

Prevalence of Gingival Biotype in a Syrian Population and Its Relation to Tooth Shapes: A Cross-Sectional Study

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Abstract

Background: Gingival biotype is one of the most important factors that impede success in dental treatments; it affects the outcomes of periodontal surgery, and restorative treatments. Researchers classified gingival biotypes into thin biotype and thick biotype. It is crucial to identify tissue biotype before treatment. **Aim of Study:** To determine the prevalence of gingival biotypes in a Syrian population, in addition, to study the distribution of gingival biotypes according to gender and tooth shape. **Material and Methods:** This cross sectional study included 500 volunteers (300 males and 200 females) from the patients who had visited the department of periodontology-dental faculty at Damascus University. Gingival thickness was assessed to determine the gingival biotype for the maxillary central incisors using the direct measurement technique (Trans-gingival probing). Shapes of the maxillary incisors were recorded. A written informed consent was taken from each patient. Statistical analysis was done using test k2 $p < 0.05$. **Results:** The mean age was 26.8 ± 4.4 years. Thick gingival biotype was detected in 58.4% of the sample and most of patients are men while the prevalence of thin gingival biotype was 41.6% of the sample. It was also observed that patients with thin gingival biotype had triangular tooth shape in 99.5% ($p < 0.05$). **Conclusion:** Thick gingival biotype was observed to be more prevalent in a Syrian population than thin biotype. Most Syrian males had thick gingival biotype with square tooth shape while females had thinner biotype and triangular tooth shape.

Keywords

Gingival Thickness, Thick Biotype, Thin Biotype, Tooth Shapes

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1. Introduction

Gingival biotype refers to the quality of the soft tissue profile surrounding the teeth; it has significant impact on the outcome of periodontal surgery and restorative treatments.

The term (gingival biotype) was introduced to describe the thickness of the gingiva in a bucco-lingual dimension (thick or thin) [1]. Various studies have shown a wide range of clinical difference in form and appearance in tissue biotypes in individuals. Different factors contribute to these differences including genetics, tooth morphology, tooth position, age, gender and growth [2].

Ochsenbein and Ross (1969) divided gingival anatomy into pronounced scalloped and flat biotype. The teeth associated with flat gingiva are of square shaped while teeth associated with scalloped gingiva have slender shape and tapered crown form [3]. Later in 1986 Claffey and Shanley defined the thin tissue biotype as a gingival thickness of ≤ 1.5 mm, and thick tissue biotype was referred to as having a tissue thickness ≥ 2 mm [4]. In a study by De-Rouck *et al.* (2009), the thin gingival biotype associated with slender tooth form occurred in one third of the study population and was prominent among women, while thick gingival biotype which was associated with square teeth form occurred in two-thirds of the study population and occurred mainly among men [5].

The thick biotype consists of flat soft tissue and thick bony architecture. This type of tissue form is dense and fibrotic with large zone of attachment, thus making them more resistant to gingival recession. While thin biotype is delicate thin with highly scalloped soft tissue and thin bony architecture. Such type is more prone to recession, bleeding and inflammation [6]. Differences in gingival and osseous architecture have a significant impact on the outcome of treatments. Therefore, gingival biotype should be evaluated at the beginning of the treatment plan for the most esthetic results.

Various methodologies have been documented for measurement the gingival tissue form. These include visual inspection, ultrasonic devices, Trans gingival probing and cone beam computerized tomography imaging.

The aim of this study is to evaluate the prevalence of gingival biotypes in a Syrian population and the distribution of the gingival biotypes with varying tooth shapes.

2. Materials and Methods

This cross-sectional study included 500 subjects (300 males and 200 females) in the age range of 20 - 35 years. They were presented for treatment at the department of periodontology, dental faculty, Damascus University, Syria in the period between March and August 2015. The study was reviewed and approved by the Research Ethics Committee at the Faculty of Dentistry, Damascus University, Syria. Informed consent was obtained from participants prior to their enrollment in the study.

Exclusion criteria chosen for this study are:

- 1) Subjects with clinical signs of periodontal disease having pockets more than 3 mm.
- 2) Subjects with clinical signs of periodontal disease or clinical attachment loss.
- 3) Subjects with restorations in the anterior maxillary teeth.
- 4) Orthodontic treatment.
- 5) Pregnant or lactating mothers.

The gingival thickness (GT) was evaluated and categorized into thick and thin on the site level of the maxillary incisors using the method described by Kan *et al.*(2010) [7]. This evaluation was based on direct measurement with the help of using endodontic file No. (15) with a silicone limiter under local anesthesia. Then the thickness was determined by using electronic digital caliper (china). When the thickness was < 1 mm it was categorized as thin and when the thickness was ≥ 1 mm it was categorized as thick.

To determine the shapes of the maxillary incisors, photographs were taken of each subject's mouth with a digital camera. The teeth shapes were recorded (triangular, square or square-tapered) using visual inspection.

Statistical analysis: Data were tabulated and analyzed using the statistical package for the social science for windows, Version 13 (SPSS, Chicago, IL, USA). To examine the association between gingival biotype and tooth shape chi square [X^2] was used. A statistical significance was considered at $p < 0.05$.

3. Results

The study comprised 500 subjects (300 males and 200 females). Mean age (26.8 ± 4.4).

The prevalence of thick gingival biotype for the sample was 58.4% while the prevalence of thin gingival biotype was 41.6%.

