

Effect of Age, Gender and Lip Length on Anterior Teeth Display

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ABSTRACT

Aim: To evaluate the exposure of maxillary and mandibular teeth during lips at resting position and study the effect of age, gender and lip length on the anterior teeth display.

Study design: Cross sectional observational study.

Place and duration: Prosthodontic Department, Lahore Medical and Dental College from 5th June till 5th September 2022.

Methodology: Selected subjects comfortably seated in dental chair. The resting position of upper lip length was recorded from subnasale to stomion at the facial midline. With participant at rest position; visible portion of anterior teeth were measured vertically from lower border of upper lip to incisal edge of incisors (canine tips at the mid-point) in maxillary teeth using vernier caliper. For mandibular teeth readings were taken from the lower lip upper border to the incisor's edges of lower teeth (at the mid-point of canine cusp tip). Three readings of each tooth were recorded and mean value taken.

Results: The visibility of anterior teeth was more prominently seen in females as compared to males but this finding was statistically insignificant. Decrease in the exposure of maxillary teeth and increase in the exposure of mandibular teeth was significantly found ($p < 0.05$). More female participants were found with shorter lip lengths as compared to males ($p < 0.05$). Lip length association with increasing age was found to be significantly increased with increasing age. It was $8.99 \pm SD 1.42$ in age group less than 30 years, $9.02 \pm SD 1.57$ in age group 31-50 and $10.01 \pm SD 1.42$ in participants above 50 years of age.

Conclusion: There was no significant difference in exposure of anterior teeth at rest between gender. Females have shorter lip lengths than males. The upper lip length increases with increasing age. The exposure of maxillary anterior teeth significantly decreases and mandibular teeth increases with increasing age.

Keywords: Anterior teeth, aging, gender, tooth display, tooth visibility, lip length.

INTRODUCTION

Dental and facial esthetics of an individual predominantly depend on the vertical height of anterior teeth¹. Vertical tooth display of incisors and canines determine the esthetic outcome of various dental treatments like restorative procedures, anterior esthetic care, orthodontic treatments, implant dentistry and prosthodontics procedure both fixed and removable². All esthetic makeovers demand a closer look at two dynamics of soft tissues while planning esthetic restorations³. The first one is the soft tissue observation at the resting position and the second dynamic to look for is the changes of the facial tissues due to the ongoing aging process⁴.

There are two muscular positions that influence the soft tissues of dentofacial complex; i.e., static and dynamic⁴. The static or the resting phase is the position where lips are relaxed along with the perioral tissues and teeth do not coincide^{4,5}. Age, gender, race and lip length are the prime factors that affect anterior teeth display in this position^{4,5}. Aging is an ongoing process that leads to reduce tonicity of musculature resulting in change in facial angles like deepening of nasolabial fold, mental grooves, horizontal labial angle⁶. The soft tissue changes in lip presents themselves as thinning of lips, drooping of corners of mouth, lip inversion, increased length of lips and lack of elasticity over time^{6,7}. All these changes result in decrease exposure of maxillary and increase exposure of mandibular teeth thus changing lip tooth relation⁸.

Many prosthodontists pay special attention to the esthetic work when dealing with fix prosthesis, restorative work, and implant dentistry but fail to incorporate the same esthetic details while fabricating removable prosthesis⁹.

To fulfil the esthetic demand in removable and fix restoration dentists have focused on the rest and dynamic position of the anterior teeth display¹⁰. Several methods have been suggested for establishing lip tooth relationship; out of them the measurement of visible amount of anterior teeth is one of the guidelines for establishing appropriate vertical height of anteriors^{11,12,13}.

Prosthodontist regularly face the challenge of restoring lost vertical dimension in edentulous patients¹¹. To maintain facial harmony esthetic considerations and proper evaluation of facial characteristics has its importance¹². Knowledge of changes in dentofacial complex due to aging is important for achieving maximum esthetics outcome, clinical success and patient's satisfaction of all age groups¹¹⁻¹³.

The aim of the study was to evaluate the exposure of maxillary and mandibular teeth during lips at resting position and study the effect of age, gender and lip length on the anterior teeth display.

METHODOLOGY

This cross-sectional observational study was carried out in department of Prosthodontics at Lahore Medical and Dental College, Lahore from 5th June till 5th September 2022 after permission from Ethical Committee. The participants selected were the students, residents and the patients at the medical college. Out of 200 selected participants; 90 were males and 110 were females with the age ranged from 19 to 60 years. Non probability purposive sampling was used for sample selection. The sample was divided in three groups according to age. Inclusion criteria was set where all the participants had caries free and periodontal healthy anterior 6 teeth in both arches. Well aligned teeth without gingival diseases, tooth surface loss and crowding were included. All those participants with history of trauma to the teeth and lips were excluded. Participants having congenital anomalies, orthodontic and surgical interventions were also excluded. Any prosthetic crowns on incisors, veneers, facial asymmetry, missing, fractured incisors or occlusal discrepancies that could affect the study outcome were also excluded. The study was approved by the college ethical committee. Informed consent was taken.

