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Clinical Evaluation of Gingival Biotype and its Association with Age and Gender among Patients Visiting a Tertiary Care Center

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ABSTRACT

Introduction

Gingival biotype is considered as the most important prognostic factor that determines the success of periodontal therapy and somehow affects its outcome. Hence, it is crucial to identify the gingival biotype before dental treatment. This study was carried out to assess the prevalence of gingival biotypes in patients visiting a teaching hospital and evaluate its association with age and gender.

Methods

This cross-sectional study was conducted from September 2021 to April 2022 amongst 225 participants from department of periodontics, Gandaki Medical College, Pokhara, Nepal. The demographic data of subjects were recorded and their gingival biotype was assessed using the probe transparency technique.

Results

Among 225 participants, the majority of them (124, 55.11%) exhibited a thick gingival biotype. Thicker gingival biotype was more prevalent among age group 18 to 40 years (65, 69.15%) and greater in males (71, 77.17%) which were statistically significant ($p<0.001$).

Conclusions

Thicker gingival biotype was more prevalent among participants in the present study. The assessment of gingival biotype of the patients can provide the knowledge to the clinician about the care to be taken while tissue handling during periodontal therapy. This in turn provides a more favorable tissue environment and maximizes the predictability of periodontal treatment.

Keywords: cross-sectional; gingival biotype; periodontal therapy.

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INTRODUCTION

Gingival biotype is one of those key factors that influence the aesthetic as well as ultimate outcome of therapy.[1] Gingival biotype is defined as the thickness of gingiva in a buccolingual dimension.[2] Several investigations have demonstrated wide variation in the thickness of gingival biotypes.[3-8]

Gingival biotype cause a significant disparity in treatment outcomes possibly due to the differences in tissue responses to trauma.[9-10] Hence in clinical practice, assessment of the gingival biotype is mandatory to achieve a predictable and stable gingival margin position after the treatment.[1]

Several studies have been conducted globally regarding the assessment of gingival biotype taking age and gender into consideration with diverse results.[11–15] Limited study has been conducted in Nepalese population.[16] Thus, the aim of the study is to assess the prevalence of different biotype in subjects visiting a dental hospital and to determine its association with the demographic parameters.

METHODS

A cross-sectional study was conducted at Gandaki Medical College Teaching Hospital and Research Center, Pokhara, Nepal. The patients attending OPD of Department of Periodontics between September 2021 and April 2022 who fulfilled the inclusion criteria were taken into the study.

Convenient sampling technique was utilized for the study and the sample size was calculated as, $\frac{Z^2pq}{e^2}$ where,

n = sample size

Z = Level of significance (1.96 at 5%)

p = prevalence (43.25%)[12]

q = complement of p (100 - 43.25%) = 56.75%

e =Allowable error= 7%

Thus, $n = (1.96)^2 \times 43.2\ 5 \times 56.75/(7)^2 = 192.42 \sim 193$.

Considering 10% as non-response rate, sample size of 213 was calculated. However, total number of participants included in the study was 225.

Ethical clearance was obtained from Institutional Review Committee of Gandaki Medical College Teaching Hospital & Research Center, Pokhara, Nepal (Reference No. 18/2078/20179). A written consent was taken from the patients prior to data collection.

The participants of either sex above 18 years, having maxillary central incisors with good oral hygiene and no any clinical signs of gingival inflammation or loss of attachment in maxillary incisors were included in the study. If both right and left central incisors were of the same biotype, only then it was enrolled in the study. The patients with past history of periodontitis, pregnant or lactating women, and patients on medication which affects the periodontal tissues such as cyclosporine A, calcium channel blockers, and phenytoin, patients with history of known systemic diseases and condition and patients with gingival recessions, fixed prosthesis, or restorations in incisors were excluded from the study.

