

Clinical assessment of variations in the gingival biotype of individuals of Mahe population with regard to age, gender and arch location

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Citation of this Article: Dr.D.M.Hemalatha, Dr.Anil Melath, Dr. Mohammed Feroz T.P, Dr. Subair. K,“ Clinical assessment of variations in the gingival biotype of individuals of Mahe population with regard to age, gender and arch location”, IJDSIR- March - 2021, Vol. – 4, Issue - 2, P. No. 166 – 173.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: The role played by gingiva in aesthetics is crucial. An appropriate treatment planning starts with the accurate diagnosis of the case which is incomplete without evaluation of the gingival biotype.

Aim: This study aims to evaluate the variations in the thickness of gingiva with respect to age, gender, and dental arch.

Materials and method: A total of 96 subjects from OPD of Department of Periodontology were divided into three different groups based on the age. Each group comprised of 16 males and 16 females .The gingival status of the patient was assessed by Gingival index (Loe and Silness). The measurement was made in the middle of attached gingiva after topical anesthesia for six maxillary and mandibular anteriors, mean of the respective arches was calculated. Comparison between the age groups was done

using ANOVA with post hoc test and Independent t test to compare between the genders.

Results: The gingival thickness was found to increase from the 15-25yr age group to 26-40yr age group in maxilla and mandible but the values were statistically significant in mandible. Male were found to have increased gingival thickness than females. Maxillary gingival thickness was more than mandibular gingival thickness. Gingival thickness in female found to increase with increase in age. Gingival thickness in male increased from 15-25yr to 26-40yr age group and then decreased in >40yr age group.

Conclusion: There are variations in the gingival thickness when comparing between age, gender and arch location. Correct estimation and assessment of the gingival thickness should be the first crucial step for treatment selection and execution. Further studies with enhanced

techniques and a larger sample size would be required to confirm the results of this study.

Keywords: Gingival biotype, variation, assessment.

Introduction

Pink aesthetics decides the appealing effect of a person's smile. Its appearance differs between people. The smile line in the anterior region is of enormous importance in aesthetic profile. The term "periodontal biotype" was introduced by Seibert and Lindhe. The gingival biotype is divided into two types: thick biotype and thin biotype. This is signified as thick flat and thin scalloped types. Claffey and Shanley defined the thin tissue biotype as a gingival thickness of <1.5 mm, and the thick tissue biotype was referred to as having a tissue thickness ≥ 2 mm.¹

The colour of the gingiva persuades its health and it outweighs its expression. It is determined by many factors such as vascularity, pigmentation, and degree of keratinisation and the thickness of gingiva. Of these, the gingival thickness is a decisive factor. It also signifies the nature of the tissue response to any kind of insults such as physical, chemical or bacterial etc. the clinical appearance of the healthy marginal periodontium also seems to be genetically determined and assumed to be influenced by tooth size, shape and position, and biological factors such as age, gender, and growth. The contour of the gingiva closely follows the contour of the underlying alveolar bone. This gives the unique scalloped appearance of the marginal gingiva.²

Thickness of gingiva is often overlooked by the clinician. It determines the capacity of the soft tissue to respond to trauma like aggressive toothbrushing behaviour and healing after a surgical procedure and increases the ease of flap handling during flap surgeries.

The identification of gingival biotype may be important in clinical practice since differences in gingival and osseous

architecture have been shown to exhibit a significant impact on the outcome of restorative therapy. The erroneous decision to commence the restorative gingival procedures without determining the gingival tissue biotype ends up in recession of the gingiva below the restoration, or exposure of the implant thread etc.

Long term success of any prosthesis in aesthetic region is principally governed by the soft tissue response in periodontal and peri implant regions. Adding value to this parameter, this study is purposed to assess the gingival biotype and its variations with age, gender and arch location among 96 subjects attending the OPD of Department of Periodontology.

Aim of the study

This study aims to evaluate the variations in the thickness of gingiva with respect to age, gender, and dental arch.

Objectives of the study

- To evaluate the difference in gingival thickness in male and female.
- To assess the variations in the gingival biotype with respect to age.
- To compare the variations of gingival thickness in maxillary and mandibular arches.

