

Original Article

RESTING UPPER LIP LENGTH AND UPPER LIP LENGTH DURING SMILE IN PATIENTS REPORTING TO PROSTHODONTICS KHYBER COLLEGE OF DENTISTRY

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ABSTRACT

Objectives: To determine the mean lip length at rest and during smile of the upper lip.

Materials and Methods: This is a descriptive, cross-sectional study that was conducted at department of Prosthodontics, Khyber College of Dentistry, Peshawar on 154 participants using a consecutive, non-probability sampling technique. Adult males and females aged 20 to 40 years with complete natural dentition and a Class I molar relationship, confirmed through clinical examination, were included. To measure the lip length at rest and during smiling a digital vernier calliper was used. The test applied to assess differences in lip length between both genders was independent samples t-test and ANOVA was used to evaluate differences across age groups.

Results: Out of 154 participants, 95 (61.69%) were males. The mean age was 29.54 ± 5.97 years. The mean lip length at rest was 19.06 ± 1.34 mm, and during smiling was 13.76 ± 1.30 mm. The mean lip elevation was 5.32 ± 0.28 mm, ranging from 5 to 7 mm. The mean lip length at rest was 19.32 ± 1.42 mm in males and 18.65 ± 1.08 mm in females, showing a difference that was statistically significant ($P = 0.002$). The mean lip length during smiling was 13.83 ± 1.42 mm in males and 13.66 ± 1.08 mm in females ($P = 0.42$).

Conclusion: Upper lip length is generally longer at rest and shortens during smiling. Males tend to have a slightly longer upper lip at rest compared to females, while lip length during smiling is similar between both genders.

Key words: Smile analysis, Upper lip, upper lip length, upper lip elevation

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INTRODUCTION

Aesthetic is a word of Greek origin dealing with beauty and its enhancement. The importance of

beauty and attractiveness is very well established in today's society. Dentofacial profile is an important aspect of aesthetics¹. A person dentofacial attractiveness is highly linked and related to his psychological wellbeing as normal dental appearance is considered more attractive in society². One component of dentofacial aesthetics is smile³. Smile is a voluntary facial expression that is strongly associated with emotion of happiness and pleasure⁴. It is more than just an expression, it rather influences personality and individual's performance in routine⁵.

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A smile has essentially three components that are interrelated to each other, they are lip framework, teeth and gingival scaffold. A smile line basically determines the display of tooth and gingiva during a smile⁶. This display is evaluated from position of lips at rest and its position and amount of mobility produced during smiling⁷. Considerably variable amount of elevation is seen in upper lip of different individuals with a range of 2-12 mm and an average of 7-8mm⁸. Lip elevation excessive than this is a limiting factor. It is categorized as high average and low with high showing 100% of incisors along with some adjoining apical gingiva, average showing 75-100% of maxillary anterior teeth along with its attached interproximal gingiva and low that shows less than 75% of maxillary anterior teeth with no display of gingiva⁹. Hence gingival display of approximately 2mm is considered acceptable during smile. With progression of age, people do show many skeletal and soft tissue changes that greatly affects overlying soft tissues i.e lips, muscles and their function ultimately affecting smile¹⁰.

Many studies have already been conducted to understand and evaluate the amount of upper lip elevation to ideal lip height. Elevation of upper lip length during smiling can be seen by identifying the level of smile line in different individuals and measured with the help of digital vernier calliper. According to one study conducted by Juboori mean length of maxillary lip was 22.79 ± 2.53 mm.⁵ In another study done by Merzzah Abdullah mean resting external upper lip length was 18.81 ± 1.54 mm in female and 20.69 ± 2.23 mm in males. However mean upper lip length at smile was 14.51 ± 2.14 mm in female and 15.92 ± 1.73 mm in males¹¹. According to Diana George, relaxed external upper lip has a length 1.2mm shorter in women than men ($p < 0.05$) while external upper lip length when smiling was 0.89mm lesser in females than males ($p < 0.05$). The upper lip length at rest and smile was 1.2mm and 0.9 mm shorter in women than men ($p < 0.01$)¹².

