

ORIGINAL ARTICLE

The Frequency of Varying Degrees of Gingival Display and Biometric Measurements of Anterior Teeth

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ABSTRACT

Aim: To find out the frequency of gingival display in dentate individuals while smiling and evaluate the biometric measurements of anterior teeth at varying degrees of display.

Study design: Cross sectional observational study.

Place and duration: Prosthodontic Department of Lahore Medical and Dental College Lahore, from 5-6-2022 to 05-09-2022

Methodology: Selected subjects comfortably seated in dental chair. Digital vernier caliper was used for recording of measurements. Each individual was asked for maximum smile and gingival display noted as visible or not. Biometric measurements e.g.; over jet, over bite were recorded for gingival displayed and non -displayed group.

Results: A total of 260 subjects including 49.2% males and 50.8% females were selected. The mean age of the subjects was 22.81±SD 2.087 years. 65.4% of individuals had gingival display whereas 34.6 % did not show gingiva while posed smiling. Gender distribution showed more display of gingiva in females 72.7% as compared to males 57.8%. Statistically significant results were obtained when compared i.e.; $p < 0.05$. The over bite values showed significant difference with respect to gender however the over jet had insignificant difference with respect to gender. The comparison of means of biometric measurements with gingival display and non-display group showed significance. The values of over jet obtained in gingival display and non-display group were 3.30±0.728 and 2.34±0.829 whereas the mean values of over bite obtained in both groups were 2.97± 0.625 and 2.78±0.625.

Conclusion: Gingival display is frequently observed in our region. Gender based difference exists with respect to gingival display level where females displaying more gingival tissue and significant variation is seen in the biometric measurements of displayed and non -displayed group. These findings would help in placing margins of fixed and removable prosthesis in best esthetic zone.

Key words: Anterior teeth, Dentate, Esthetics, Gingiva, Gingival display, Over jet, Over bite, Smile,

INTRODUCTION

Facial attractiveness influences a person's social interaction, gives self-confidence and enhance personality development¹. Smile esthetics and facial beauty bears a strong relation and are related to each other^{1,2}. A well-balanced attractive smile is composed of components in harmony such as tooth shape, shade, size, colour and alignment³. It is also influenced by the amount of gingival show and shapes of lips. To achieve an attractive smile during restorative procedures all these components should have harmonious relationship with each other⁴.

The variable such as gingival display can immensely affect the beautiful smile. Gingival display by definition is the amount of gingiva displayed while smiling.⁵ It is also the distance that is present between the gingiva and lips while smiling^{1,4}. The lower border of upper lips and maxillary teeth along with gingival visibility construct the smile line. Smile type is classified into 4 classes. Class I i.e., gummy smile with more than 2mm gingival display, Class II i.e., high smile line with 0-2mm gingiva display, Class III; average smile displaying only embrasure and Class IV low smile line without visibility of gingiva⁶. A gummy smile line is the one exposing excessive more than 2mm gingival tissue. It renders smile as unpleasant one and severe.⁷ However various studies reported gummy smile as an attractive smile type in different populations of the world. Factors of gummy smile includes short heighted philtrum, incisal sized clinical crowns of incisors, excessive vertical height of maxilla, increased over jet and overbite and short length of lips⁸.

The vertical and horizontal over lap of the teeth are termed as over jet and over bite. They have a close relationship with the degrees of gingival display⁹. Some investigators reported their biometric measurements to be on the higher side of the scale in persons having gummy smiles as compare to those with less

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gingival display. Few researchers reported gender differences in the biometric measurements while others found them to be insignificant¹⁰.

In Prosthodontic practice dentist continuously struggles to place the restoration margins in best functional and aesthetic zone¹¹. Fabrication of crowns and bridges, implant restorative procedures and partial dentures require assessment of gingival display for margin placements.¹² The display of gingiva is of interest at different lip angles such as during smile, speech, exaggerated smile and at rest. The correlation of horizontal and vertical overlap of the teeth with the gingival display is of interest as it will help in the esthetic placement of the prosthodontic restorations in esthetic zone.¹³ Not much literature is available in our country on such topic. The study would help the dental practitioner to fine tune their practice regarding esthetic restoration placement.