Materials and method:

Source of Data: Outpatients from the Department of Periodontics, Mahe Institute of Dental Sciences and Hospital, willing to give the informed consent and to comply with the study will be included.

Study design: A total of 96 subjects will be divided into three different groups based on the age.

Each group comprised of 16 males and 16 females.

- Group I : 32 subjects with 15–25 years of age.
- Group II : 32 subjects with 26–39 years of age.
- Group III: 32 subjects with age more than 40 years.

Results

The present study was aimed at the clinical assessment of variations in the gingival biotype of individuals with regard to age, gender and arch location. The study population consisted of 96 patients of both sexes, satisfying the following criteria:

- Patients with no evidence of gingivitis and periodontitis.
- Patients with adequate width of attached gingiva.
- No visible signs of dental caries.
- Patient with all the maxillary and mandibular anterior teeth.

Patients were categorized into 3 groups based on their age. Each patient's gingival status was assessed by gingival index (Loe and Silness). The facial gingiva was topically anesthetized. The gingival thickness was assessed midbuccally, using an endodontic spreader (No.20) with a rubber stopper and measured on the digital vernier caliper. The measurement was made in the middle of attached gingiva between the mucogingival junction and the gingival margin. The thickness of gingiva was recorded for six maxillary and six mandibular anterior teeth and final readings were obtained by calculating the mean of all six measurements in the respective arches. The observations were tabulated and analysed statistically. The statistical constants like mean, standardized deviation and p value were computed using SPSS software. Comparison between the age groups were done using ANOVA and Independent t test was used to compare between the genders and the variations between the arch locations.

Comparison between age group:

Mean Maxillary gingival thickness was

1.03688mm for 15-25 yr age group

1.11781mm for 26-39yr age group

1.10844 mm for >40yr age group.

Mean Mandibular gingival thickness was:

0.8709 mm for 15-25yrs age group

0.9694 mm for 26-39yrs age group

0.9672 mm for >40yr age group.

Statistically significant difference was present in the mandibular gingival thickness between the three age groups with p value of 0.025. There was no statistical significance in the maxillary gingival thickness between the age groups. (Graph 1, 2).

Comparison between genders

Mean gingival thickness for Males was:

Maxilla - 1.10375 mm

Mandible - 0.9387 mm

Mean gingival thickness of Females:

Maxilla-1.07167 mm

Mandible- 0.9329 mm

The results were not statistically significant between the genders. Male were found to have mild increase in gingival thickness in the maxillary and mandibular gingival thickness. But the values were not statistically significant. (Graph 3).

Comparison between the arch locations

Mean maxillary gingival thickness was 1.08771 mm and the mean mandibular gingival thickness was 0.9358 mm. The values were statistically significant. The maxillary gingival thickness was more than the mandibular gingival thickness.

The mean gingival thickness of the male and female subjects when compared between the age groups showed that the maxillary gingival was thicker than the mandibular gingival thickness. (Graph 4,5)

The mean maxillary gingival thickness of the female subjects for age group 15-25 yrs was 1.01313 mm, 26-39 yr was 1.08687 mm and >40yr was 1.11500 mm which showed that the gingival thickness of the maxillary gingival was increasing with increase in age. Similar variation was seen in the mandibular gingival thickness.

Mean mandibular gingival thickness was 0.8619 mm for 15-25yr, 0.9538 mm for 26-39yr and 0.9831mm for >40yr age group. But the variations were not statistically significant. (Graph 6).

The mean maxillary gingival thickness of the male subjects for age group 15-25yr was 1.06063 mm , 26-39 yr was 1.14875 mm and >40yr was 1.10188 mm. which showed that the maxillary gingival thickness increase from 15-25 yr age group to 26-39 yr age group, and decreased from 25-40yr age to >40yr age group. Similar variation was found with the mandibular gingival thickness. Mean mandibular gingival thickness of 15-25 yr was 0.8800mm, 26-39 yr was 0.9850 mm ,>40yr was 0.9513 mm. But the values were not statistically significant.(Graph 7)

Discussion

Gingival tissue profile is the key factor in determination of the aesthetics of a subject according to study by Chow et al. ³ Deficiencies of these soft tissues often affect the prognosis of the tooth. The gingival thickness is determined by translucency of probe as studied by Kan et al ⁴, transgingival probing as studied by Cook et al ⁵, Zweers et al. ⁶ Ultrasonography has been used for the gingival thickness estimation as studied by Barriviera et al ⁷, and Ronay et al. ⁸ This present study was conducted to clinically assess the gingival biotype and its variations with regard to age, gender and arch location. The gingival thickness was assessed by digital vernier caliper as studied by Sharma et al ⁹.