Assessment of upper lip elevation during smiling helps in understanding smile line characteristics and differences between males and females. These findings may be useful for prosthodontists during esthetic rehabilitation, especially in anterior teeth arrangement for complete dentures and smile evaluation in anterior fixed prostheses. Knowledge of the lip-crown relationship may help in better esthetic

treatment planning and prosthesis design.

The main objective of this study was to determine mean upper lip length at rest position and mean upper lip length during smile among patients reporting to prosthodontics department of (For Blinding).

There is no statistically significant difference between the mean upper lip length at rest and mean upper lip length during smile in patients reporting to Prosthodontics.

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MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at the Department of Prosthodontics, Khyber College of Dentistry, Peshawar from 1st August 2020 to 1st December 2021, using a consecutive non-probability sampling technique. Informed consent in written form was obtained from all participants, and approval was taken from the hospital's ethical committee.

By using WHO sample size calculator, the total sample size was 154 by using mean upper lip length (22.79 ± 2.53)⁵ by keeping 95% confidence interval and absolute precision of 40%.

The inclusion criteria consisted of patients who had never undergone maxillofacial surgical procedures, had no previous history or ongoing orthodontic treatment, and had not received any prosthodontic procedures in the smile zone area. Patients included also exhibited a Class I incisor relationship without any crowding or spacing and had an intact upper lip and normal facial profile. The exclusion criteria included patients with craniofacial deformities, missing teeth in the anterior region, or attrition in the anterior aesthetic zone. Additionally, patients with physical or mental disabilities and those with a cleft lip were excluded from the study.

Individuals with an intact upper lip who met and satisfied the inclusion criteria were invited to participate in the study. The purpose of the study, procedures, potential risks, and benefits was clearly explained to them. Written informed consent was obtained. Participants were assured that their personal information and collected data would be

kept confidential. A digital Vernier caliper having a precision of 0.01 mm was used to measure the upper lip length both at rest and while smiling. Participants were instructed to sit upright while measurements were taken from the subnasale to the lower vermilion border. The relaxed or resting lip state referred to the natural position of the lips when the patient was at rest and not actively contracting the facial muscles. Measurements were first recorded in the resting state and then during smiling. Three readings were taken during smiling, and the mean value was recorded.

Resting lip length referred to as the distance measured from the subnasale to the lower vermilion border when the face was in a fully relaxed state. Lip elevation described the amount by which the lip was stretched and raised during a smile, revealing the upper incisors and gingiva; this measurement was always shorter than the resting lip length. The smile line was defined as an imaginary line along the incisal edges of the maxillary anterior teeth, which ideally followed the curvature of the superior border of the lower lip during smiling.

The data were collected, entered, and then analyzed using SPSS version 21. Categorical variables such as gender were summarized using frequencies and percentages, while numerical variables like age and lip length (at rest and during smiling) were expressed as mean $\pm$ standard deviation. Data were stratified based on age groups and gender. Lip elevation was determined by subtracting the mean lip length during smiling from the mean lip length at rest. An independent samples t-test was applied to assess the difference between the both the genders, and ANOVA was used to evaluate differences across age groups. A significance level of 5% was set for all statistical tests.

RESULT

The males were 95(61.69%) while the females

were 59(38.31%). The mean age of this study was 29.54 ± 5.97 years with range from 20 to 40 years. The mean lip length at rest was 19.06 ± 1.34 mm while at smile was 13.76 ± 1.303 mm. The mean lip elevation was 5.32 ± 0.28 mm ranging from 5 to 7mm. (Table 1)

The mean lip length at rest was 19.32 ± 1.42 mm in males and 18.65 ± 1.08 mm in females with a difference that was statistically significant ($P=.002$), these results favour the alternate hypothesis. The mean lip length at smile in males was 13.83 ± 1.42 mm and in females was 13.66 ± 1.086 mm with no statistically difference ($P= 0.42$). The mean lip elevation in males was 5.5 ± 0.072 mm and in females was 5.051 ± 0.28 mm. The difference in lip elevation between genders was very highly statistically significant ($P<0.001$). (Table 2)

Comparison of lip length at rest and at smile among age groups shows the difference for both at rest ($P=.110$) and at smile ($P= .099$) was statistically significant. Lip elevation has no statistically significant association with age of the participants ($P=.603$). The details are given in table 3.

