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Supracrestal Gingival Tissue Measurements in Healthy Human Periodontium

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Abstract: The objective of the study is to measure the dimensions of supracrestal gingival tissue in healthy human periodontium. In this study 30 dental students with clinically healthy periodontium were examined by doing sulcular probing, from the gingival margin to the top of the alveolar crest, using a UNC-15probe, at maxillary and mandibular incisors, canines, and premolars and first molars unilaterally. No statistical difference was detected ($p>0.05$) in comparision of mean supracrestal gingival tissue (SGT) measurements among male and females in maxillary and mandibular arch. However, comparison of mean SGT of individual tooth types in maxillary and mandibular arch showed significant difference with p value of 0.005 and 0.000 respectively. There is significant difference in the SGT dimensions in the different tooth in the same arch, whereas the male and female population showed no statistical difference in SGT measurements. Maxillary and mandibular SGT dimensions were lesser for the central incisors compared to the other teeth in the arch which were measured. Thus, indicating more bone reduction as we move posteriorly from anterior.

Keywords: Supracrestal, dimensions.

INTRODUCTION

The biologic width and its principles have been discussed sufficiently in the literature and have been used as clinical guidelines during the evaluation of periodontal and restorative, interrelationships. The average measurements of the gingival sulcus depth (0.69 mm), the epithelial attachment (0.97 mm), and the connective tissue attachment (1.07 mm) were studied by Gargiulo *et al*. [1] in 1961.

These measurements may vary at each tooth or at different sites on the same tooth. The term supracrestal gingival tissue (SGT) was introduced by *Smukler and* Chaibi[2] in 1997 as the tissue coronal to the alveolar crest up to the gingival margin. Amongst the different causes for SGT violation the common ones are root fracture or perforation, dental resorption, prosthetic preparation, and caries. Any faulty restoration or prosthesis may lead to inflammation of marginal soft tissue [3,4] which gradually migrates to underlying bone causing resorption and necrosis. Thus, for any prosthetic and restorative treatment to be successful integrity of biologic width is very important. There are different treatment options available for the treatment of violated tooth involving tooth extraction, crown lengthening and sometimes forced eruption. Crown lengthening procedure basically involves removal of marginal bone and apical positioning of soft tissue so as to obtain new SGT complex [5-7]. Based upon the literature available[7,8] it is found that sufficient bone should be resected to permit 3.0 mm of sound tooth structure above the crest of bone to house the supracrestal fibers, junctional epithelium, and gingival sulcus. However, such standardized measurements are based on microscopic or empiric observations, with no individualized data. The purpose of this study was to measure and compare contra laterally the dimensions of SGT in healthy human periodontium.

MATERIALS AND METHODS

In this study 30 dental students aged between 18 to 26 years with clinically healthy periodontium were recruited from People's College of Dental Sciences, Bhanpur, Bhopal (M.P.).All students voluntarily signed an informed consent document, which was approved by the Ethical Committee of the People's College of Dental Sciences, Bhopal (M.P.).Students who participated in the study were systemically healthy subjects with full complement of fully erupted teeth from central incisors to second molars in all 4 quadrants and having high level of oral

hygiene and without any history of orthodontic/restorative treatment or extraction. Whereas, students having gingival/periodontal disease, malocclusion or malalignment of teeth, tobacco-related habits and if on any medications were excluded from the study.

Sulcular probing from the gingival margin to the top of the alveolar crest, using a UNC-15 probe, was performed at maxillary and mandibular incisors, canines, and premolars and first molars unilaterally under local anesthesia with the objective of measuring the dimensions of the supra crestal gingival tissue. Probing was performed at six sites on each tooth (distobuccal [DB], mid-buccal [B], mesiobuccal [MB], mid-lingual [L], distolingual [DL], mesiolingual [ML]).

Data were expressed as means and standard deviation unpaired t-test to compare the SGT measurements between males and females One-way ANOVA with post-hoc analysis to compare the SGT measurements between different teeth in the maxilla and mandible

RESULTS

Results showed that SGT variation among men and women ranged from 1.0 to 6.0 mm (mean 3.5 mm).Comparison of mean SGT using unpaired t test for different maxillary teeth among males and females showed no statistical difference (Table 1). However results showed that mean SGT value is relatively higher in females compared to males for all the maxillary teeth. Similar results were observed for mandibular arch where comparison of mean SGT showed no significant difference among male and females (Table 2) whereas mean SGT value is quite similar in both male and females in mandibular arch. Statistically significant results were observed on comparing mean SGT of individual tooth types in maxillary and mandibular arch with p = 0.005 and 0.000 respectively (table 3 and 4).