According to our study results, the gingival thicknesses increase with increase in the age group from 15-25yr to the middle age group 26-40yr age. This result was in accordance with the study by Aishwarya et al¹⁰. The gingival thickness value of the older age group >40 yr was found to decrease when compared with the 26-40 yr age group.

Our results were in accordance with the results of Muller et al ^{11,12} where the gingival thicknesses of the male subjects were more than the gingival thickness of the female. There was also significant difference in the gingival thickness of the male and female subjects when compared among the age groups. The female gingival thickness was found to increase with increase in age. But the male subjects were found to have, an increase in gingival thickness till the middle age and then the gingival thickness reduced for >40 yr age group.

In our study, the gingival thickness of the mandibular arch decreased with the increase in age. The gingival thickness of the female was found to increase with the increase in the age when compared among the three age groups. This finding is contradictory to the results from the study by Muller et al ^{11,12}, where the gingival thickness of female subjects decreased with increase in age.

Influence of gingival thickness on underlying bone has been found by Fu et al ¹³ and La Rocca et al ¹⁴ and the thick gingiva has found to influence the buccal bone morphology. Periodontal disease progression has been studied by Joshi et al ¹⁵ and Liu et al ¹⁶ in association with the gingival tissue thickness. Thick gingival biotype has found to have a decreased disease progression when compared with the thinner counterpart.

Gingival bleeding has been proved to be more pronounced in the thinner gingival biotype than the thick gingival biotype as studied by Claffey and Shanley et al.¹ Non surgical treatment outcomes like gingival shrinkage after scaling and root planing have been associated with the gingival thickness as studied by Sin et al.¹⁷ The post treatment shrinkage of the tissue has been found to be enhanced in the thinner gingival biotype .

Estimation of the gingival biotype has found to influence the outcome of the surgical treatments. They are crown lengthening procedures, orthodontic therapy treatment,

prosthetic crown placements etc. Exclusive periodontal treatments like periodontal flap tissue handling in periodontal surgery, treatment of grade 2 furcation defects by guided tissue regeneration, outcome of root coverage procedures, connective tissue grafts harvesting have found to be influenced by the gingival thickness.

Anderegg et al¹⁸ has shown the importance of assessing the gingival thickness in the guided tissue regeneration procedures. Thick gingival biotype has found to have a better wound closure and post operative tissue shrinkage is less in thick gingiva. Hwang et al¹⁹, Wennstrom et al²⁰ has shown the association of the increase in the thickness of the periodontal flap increases the ease of tissue handling as it reduces the chances of perforation of the flap. The vascularity is not compromised and healing is often satisfactory with the thick tissues. Connective tissue graft harvesting is often decided after evaluating the gingival tissue thickness in the palatal mucosa. The thicker the gingival tissue the more profound selection of the connective tissue graft procedure. According to the results of Rucha et al²¹, enhancing the gingival tissue biotype increases the treatment outcome. Ridge augmentation procedures too are impacted by the gingival thickness as studied by Thoma et al²² and Chao et al.²³

Thinner gingival tissue has found to have more incidence of gingival recession, and reduced buccal bone thickness etc. these factors are of concern in assessing the long term prognosis and success of peri implant plastic surgery procedures too.

Periodontal and peri implant plastic surgical procedures solely rely on the excellent healing of the gingival tissue. May it be the gingival tissue harvest or the gingival tissue healing, all have been influenced by the gingival vascularity. De Sanctis et al²⁴, has provided the data on the importance of the gingival tissue elements on the root

coverage procedures in which they have enlisted various factors for assessment. Out of these factors, gingival thickness estimation stands more chance of predicting the success of the procedure.

Studies done by Baldi et al²⁵, Graces- Mc Intyre et al²⁶, Aroca et al²⁷ and Viera et al²⁸ have shown the outcome of the coronally advanced flap procedures assessing the gingival tissue thickness.