3.1. Frequency Distribution of Different Biotypes among Males and Female

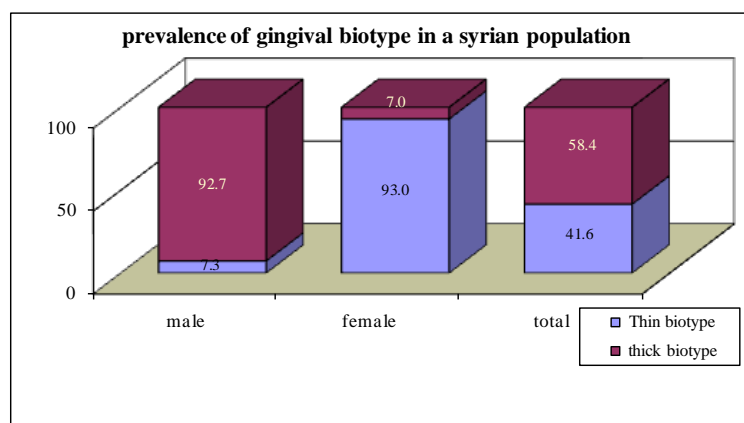
Among the male population, thicker gingival biotype was observed to be more prevalent with 92.7%, while compared to thin form with 7.3%. Among the female subjects, higher prevalence of thin biotype was found with 93% when compared to thick form with 7% ($p = 0.005$) (Graph 1).

3.2. Prevalence of Gingival Biotypes in Subjects with Varying Tooth Shapes

Among the participants with triangular tooth shape, 99.5% had a thin gingival biotype while 0.5% had thick gingival biotype. While for square tooth shape, 99.6% had a thick gingival biotype while 0.4% had thin gingival biotype. For the participants with square-tapered tooth shape, 79.5% had a thick gingival biotype (Table 1).

4. Discussion

The gingival perspective of esthetics is concerned with soft tissue covering around the teeth. Gingival morphology plays an important role in determining the final esthetic outcome; therefore, during treatment it is important to recognize gingival biotypes. Gingival biotype helps in better determination of the treatment outcome in various branches of dentistry and is important in clinical practice.



Graph 1. Prevalence of gingival biotype in a Syrian population.

Table 1. Prevalence of gingival biotypes in subjects with varying tooth shapes.

Sex	Tooth shape	Gingival biotype		total
		thick	thin	
Male	Triangular	0 (0%)	21 (100%)	21 (100%)
	Square	252 (99.6%)	1 (0.4%)	253 (100%)
	Square-tapered	26 (100%)	0	26 (100%)
Female	Triangular	1 (0.5%)	185 (99.5%)	186 (100%)
	Square	-	-	-
	Square-tapered	13 (92.9%)	1 (7.1%)	14 (100%)
Total	Triangular	1 (0.5%)	206 (99.5%)	207 (100%)
	Square	252 (99.6%)	1 (0.4%)	253 (100%)
	Square-tapered	39 (97.5%)	1 (2.5%)	40 (100%)

Gingival thickness is assessed by an invasive and a non-invasive method. Invasive methods such as injection needle or probe while non-invasive methods included visual examination, the use of ultrasonic devices, probe transparency and cone beam computed tomography (CBCT) [5] [8] [9].

The visual assessment of the gingival biotype by itself is not sufficiently reliable and may not be considered as a valuable method as previous studies have found [7] [10]. The ultrasono graphic method of assessing gingival thickness is a non-invasive method [11]. The CBCT measurements were found to be an accurate representation of the clinical thickness of both labial gingiva and bone. However, exposure to radiation and cost makes it less desirable [12]. The transparency of a periodontal probe was chosen as it is considered atraumatic, rapid and with relatively low cost. Furthermore, this method was found to be an easy, reproducible, reliable and an objective method [7].

In our study, the prevalence of thick gingival biotype was 58.4% of the sample while thin gingival biotype was 41.6% of the sample. This finding is consistent with previous studies in which they found that thick gingival biotype was more prevalent among their sample populations [1] [13].

The frequency distribution of GT¹ states thicker biotype in males 92.7% as compared to females. Females have more number of thin biotype 93% while 7% have a thick biotype. The results stated are in agreeable to those with Anand *et al.*, [14] Vinaya *et al.*, [15] De Rock *et al.*, [5] and Muller *et al.*, [11] who stated 1/3rd of the sample to be females with a thinner biotype. De Rock *et al.* (2009), in their study presented that male participants had thicker biotype to conceal the periodontal probe when compared to female. Study by Manjuntah *et al.*, (2015) documented that thick gingival biotype was more prevalent in male with 76.9% as compared to thin gingival biotype which was observed in females with 44.7% [16].

Our findings in this study have showed that thick gingival biotype was associated with square tooth shape especially in men (Figure 1) while thin gingival biotype was associated with triangular tooth shape in females (Figure 2). And this is in agreeable to previous studies with Oschbein and Ross [3] who were the first to document the relation of flat thick gingival biotype with square tooth form and thin biotype with tapered tooth shape. A study by Vinaya *et al.*, (2013) documented that men had thicker biotype with short-square tooth shape while females had slender-tapered tooth shape [15]. Seo *et al.*, in their study did not find any statistically significant differences between the longer and shorter teeth in relation to gingival biotype [17], in contrast to our findings. This could be a result of the sample size (78 subjects, as opposed to 500 subjects in the present study). For the patients who have square-tabered tooth shapes it was shown that 97.5% have thicker biotype (Figure 3).

5. Conclusions

Within the limitation of the present study, following conclusions were drawn:

- The thicker biotype is more prevalent in male population while the female population consists of thin, scalloped gingival biotype.
- Thick gingival biotype is associated with square tooth shapes while thin biotype is associated with triangular tooth shapes.



Figure 1. Thick gingival biotype with square tooth form.

¹GT: Gingival thickness.



Figure 2. Thin gingival biotype with triangular tooth form.



Figure 3. Thick gingival biotype with square-tapered tooth form.

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