DISCUSSION

This investigation was aimed to determine mean upper lip length at rest position and mean upper lip length during smile among patients reporting to prosthodontics department (For Blinding). Our results showed that the mean lip length at rest was 19.06 ± 1.34 mm while at smile was 13.76 ± 1.303 mm. The mean lip elevation was 5.32 ± 0.28 mm ranging

Table 1: Mean of age, lip length at rest, lip length at smile and lip elevation

Variable	Mean $\pm$ SD	Range
Age (years)	29.54 ± 5.97	20-40
Lip length at rest (mm)	19.06 ± 1.34	17-22
Lip length at smile (mm)	13.76 ± 1.303	12-16.5
Lip elevation (mm)	5.32 ± 0.28	5-7

Table 2: Comparison of lip measurements between genders

Parameter	Gender	Mean $\pm$ SD	95% CI	P-value
Lip length at rest	Male	19.32 ± 1.42	0.24 to 1.09	0.002
	Female	18.65 ± 1.08		
Lip length at smile	Male	13.83 ± 1.42	-0.25 to 0.61	0.423
	Female	13.66 ± 1.09		
Lip elevation (mm)	Male	5.50 ± 0.072	0.38 to 0.51	<0.001
	Female	5.05 ± 0.28		

Independent t-test

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from 5 to 7mm. A statistically significant difference was found for lip length at rest among both the genders.

The typical upper lip length at rest which was measured from the subnasale to the lowest point of the upper lip at the center which is around 23 mm in men and 20 mm in women. Clinically, the relationship of the upper lip with the maxillary incisors and oral commissures is important during smile analysis. An imbalance between upper lip length and commissure height may influence smile esthetics and lip line appearance at rest. Therefore, evaluation of upper lip length can be helpful during esthetic assessment and prosthodontic treatment planning¹³.

A relatively short upper lip compared to commissure height can lead to an unaesthetic, reversed upper lip line at rest. While modifying commissure height is challenging, lip lengthening can also be achieved through surgical procedures, either alone or in conjunction with a Le Fort I osteotomy¹⁴. In adolescents, a shorter upper lip may be considered normal due to the ongoing lip growth that continues even after vertical facial development has finished. Interestingly, a short upper lip does not always correspond to a high smile line; in fact, studies have shown that individuals with gingival display often have longer upper lips compared to those without visible gingiva¹⁵.

Many studies have already been conducted to understand and evaluate the amount of upper lip elevation to ideal lip height. Elevation of upper lip length during smiling can be seen by identifying

the level of smile line in different individuals and measured with the help of digital vernier calliper. According to one of the study that was conducted by Al Juboori the average (mean) upper lip length measured for entire sample was 22.79 ± 2.53 mm. The P-value was 0.052.5 In another study performed by Merzzah Abdullah the mean external upper lip length while at rest was 18.81 ± 1.54 mm in female and 20.69 ± 2.23 mm in males. However the mean external upper lip length while smiling was 14.51 ± 2.14 mm in female and 15.92 ± 1.73 mm in males¹¹. According to Diana George, external upper lip length when in relaxed position was 1.2mm shorter in women than men ($p < 0.05$) and while smiling external upper lip length was 0.89mm lesser in females than males ($p < 0.05$). The upper lip at rest and smile was 1.2mm and 0.9 mm shorter in women than men ($p < 0.01$)¹².

Fonseca reported that the normal upper lip length typically ranges between 18.0 to 22.0 mm in females and 20.0 to 24.0 mm in males, indicating a naturally longer lip length in men¹⁶. Supporting this, a study by Hega et al¹⁷ observed that, on average, women have upper lips that are 3.1 mm shorter than those of men. The degree to which the gingiva and teeth are visible during smiling is not solely dependent on lip length but is also influenced by a combination of dynamic and structural lip factors¹⁸.