Free gingival tissue grafts from the thicker gingival biotype has been shown to have a better treatment outcome than the thin gingival biotype as studied by Serap K Akcon et al.²⁹ Connective tissue grafts have also been found to be influenced by the gingival tissue thickness as studied by Zuchelli et al.³⁰ Rasperini et al³¹ studied the influence of gingival biotype on orthodontic treatment. Orthodontic procedures performed in thinner gingival biotype had been found to result in more recession than the thicker gingival biootype. Shah et al³² Bansal et al³³ has shown the importance of assessing the gingival biotype on the prosthodontic treatment outcomes where thicker gingival biotype had less incidence of gingival recession post prosthetic crown placement.

Lee et al³⁴, Zuhr et al³⁵ and Maio et al³⁶ has assessed the importance of assessing gingival biotype in implant treatment planning. In the implant case selection, assessment of the gingival thickness plays a pivotal role. According to Zuchelli et al³⁷ the assessment of the peri implant gingival tissue thickness increases the treatment options and influences the treatment plan.

Gingival tissue thickness estimation, though a very simple step in diagnosis has been a major factor in the treatment planning and outcome of the procedures. Adequately assessed and planned treatment warrants a better and an acceptable outcome of the procedure. Within the limitations of the study, we were able to show a gender variation, age related variation and the maxillary and

mandibular arch related variations of the gingival thickness. Further studies with an enhanced sample size and variant method of assessing gingival biotype will shed more light on this part of the subject.

Conclusion

Gingival tissue thickness estimation, though a very simple step in diagnosis has been a major factor in the treatment planning and outcome of the procedures. Adequately assessed and planned treatment warrants a better and an acceptable outcome of the procedure. Correct estimation and assessment of the gingival thickness should be the first crucial step for treatment selection and execution. Within the limitations of the study, we were able to show a gender related variation, age related variation and the maxillary and mandibular arch related variations of the gingival thickness. Further studies with an enhanced sample size and variant method of assessing gingival biotype will shed more light on this part of the subject.

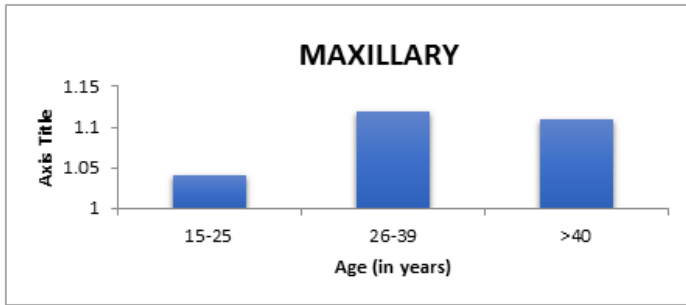
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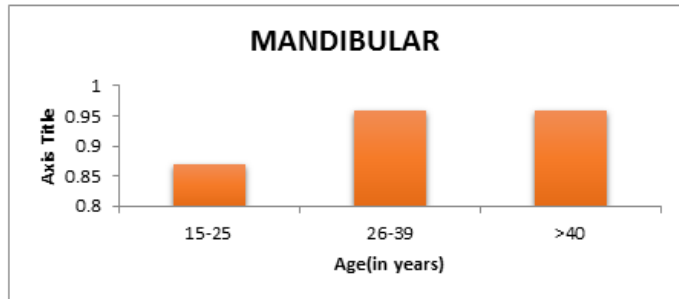
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Legend Graphs

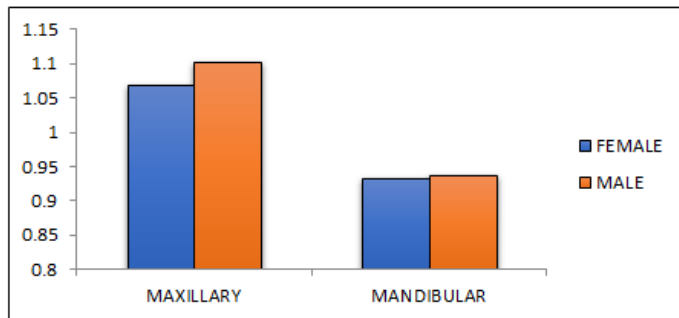
Graph 1: Comparison of Maxillary gingival thickness between the three age groups.