The objective of the current study was to find out the frequency of gingival display in dentate individuals while smiling and evaluate the biometric measurements of anterior teeth at varying degrees of display.

METHODOLOGY

This cross-sectional observational study was carried out in the Prosthodontic department of Lahore Medical and Dental College Lahore from 5th June till 5th September 2022. A total of 260 subjects were selected i.e., 132 females and 128 males. All subjects were students/ house officers of the Dental college. The age ranged was 19 till 26 years. Non probability purposive sampling technique was used for subject selection. Inclusion criteria was set and individuals possessing anterior teeth in both arches were selected. Caries free teeth and teeth without periodontal problems, restorations and fractures were selected. All individual having anterior teeth free of spacing, crowding and

asymmetry were selected. All the individuals with orthodontic treatments, congenital and acquire defects of teeth were excluded. Informed consent was obtained and ethical approval obtained from the Institute Ethical Committee.

Subjects were comfortably seated in dental chair. They were asked to sit upright without support. Cheeks were retracted with a cheek retractor. Digital vernier caliper was used for recording of measurements. The vernier caliper had accuracy value of 0.01mm. Each individual was asked for maximum smile and gingival display noted as visible or not. External edges of vernier caliper were used to find out the overjet i.e., horizontal over lap of teeth was measured by measuring the distance between labial surfaces of mandibular central incisors and the incisal edges of maxillary central incisors. In case of no overjet and over bite i.e., edge to edge relation the values noted as zero. Subjects vertical overlap i.e.; over bite was calculated in maximum intercuspation position by marking the incisal edge overlap of upper central incisors on labial surface of lower central incisors. The measurement for over bite is calculated from this point till the incisal edge of lower incisors. Three measurements of over jet and over bite were obtained and mean value taken. Data was entered and analyzed in SPSS version 21. Chi square test was run to find out the gender-based difference in gingival display while smiling. Sample t test was used to evaluate the gender-based difference in over jet and over bite. p value 0.05 was considered as significance level.

RESULTS

A total of 260 subjects including 128(49.2%) males and 132(50.8%) females were selected. The age of the individual ranged from 19 to 26 years with mean age (Table I). Gender distribution showed more display of gingiva in females 96(72.7%) as compared to males 74(57.8%). Statistically significant results were obtained when compared i.e.; $p < 0.05$ (Table I). The over bite values showed significant difference with respect to gender however the over jet had insignificant difference with respect to gender (Table II). The comparison of means of biometric measurements i.e., over jet and over bite with gingival display and non-display group showed significance. The values of over jet obtained in gingival display and non-display group were 3.30 ± 0.728 and 2.34 ± 0.829 whereas the mean values of over bite obtained in both groups were 2.97 ± 0.625 and 2.78 ± 0.625 . There was significant difference in the values of over jet and over bite in displayed and non-displayed group i.e., $p < 0.05$ (Table III).

Table I: Gender distribution with respect to gingival display while smiling (n=260).

Gender	Display	Without display	P value
Males	74(57.8%)	54(42.2%)	0.011
Females	96(72.7%)	36(27.3%)	
Total	170(65.4%)	90(34.6%)	

Table II: Gender based difference in over jet and over bite. N=260

Biometric measurements	Males (n=128) Mean(\pm SD)	Females (n=132) Mean(\pm SD)	Total Mean(\pm SD)	Significance t test(p value)
Over jet (mm)	2.88(\pm .918)	3.06(\pm .85)	2.974(\pm .88)	-1.59(0.22)
Over bite(mm)	2.90(\pm .543)	2.91(\pm .72)	2.908(\pm .639)	0.003(-.08)

Table III: Comparison of over jet and over bite of incisors at different degrees of gingival display

