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Original article

Assessment of Gingival Biotype in the Esthetic Zone among Dental Students at University of Tripoli

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ABSTRACT

The form and structure of the soft tissue and maxillary anterior teeth at the esthetic zone play an important role in determining the outcome. The gingival biotype is important because of the structural characteristics of the periodontics. This study targeted to determine gingival biotype prevalence and characteristics in the esthetic zone among Libyan dental students. A cross-sectional study was done for 220 students aged between 20 and 30 years. In the periodontal department, healthy periodontal tissues with no loss of attachment and the presence of all upper anterior teeth were selected. Clinically, gingival biotype was examined and recorded according to the transparency of the periodontal probe and visual inspection. The present study evaluated the frequency of gingival biotype and its association with gender and crown shape. All measurements were made for a total of students according to gingival transparency and were statistically evaluated. This study has shown that gingival biotype varies among different genders, ages, and tooth forms in our population. Understanding tissue biotypes can help dentists choose the correct dental treatment for better results.

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INTRODUCTION

In harmonious esthetics and natural function. During treatment planning, it is important to distinguish the differences in type of gingival and understand the gingival characteristic of restorative dentistry. A group of studies have been showed to recognize different combinations of morphometric data related to both soft and hard tissues existing in natural dentition. In this information, “gingival biotypes” have been identified and described as the thickness of gingiva in the faciopalatal direction. Several studies suggested the presence of two types of gingival biotype, namely thick and thin [1]. Claffey and Shanley (1986) defined the tissue biotype as thin when thickness of gingival is < 1.5 mm, and the thick type was referred to as a gingival with a tissue thickness of >2 mm [2]. In another study by De-Rouck et al. (2009), the thin biotype was accompanying with a slender form of tooth in one third of the study individuals and was prominent with females, while the thick gingiva was associated with square form of the tooth. in two-thirds of the study and occurred mainly among males [3]. There are anatomical, biochemical, and physiological variations observed between genders. There are several differences detected even in dental and oral tissues of genders, which have been used in dentistry and forensic medicine [4]. Gingival tissue is a part of the oral mucosa that covers the alveolar bone and surrounds the teeth in a collar-like fashion. Gingiva is a keratinized that acts as a barrier against the entry of different microbes [5].

The gingival biotype plays an essential role in maintenance of oral health as well as in implant and restorative dentistry. It is one of those aspects that vary in females and males from an anatomical and morphometric perception [6]. The gingival form and structure Identification is important because differences in architecture of soft and hard tissue have shown to reveal a significant impact on the final esthetic outcome of restorative, periodontal therapy procedures, and

implants [7]. Various methods have been proposed to measure gingival thickness, such as direct measurements, probe transparency (TRAN), ultrasonic devices, and cone-beam computed tomography (CBCT) [3,8,9]. The using simple and reliable methods to categorize the gingival biotype in practice would be helpful, as this would help to alter the treatment of individual and predict its specific result. The visibility of Probe through gingival tissue has been strongly related to clinical classification of thin biotype, whereas inability to visualize has been related to clinical thick biotype [10]. Hence, the target of the present study was to assess the incidence of gingival biotypes and categorize gingival biotypes based on measured tooth shape and gender.

METHODS

Study Design and Sampling Procedure

The study was a cross-sectional design in which a total of 220 systemically healthy students, aged between 20 and 30 years, who applied to Tripoli University Faculty of Dentistry Department of Periodontology, were included in this study in the period between January and May 2024.

Ethical Consideration

Participation in the study was on a voluntary basis, and the consent of those who decided to participate in the research was obtained. The research protocol was conducted following the procedures of the Declaration of Helsinki and was accepted by the Tripoli University Faculty of Dentistry Ethics Committee. This study depended on clinical examinations without invasive procedures. All participants were first informed verbally regarding the study purpose and assigned a written consent form was obtained after explaining the details of clinical procedures prior to participation. All procedures performed followed standardized infection control measures .

Inclusion and exclusion criteria

The inclusion criteria of the study were students, males and females, aged from 20 to 30 years, with good periodontal health, nonsmokers, and systemically healthy. While students who met one of the following criteria were excluded: any periodontal disease, systemic disease, smokers and gingival recession in anterior teeth. This study depended on clinical examinations without invasive procedures. All participants where first informed verbally regarding the study purpose and assigned consent form was obtained after explaining the details of clinical procedures prior to participation. Examined agreed to participate in the study and included in the study. All procedures performed followed standardized infection control measures.