After explaining the nature of the study, the demographic details of the participants were recorded. Under strict aseptic condition, clinical examinations was carried out using sterile, calibrated and standardized periodontal probe (University of North Carolina- 15). The gingival biotype was determined by transparency of periodontal probe through gingival sulcus (TRANS) technique.[17]In this technique, probe was inserted at the mid-

facial aspect of maxillary right and left central incisors with a gentle force. If the outline of the underlying periodontal probe was seen through the gingiva, it was categorized as thin (Figure 1); if not, it was categorized as thick (Figure 2). The data were collected by single examiner and recorded in the proforma.

Figure 1. Thin gingival biotype

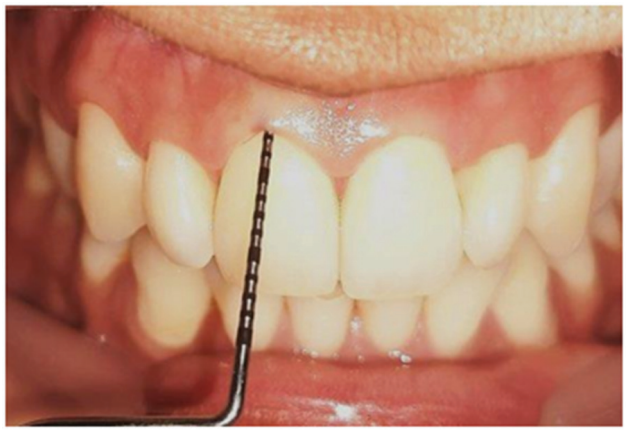

Figure 2. Thick gingival biotype

The data were entered into the excel sheet and was analyzed using statistical package for the social sciences version 16.0. Univariate analysis including frequencies and percentage of demographic data and gingival biotype were calculated. Pearson Chi-square analysis test was used to determine the association between gingival biotype with age and gender where p-value <0.05 was considered statistically significant.

RESULTS

A total of 225 participants were included in the study. Majority of them (94, 41.78%) belonged to age group 18 to 40 years and least (56, 24.89%) were in > 60 years age group. The proportion of females (133, 59.11%) was more than males (92, 40.89%). Maximum number of participants (124, 55.11%) exhibited thick gingival biotype (Table 1).

Table 1. Demographic details of the study participants (n=225).

Age groups	N (%)
18-40	94 (41.78)
41-60	75 (33.33)
>60	56 (24.89)
Gender	
Male	92(40.89)
Female	133(59.11)
Gingival biotype	
Thick	124(55.11)
Thin	101(44.89)

The prevalence of thick gingival biotype was found to be more in age group 18 to 40 years (65, 69.15%) while thin biotype was more prevalent in >60 years (41, 73.21%). This was found to be statistically significant (p<0.001) (Table 2). The prevalence of thick gingival biotype was more in males (71, 77.17%) while thin biotype was found to be greater in females (80, 60.15%), which was found to be statistically significant (p<0.001).

Table 2. Association of age and gender with gingival biotype in the study participants.

	Gingival biotype		p-value
Age groups	**Thick n(%)**	**Thin n(%)**	<0.001*
18-40	65(69.15)	29(30.85)	
41-60	44(58.67)	31(41.33)	
>60	15(26.79)	41(73.21)	
Gender			<0.001*
Male	71(77.17)	21(22.83)	
Female	53(39.85)	80(60.15)	

*statistically significant

DISCUSSION

Gingival biotype is the key factors that govern the prognosis and treatment outcome of dental treatment. It plays an important role in determining the final esthetic outcome during root coverage, extractions, orthodontic tooth movement and implant placement especially in the maxillary anterior area.[18] Thin biotype is usually associated with gingival recession whereas thick biotype with deep periodontal pockets.[1,18] Therefore, it is important to take into consideration the differences in the response of gingival tissue during treatment planning for the predictable prognosis and to avoid unexpected complications.