Biometric measurement	Over jet Mean \pm SD	Over bite Mean \pm SD	Significance	
			T value	P value
Gingival display	3.30(\pm .0728)	2.97(\pm 0.625)	9.21	0.000
Without display	2.34(\pm 0.829)	2.78(\pm 0.625)	2.18	0.03

DISCUSSION

The current study was aimed to investigate the frequency of gingival display during smiling and to find out the difference in overjet and overbite between subjects who display who display the gingiva with those who do not. The participants of the study were

the dental students/house officers of the college and the sample represented the Pakistani population. In the present study gender-based difference has been reported with respect to gingival display during posed smiling. In the current study 50.8% females displayed gingiva during smiling as compare to males that is 49.2% and the results were significant. This finding was in accordance with the results of the other studies^{14,15,16}. Similarly, Tjan¹⁷ et al reported only 37% males displaying gingiva as compare to 80% females and the difference was significant.

For acceptable and pleasing esthetics gingival display is considered to be the essential element by the public¹⁸. Out of 260 participants 65.4 % displayed gingiva and 34.6% did not. Peck et al¹⁹ documented excessive gingival display to be a rare trait in men. Gingival display level upto 3mm from cervical margin is generally considered as pleasing and acceptable. ¹⁹Faiza Khan¹⁵ and coworker reported small percentage of subject i.e.; 37.8% displaying gingiva while smiling. They further documented more display in women than men and found the ratio almost double i.e.; 2:1. They found significant gender-based difference in gingival display group $p < 0.05$ and insignificant gender -based difference in non-displayed group i.e.; $p > 0.05$. Al Hababeh¹⁶ and coworkers found female patients showing more gingival tissue in maxilla and found significant difference between sex $p < 0.05$. Female display 0.12mm mean more gingiva as compare to males. 42.8% female and only 25.6% males display gingiva in their respective study. Ozge²⁰ and coworker documented average gingival display higher in females. Jesen²¹ et al also reported the similar findings.

The over jet and over bite are the horizontal distance and the vertical overlap of incisors.¹³ The mean values found in current study for overjet and over bite were 2.974 and 2.908 respectively. We found significant difference of over bite in gender $p < 0.05$, however the over jet values were insignificant. Similarly, the significant difference seen in both these measurements in subjects showing gingiva and those without gingival display $p < 0.05$. Faiza Khan¹⁵ and coworker reported mean horizontal and vertical overlap of incisors up to 3.15mm and 3.03mm respectively. In concordance with the results of the present study they also reported slightly higher values of over jet and over bite in females as compare to males however they in contrast reported insignificant gender -based difference in over bite values. Likewise other studies reported insignificant difference^{16,19}.

Over jet and over bite of incisors can differ significantly among different racial groups and genders²². We found significant difference in values of over jet and over bite in subjects who displayed gingiva with those who did not. Peck¹⁹ et al also found significant difference of values in their study. They reported overjet 1.5mm and over bite 1mm larger values in patients who displayed gingiva. Faiza Khan¹⁵ and coworker also reported significantly high values in patients with gingival show. Few other research studies reported the similar results^{19,23,24}. In the current study higher over jet and over bite found in displayed group.

Oral rehabilitation procedures should be carefully planned, diagnosed and esthetically manages patients demand pleasing appearance that not only works for improving their self-confidence but also their social well-being. The results of the current study can aid in esthetic placement of restoration margins and management of cases with gingival abnormalities. The study can be helpful in treating patients who display gums while smiling. Their restorations like implants installation and the idea about their placement potential site can be better planned. Moreover, fixed and removable prosthodontic outcome with improve esthetics can be obtained.

CONCLUSION

Gingival display is frequently observed in our region. Gender based difference exists with respect to gingival display level where females displaying more gingival tissue and significant variation is seen in the biometric measurements of displayed and non-

displayed group. These findings would help in placing margins of fixed and removable prosthesis in best esthetic zone.

Contribution of authors: HZR: Manuscript final reading BB: Conceived idea AZ: Statistical analysis MABS: Data collection HZC: Manuscript writing AMBH: Literature review SN: Designed research

Conflict of interest: Nil

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