Table-1: Comparison of mean SGT (supracrestal gingival tissue) for different maxillary teeth among males and females

TOOTH TYPE	MALE(mean SD)	FEMALE(meanSD)	F value	P value
Central Incisor	2.51(0.47)	2.84(0.3)	3.787	0.062
Lateral Incisor	2.87(0.45)	3.09(0.46)	1.581	0.219
Canine	2.91(0.43)	3.19(0.3)	3.230	0.083
First Premolar	2.79(0.29)	2.98(0.4)	2.120	0.157
Second Premolar	2.91(0.44)	3.3(0.3)	0.325	0.573
First Molar	2.92(0.45)	3.13(0.46)	1.338	0.257

Table-2: Comparison of mean SGT (supracrestal gingival tissue) for different mandibular teeth among males and females

TOOTH TYPE	MALE(mean SD)	FEMALE(meanSD)	F value	P value
Central Incisor	2.4(0.35)	2.42(0.23)	0.016	0.902
Lateral Incisor	2.53(0.49)	2.52(0.28)	0.006	0.940
Canine	2.74(0.59)	2.74(0.29)	0.000	0.995
First Premolar	2.65(0.51)	2.68(0.3)	0.019	0.892
Second Premolar	3(0.46)	2.94(0.25)	0.138	0.713
First Molar	2.96(0.54)	2.96(0.21)	0.000	0.994

Table-3: Comparison of mean SGT (supracrestal gingival tissue) of individual tooth types in maxillary arch

TOOTH TYPE	MEAN SD	RANGE
Central Incisor	2.61(0.45)	1.92-3.42
Lateral Incisor	2.93(0.46)	2.08-3.92
Canine	2.99(0.41)	2.08-3.67
First Premolar	2.85(0.33)	2.17-3.67
Second Premolar	2.94(0.4)	2.2-3.9
First Molar	2.98(0.46)	1.9-3.75
P value	**0.005**	

Table-4: Comparison of mean SGT (supracrestal gingival tissue) of individual tooth types in mandibular arch

TOOTH TYPE	MEAN SD	RANGE
Central Incisor	2.41(0.31)	1.67-3
Lateral Incisor	2.53(0.43)	1.33-3.42
Canine	2.74(0.51)	1.67-3.67
First Premolar	2.66(0.45)	1.33-3.58
Second Premolar	2.98(0.41)	2-3.75
First Molar	2.96(0.46)	2-4
P value	0.000	

DISCUSSION

The term biologic width, first mentioned by Cohen in 1962 and based on the study of Gargiulo *et al.* [1], includes the junctional epithelium and the connective tissue fibers and has been widely discussed in the literature. The term supracrestal gingival tissue has been suggested for the sum of the supracrestal fibers, the junctional epithelium, and the gingival sulcus. It has been stated that this entity occupies approximately at least 3.0 mm supracrestally. In the absence of periodontal disease, sulcular probing, via the crevice to the crest of the alveolar bone, may be used to determine the dimension of the SGT at any specific site prior to crown-lengthening surgery. Although sulcular probing has been mentioned in the literature since the 1950s, it was not until 1989 that Ursell [9] developed a study to evaluate this clinical measurement method Nevertheless, there is a paucity of studies in the literature regarding sulcular probing as a method to identify the SGT values in individuals. The present study evaluated the clinical SGT in healthy human periodontium by sulcular probing. In this study, 30 dental students (out of which there were 21 males and 9 females) 360 teeth, and 2160 sites were probed to perform unilateral comparisons of the SGT measurements in each individual. The contra lateral comparisons were not done in this study as it was done by Barboza *et al*. in 2008 where the results showed no statistical difference. Similarly there is no significant difference in SGT dimensions amongst the male and female population group in this study. In this study the mean supra crestal gingival tissue measurements in the maxillary and mandibular arch are highly significant with p =0.005 and p = 0.000 respectively. The mean SGT for different maxillary and mandibular teeth among males and females were lesser compared to the previous study done by Barboza *et al*, showing that SGT measurement is genetically predetermined. Therefore, measurements done in one population group cannot be used for another population. If the dimension of the SGT for a given situation is known, it is possible to reliably predict the final position of the gingival margin. Thus, the final preparation is extremely important and should respect the period needed for the SGT to heal.

CONCLUSION

There is significant difference in the SGT dimensions in the different tooth in the same arch, whereas the male and female population showed no statistical difference in SGT measurements.

The standard 3.0 mm of bone removal for crown-lengthening procedures or 0.5 mm for tooth preparation into the sulcus should be reviewed and more studies with larger population groups are warranted**.**

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