In a study performed by Alkhalaf et al¹⁹, assessed upper lip length in patients with different Angle malocclusion groups and reported mean upper lip lengths of 15.28 ± 1.21 mm in Group 1, 17.60 ± 1.32 mm in Group 2, and 18.00 ± 1.04 mm in Group 3. Their

Table 3: Comparison of lip measurements among age groups

Parameter	Age Group (years)	Mean $\pm$ SD	F-value	P-value
Lip length at rest	20–25	19.04 ± 1.33	2.048	.110
	26–30	18.78 ± 1.28		
	31–35	18.97 ± 1.27		
	36–40	19.56 ± 1.41		
Lip length at smile	20–25	13.71 ± 1.31	2.132	.099
	26–30	13.50 ± 1.29		
	31–35	13.68 ± 1.22		
	36–40	14.27 ± 1.30		
Lip elevation	20–25	5.33 ± 0.23	0.619	.603
	26–30	5.32 ± 0.27		
	31–35	5.28 ± 0.25		
	36–40	5.38 ± 0.41		

*One-way ANOVA test

findings demonstrated variation in upper lip length among different malocclusion patterns. In the present study, Angle classification was not considered as a stratification factor; however, the mean upper lip length observed (19.06 ± 1.34 mm) was closer to the values reported for Angle Class II Division 2 patients in their study.

Maliha Mumtaz et al.²⁰ also evaluated the differences of upper lip length among individuals with competent, lips-apart, and incompetent lips at rest. The retrospective study included 66 Class I, vertically normal-angle individuals aged 12–19 years, divided into three groups based on interlabial gap. Mean upper lip lengths were 20.04 mm, 18.81 mm, and 19.00 mm for competent, lips-apart, and incompetent groups, respectively. Males had a mean lip length of 19.61 mm, and females 19.07 mm. Differences in lip length among the groups and between genders were statistically insignificant.

Our findings showed that mean lip elevation was 5.5 ± 0.072 mm in males and 5.051 ± 0.28 mm in females, falling within the normal range of 4–6 mm; values above this indicate hypermobility. Peck and Peck²¹ reported an average elevation of 5.2 mm (23% reduction from rest), while Tarantili et al. found a 28% decrease during spontaneous smiles. Other studies reported average lip mobility ranging from 5.0 to 6.7 mm across gender and lip length groups, with similar reductions in lip length during smiling regardless of sex. On average, the upper lip elevates by 7–8 mm or 80% of its original length, with women showing slightly more elevation, leading to greater gingival display. It's important to identify hyper- or hypomobile lips accurately, as surgical overcorrection can negatively affect smile esthetics and facial harmony²².

CONCLUSION

Within the limitations of this study, it can be concluded that normative values for upper lip length at rest and during smiling were established. The mean lip length at rest was 19.06 ± 1.34 mm, and during smiling was 13.76 ± 1.30 mm. The average lip elevation measured was 5.32 ± 0.28 mm. The average lip elevation observed during smiling was 5.32 ± 0.28 mm. A statistically significant difference in upper lip length at rest was found between genders, with males showing greater values than females. These findings may be useful in smile analysis and esthetic

treatment planning, particularly in prosthodontic rehabilitation involving complete dentures and anterior fixed prostheses.