Data collection

A periodontal examination was conducted using instruments provided by the polyclinic. All subjects were randomly selected in the present study after that provided with oral Hygiene instructions. A plaque index and gingival index were conducted prior to initiating the periodontal examination. Students without bleeding on probing and with no visible plaque were included in the study. A single examiner conducted the entire procedure to reduce the interobserver variability, to ensure accuracy and reliability in measuring clinical parameters. The examiner re-examined half the students 2 weeks later, and 100% calibration was achieved. The clinical procedures followed along with the armamentarium used are shown in figure 1.

Clinical Parameters

To assess the clinical and anatomical parameters, visual inspection measures William's probe was used as the main instrument for the measurement of all parameters. The clinical parameters included in this study are gingival thickness (GT), gingival width (GW), and width of crown / length of crown ratio (CW/CL).

Assessment of Gingival Biotype

The gingival biotype considered as thick or thin, according to the visibility of the probe. If the probe is reflected from the gingiva, the biotype is thin; if the probe did not reflect on the gingiva, the biotype was determined to be thick [11]. The individual’s biotype was considered as thick when it was fibrotic and rigid with no probe transparency in the six teeth, and as thin when the gingiva was delicate, friable, and translucent during probing in all the six assessed teeth. For measuring the thickness of gingival, a size 15 endodontic spreader filled with a stopper was placed vertically at a point in the middle of the keratenized gingiva, and this measurement was recorded with a periodontal probe.

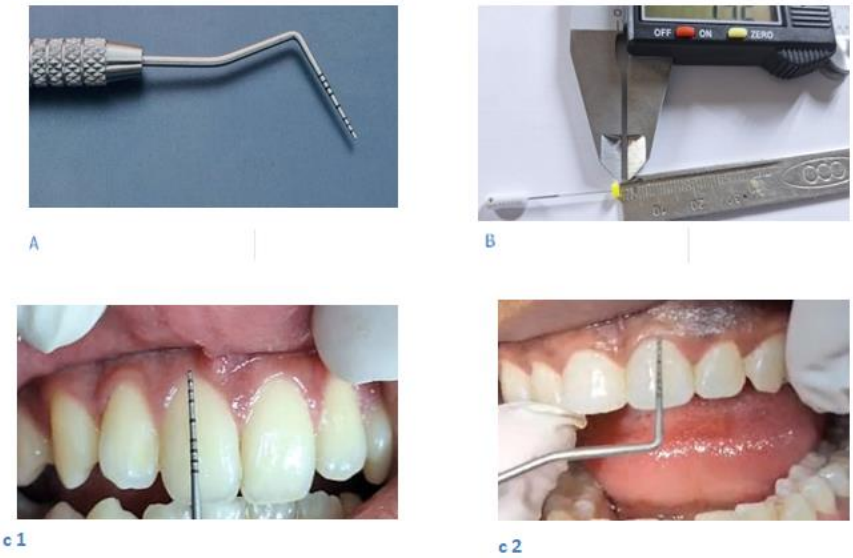

Figure 1. Photographs of clinical procedures and armamentarium. (A) William's periodontal probe. (B) Measurement of thickness of keratinized gingiva with an endodontic spreader with a stopper and a digital Vernier caliper. (C) Different tooth shape presented in different gingival biotype. c 1) Rectangular teeth with thin gingiva. c 2) Square teeth with thick gingiva.

Determine Crown Shape

To determine the shapes of the upper anterior teeth, photographs were taken of each subject's mouth with a digital camera. The teeth shapes were recorded (triangular, square) using visual inspection. The assessment of demographic factors included sex, age.

Statistical analyses

A descriptive analysis was performed to determine the prevalence of the gingival biotype. Data were analyzed using the statistical package for public science for Windows, ersion 10 (SPSS, Chicago, IL, USA). To examine the relationship between gingival biotype, gender, and tooth shape, a chi square [X2] was used. A statistical

RESULTS

A total of 220 participants involved in the study. The demographic data and clinical periodontal status of the individuals incorporated into the research are outlined in Table 1. The proportion of females (60.1%) was higher than that of males (39.9%). The maximum number of participants (64.4%) exhibited a thick gingival biotype (Table 1). Table 2 shows that the mean values of gingival biotype with respect to gender and shapes of maxillary teeth.