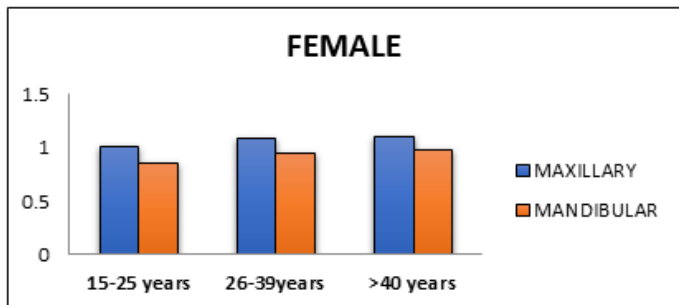
Graph 2: Comparison of Mandibular gingival thickness between the three age groups



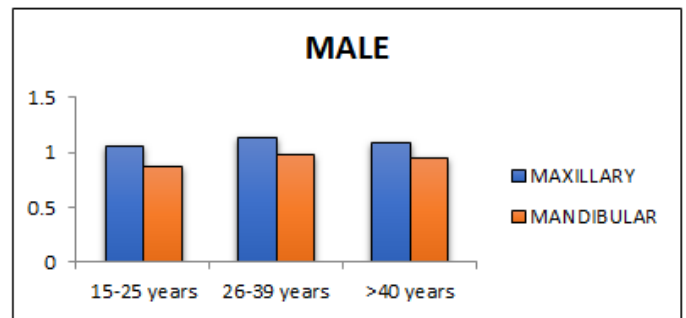
Graph 3: Comparison of the maxillary and mandibular gingival thickness between genders.



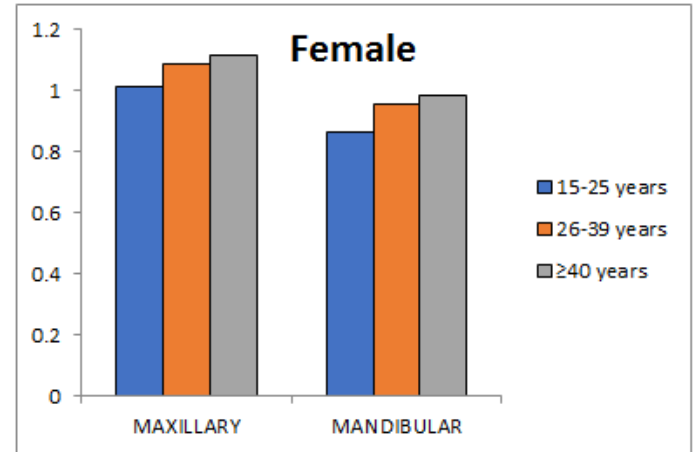
Graph 4: Comparison of the maxillary and mandibular gingival thickness in females:



Graph 5: Comparison of the maxillary and mandibular gingival thickness in males.



Graph 6: Comparison of the maxillary and mandibular gingival thickness in female subjects:



Graph 7: Comparison of the maxillary and mandibular gingival thickness in male subjects:

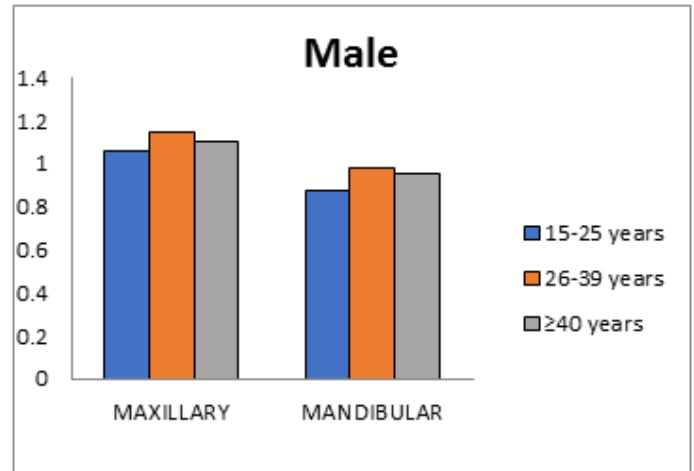


Figure 8: Armamentarium