REFERENCES

1. Banditsaowapak P, Cheng JH-C, Chen DD-S, Chou MY. Three-dimensional analysis of posed smile in adults: A scoping review. *J Dent Sci.* 2024;19(2):773-86.
2. Campos LA, Campos JADB, Marôco J, Peltomäki T. Aesthetic dental treatment, orofacial appearance, and life satisfaction of Finnish and Brazilian adults. *PLoS One.* 2023;18(6):e0287235.
3. Tajbakhsh N, Delpisheh F, Ghadimi N, Ansari S. Smile management: White esthetic, pink esthetic and facial attractiveness, a review of literature. *Res J Biol Pharm.* 2022;5(2):046-50.
4. Sabbah A. Smile analysis: diagnosis and treatment planning. *Dent Clin North Am.* 2022;66(3):307-41.
5. Barranca-Enríquez A, Romo-González T. Your health is in your mouth: a comprehensive view to promote general wellness. *Front Oral Health.* 2022;3:971223.
6. Alikhasi M, Yousefi P, Afrashtehfar KI. Smile design: mechanical considerations. *Dent Clin.* 2022;66(3):477-87.
7. Bakeman EM, Kois JC. Maxillary lip dynamics and gingival display revisited: Utilizing standardized metrics. *J Esthet Restorat Dent.* 2023;35(5):727-34.
8. Sabri R. The eight components of a balanced smile. *J Clin Orthod.* 2005;39(3):155-67.
9. Liu Y, Li CX, Nie J, Mi CB, Li YM. Interactions between orthodontic treatment and gingival tissue. *Chin J Dent Res.* 2023;26(1):11-8.
10. Abda A, Koya S, Maniyankod S, Fathima M, Palliyath MM, Shetty S. Influence of Gingival Display on Smile Esthetics Based on the Orthodontist, Dentist, and Layperson's Perspectives: A Systematic Review and Meta-analysis. *World.* 2025;16(3):298.
11. Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: Part 2. Smile analysis and treatment strategies. *Am J Orthod Dentofacial Orthop.* 2003;124(2):116-27.
12. Sarver DM. The importance of incisor positioning in the esthetic smile: the smile arc. *Am J Orthod Dentofacial Orthop.* 2001;120(2):98-111.
13. Bhadel R, Kinra MS, Jain S, Sayed ME, Aggarwal A, Marrapodi MM, et al. Evaluation of Various Facial Measurements as an Adjunct in Determining Vertical Dimension at Occlusion in Dentate Individuals—A Cross-Sectional Study. *Prosthesis.* 2024;6(5):989-1001.
14. Saleem R, Kukreja BJ, Goyal M, Kumar M. Treating short upper lip with “Unified lip repositioning”

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- technique: Two case reports. *J Ind Soc Periodontol.* 2022;26(1):89-93.
15. Geron S, Atalia W. Influence of sex on the perception of oral and smile esthetics with different gingival display and incisal plane inclination. *Angle Orthod.* 2005;75(5):778-84.
 16. Iqbal TA, Jawed S, Imran S, Beenish H, Arif SIR. Correlation of Various Anatomical Facial Landmarks with Inter-Canine Distance in Population of Northern Punjab. *J Islamabad Med Dent College.* 2024;13(4):660-5.
 17. Alshamri HA, Al Moaleem MM, Al-Huthaifi BH, Al-Labani MA, Naseeb WR, Daghriri SM, et al. Correlation Between Maxillary Anterior Teeth and Common Facial Measurements. *Clin Cosm Invest Dent.* 2023;23:289-300.
 18. Wang J, Li F-L, Yang H-X, Li L-M. Correlation between different points on the face and the width of maxillary anterior teeth. *Heliyon.* 2024;10(6):e27642. Doi:10.1016/j.heliyon.2024.e.
 19. Alkhalaf M, Al-Sabbagh R. An evaluation of upper lip length and thickness changes on smiling in patients with class I, class II Div1, 2 of malocclusion according to angle's classification. *J Orthod Endod.* 2015;1:16.
 20. Mumtaz M, Shaheed M, Zia AU, Illyas K. Comparison of mean upper lip length in individuals with competent lips, lips apart and incompetent lips. *Pak Orthod J.* 2020;12(1):61-4.
 21. Amin Salehi E, Heshmat H, Moravej Salehi E. In vitro evaluation of the effect of different sandblasting times on the bond strength of feldspathic porcelain to composite resin. *J Islam Dent Assoc Iran.* 2013;25(1):22-30.
 22. Pollington S, Fabianelli A, van Noort R. Microtensile bond strength of a resin cement to a novel fluorocanase glass-ceramic following different surface treatments. *Dental Mater.* 2010;26(9):864-72.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

AUTHORS' CONTRIBUTION

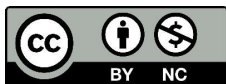
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Conception or Design: MH, AK, SK, HM, KN, TA

Acquisition, Analysis or Interpretation of Data: MH, AK, SK, HM, KN, TA

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All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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