The present study was carried out to determine prevalence of gingival biotype in patients attending a dental hospital and determine its association with the demographic parameters. Central incisor was chosen because it is the one of the tooth which influences the aesthetics and the determination of biotype is easier and more accurate for that tooth. The method of assessment of gingival biotype include direct measurements,[19] probe transparency,[17] ultrasonic devices,[10] and most recently, cone-beam computed tomography.[20] Among these various methods, TRANS technique was chosen in the present study because it is simple, easy, minimally invasive and routinely done procedure during the periodontal examination.[16]

Our study showed higher prevalence of thick gingival biotype which is in accordance with former studies.[4,11–13,15,18] Thicker biotype consists of dense, fibrotic and adequate width of attached gingiva which is associated with good periodontal health. Evidences suggest that thicker tissue tends to resist trauma and recession, enhances creeping attachment, improves implant aesthetics, permits easier tissue manipulation, presents less clinical inflammation, and enhances surgical outcome.[10,21,22] Thick tissues can withstand the collapse and contraction due to the presence of higher amount of extracellular matrix and collagen. Moreover, higher vascularity enhances oxygenation, improves immune response, growth-factor migration, and toxic products clearance, leading to better healing response. Furthermore, increased layers of epithelial keratinization in thicker tissue precludes microbial invasion and thus, physical damage.[23] These factors signify a good periodontal health and relatively positive response to any treatment in case of thicker gingival biotype.

Thin gingival biotype was less prevalent in our study. It is characterized by thinner layers of epithelium making it delicate and almost translucent and friable in appearance with a minimal zone of attachment and is suggestive of thin or minimal labial bone over the roots. Several evidences support the notion that the thin gingival tissue is lesser resistant to any inflammatory, surgical, or traumatic injury and therefore, usually exhibits gingival recession.[6,7,22]reduce the need for augmentation procedures, minimize surgical exposure of the patient, reduce treatment time and improve esthetic outcomes.\nMETHOD: This retrospective review analyzed the esthetic outcomes of 42 non-adjacent single-unit implant

restorations completed using an immediate implant surgical placement protocol.\ nRESULTS: The mean time in function was 18.9 months (range 6-50 months That is why, the patients with thin gingival biotype need special considerations during any esthetic, restorative, or periodontal therapy and if required, should be preceded with surgical procedure to enhance the gingival thickness.[11]

In the present study, the thicker gingival biotype was more prevalent in younger age groups and thinner in older groups. A similar result was found in literature.[15,24-27] It may be due to decrease in keratinization and changes in oral epithelium with increased aging. Also, with aging the interdental papilla recedes which may be the reason for higher frequency of thin biotype in older age groups.[11,15] On contrary, some studies reported that younger age groups had thinner gingival biotype than older age groups.[16,28,29] However, few other studies found no significant difference in gingival biotype among different age groups.[12,13] Further our study found males having thicker biotype than females which is supported by earlier studies.[3,11,13,15,25,26] On contrary some studies found no significant difference regarding gingival biotype according to gender.[12,16] While few studies showed higher prevalence of thick biotype in females. This contradiction may be due to ethnic differences.[30]

Different gingival biotypes can influence the diagnosis and treatment planning for different patients. In addition, these techniques when appropriately applied can save the treatment time, cost and eventually increase predictability of the treatment. Inclusion of biotype assessment in the diagnostic record of the patient can give the clinician an idea about the care to be taken in tissue handling, the type of procedure to be employed in a certain situation as well as the expected outcome. However, multicentric studies, larger sample sizes, inclusion of ethnic variations and use of advanced diagnostic techniques are further required to support the findings of our study.

CONCLUSIONS

Thicker gingival biotype was more prevalent in the study population with predominance in younger age groups and in males. Thus, determination of gingival biotype before treatment allows clinician to perform the suitable clinical procedures which ultimately minimizes recession and alveolar bone resorption. Hence, gingival biotype assessment should be routinely done for all patients.

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