Yeh CY, Chan HL, Tatarakis N, Leong DJ, Wang HL. Tissue biotype and its relation to the underlying bone morphology. J Periodontol. 2010; 81(4):569-574.

14. Morris ML. The position of the margin of the gingiva. Oral Surg Oral Med Oral Pathol. 1958; 11:969-84.