Table 1. Characteristics of the sample of study participants (n = 220)

Variables		Number	Percentage
Gender	Male	89	39.9 %
	Female	131	60.1%
Age	<25	70	37.2%
	≥25	150	62.8%
Gingival biotype	Thick	119	64.4%
	Thin	101	35.6%
Crown shape	Square	130	59.2%
	Rectangular	90	40.8%

Table 2. Mean values of gingival biotype with respect to gender and shapes of maxillary teeth

Variables		Gingival biotype Thick	Thin	P value
Gender	Male	69(73.7)	20 (26.6)	p < 0.001
	Female	50 (38.89)	81 (61.11)	
Tooth shape	Square	95 (71.7)	35 (29.8)	p < 0.001
	Rectangular	29 (28.3)	61 (70.2)	

DISCUSSION

The esthetic outcome of restorative dentistry requires a healthy periodontium and its compatibility with the surrounding hard and soft tissues. Therefore, during treatment, it is essential to recognize gingival biotypes. Gingival biotype helps in better assessment of the treatment outcome in various branches of dentistry and is important in clinical practice [12]. Hence, the aim of the present study to evaluate the frequency of gingival biotypes and categorize gingival biotypes based on measured tooth shape and gender in a group of healthy Libyan students. The study was carried out on 220 students with an age range of 20–30 years old who had all maxillary anterior teeth and a healthy periodontium.

Several methods of assessment of gingival tissue include visual examination, periodontal probes, ultrasonic devices, or radiographic methods [13, 14]. The transparency of a probe was used as it is atraumatic and easy, rapid, and relatively low cost. This method also found to be atraumatic, reliable, reproducible, and objective method [15]. The prevalence in this study of the thick biotype was 64.4% of the sample, while the prevalence of the thin biotype was 35.6% of the sample Fig-2. This finding is consistent with previous studies in which they found that the thick biotype was more prevalent among their sample populations [16,17]. The distribution of GT states a thicker biotype in 69 (73.7%) males, 81(61.11%) females have a higher number of thin biotypes, while 50(38.89%) have a thick biotype. The results stated are agreeable with those of Anand et al. [18], Vinaya et al. [19], De Rock et al. [3], and Muller et al. [17] who stated 1/3 of the sample were females with a thinner type. De Rock et al. (2009), in their study, presented that, male participants had a thicker biotype to hide the probe when compared to females. Frequency distribution of gingival biotype in males and females, A study by Manjuntah et al. (2015) documented that the thick biotype more prevalent in males with 76.9% as compared to the thin gingival biotype, which was observed in females with 44.7% [20]. This study showed that thick biotype was related to square tooth shape, especially in males, while thin gingival biotype was related to triangular tooth shape in females, and this is in agreement with previous studies with Oschbein and Ross [3], who documented the relation between flat thick gingival biotype with square tooth form and thin biotype with triangular shape. Vinaya et al., (2013) documented that, males had a thicker biotype with a short-square tooth study, did not find any statistically significant differences between the longer and shorter teeth in relation to gingival biotype [21], in contrast to this study. This could be a result of the sample size (78 subjects as opposed to 220 subjects in the present study).

CONCLUSION

In this study, it has been demonstrated that gingival biotype varies in gender, and tooth shape among the students in our country. also understanding the nature of tissue biotypes, dentists can employ appropriate dental management in this specific area and this will provide more favorable results after dental treatment.

Conflict of interest. Nil

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تقييم النمط اللثوي في المنطقة الجمالية بين طلاب طب الأسنان بجامعة طرابلس

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المستخلص

يلعب شكل وبنية الأنسجة الرخوة والأسنان الأمامية العلوية في المنطقة الجمالية دورًا مهمًا في تحديد النتيجة. يعد النمط اللثوي مهمًا بسبب الخصائص البنيوية لأمراض اللثة. استهدفت هذه الدراسة تحديد انتشار النمط اللثوي وخصائصه في المنطقة الجمالية بين طلاب طب الأسنان الليبيين. أجريت دراسة مقطعية لـ 220 طالبًا تتراوح أعمارهم بين 20 و 30 عامًا. في قسم أمراض اللثة، تم اختيار أنسجة اللثة السليمة بدون فقدان الارتباط ووجود جميع الأسنان الأمامية العلوية. سريريًا، تم فحص النمط اللثوي وتسجيله وفقًا لشفافية مسبار أمراض اللثة والفحص البصري. قيمت الدراسة الحالية تواتر النمط اللثوي وارتباطه بالجنس وشكل التاج. تم إجراء جميع القياسات لإجمالي الطلاب وفقًا لشفافية اللثة وتم تقييمها إحصائيًا. أظهرت هذه الدراسة أن النمط الحيوي للثة يختلف باختلاف الجنسين والأعمار وأشكال الأسنان في مجتمعنا. إن فهم الأنماط الحيوية للأنسجة يمكن أن يساعد أطباء الأسنان في اختيار العلاج السني الصحيح للحصول على نتائج أفضل.

الكلمات المفتاحية. النمط اللثوي السميك، النمط اللثوي الرقيق، شكل الأسنان، المنطقة الجمالية.