Two experienced prosthodontists observed and recorded the desired data. Digital vernier caliper with accuracy of 0.01mm was used for recording of measurements. Internal edges of vernier caliper were used for recording values. Each participant was asked to sit upright in the dental chair in the resting position. The resting position of upper lip length was recorded from subnasale to stomion

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at the facial midline. With participant at rest position; visible portion of anterior teeth were measured vertically from lower border of upper lip to incisal edge of incisors (canine tips at the mid-point) in maxillary teeth. For mandibular teeth readings were taken from the lower lip upper border to the incisor's edges of lower teeth (at the mid-point of canine cusp tip). Three readings of each tooth were recorded and mean value taken. SPSS version 20 was used for data analysis. Recorded data was analyzed by Mann Whitney-U test and Kruskal Walli's test. The significant level was set at 5%.

RESULTS

A total of 200 participants were selected for the current study including 90; 45% males and 110; 55% females participants. The age range of the participants was 19 years to 60 years with mean age $40.97 \pm SD 12.80$. Teeth visibility of anterior teeth at relaxed upper lip length position with respect to gender was depicted in Table I. The visibility of anterior teeth was more prominently seen in females as compared to males but this finding was statistically insignificant. Female participants displayed more maxillary and mandibular teeth as compared to the males.

When the visibility of teeth was assessed in different age groups, statistically significant results were obtained (Table II). Decrease in the visibility of maxillary teeth with respect to increasing age was seen. ($p < 0.05$). However, visibility of mandibular teeth was found to be significantly increased ($p < 0.05$) (Table II).

Table I: Tooth visibility with respect to gender (n=200).

Teeth Measured	Gender		P value
	Male Mean \pm SD	Female Mean \pm SD	
Maxillary right central incisor	1.49 \pm 1.23	1.66 \pm 1.22	0.329
Maxillary right lateral incisor	1.48 \pm 1.26	2.14 \pm 5.22	0.306
Maxillary right canine	1.63 \pm 1.27	1.94 \pm 1.68	0.369
Mandibular right central incisor	1.47 \pm 0.87	1.69 \pm 0.90	0.094
Mandibular right lateral incisor	1.56 \pm 0.87	1.70 \pm 0.93	0.244
Mandibular right canine	1.61 \pm 0.88	1.81 \pm 0.99	0.22

Mann Whitney -U test applied. $p < 0.05$ was significant

Table II: Tooth visibility comparison with respect to age groups (n=200)

Teeth Measured	Age			P-value
	<30 years Mean \pm SD	31-50 years Mean \pm SD	>50 years Mean \pm SD	
Maxillary right central incisor	2.76 \pm 1.07	1.54 \pm 1.02	0.645 \pm 0.729	.000
Maxillary right lateral incisor	2.78 \pm 1.03	2.11 \pm 5.61	0.612 \pm 0.69	.000
Maxillary right canine	2.92 \pm 1.12	1.81 \pm 1.52	0.824 \pm 1.09	.000
Mandibular right central incisor	1.16 \pm 0.68	1.55 \pm 0.90	2.02 \pm 0.85	.000
Mandibular right lateral incisor	1.18 \pm 0.65	1.60 \pm 0.93	2.09 \pm 0.86	.000
Mandibular right canine	1.28 \pm 0.66	1.67 \pm 0.92	2.18 \pm 0.85	.000

Kruskal Walli's test applied. $p < 0.05$ was significant

Table III: Tooth visibility comparison with respect to upper lip length in age groups (n=200).

Teeth Measured	Upper lip length(mm)			P-value
	6.6-9.3 Mean \pm SD	9.3-11.7 Mean \pm SD	11.7-14.1 Mean \pm SD	
Maxillary right central incisor	1.94 \pm 1.14	1.29 \pm 1.24	.600 \pm 806	.000
Maxillary right lateral incisor	2.43 \pm 5.30	1.32 \pm 1.21	0.52 \pm 0.88	.000
Maxillary right canine	2.25 \pm 1.60	1.41 \pm 1.28	.071 \pm 0.75	.000
Mandibular right central incisor	1.58 \pm 0.91	1.60 \pm 0.83	1.65 \pm 1.1	0.955
Mandibular right lateral incisor	1.61 \pm 0.93	1.66 \pm 0.85	1.73 \pm 1.09	0.858
Mandibular right canine	1.71 \pm 0.94	1.73 \pm 0.82	1.77 \pm 1.09	0.958

Kruskal Walli's test applied. $p < 0.05$ was significant

Length of the upper lip with respect to the amount of the visibility of anterior teeth was shown in Table III. Shorter lips in participants significantly displayed more maxillary teeth than those having longer lips. Similar finding was seen in mandibular teeth display but the findings were statistically insignificant ($p > 0.05$) (Table III). Lip length association with increasing age was found to be significantly increased with increasing age. It was $8.99 \pm SD 1.42$ in age group less than 30 years, $9.02 \pm SD 1.57$ in age group 31-50 and $10.01 \pm SD 1.42$ in participants above 50 years of age. More female participants were found with shorter lip lengths; $8.63 \pm SD 1.32$ as compared to males $10.11 \pm SD 1.44$ ($p < 0.05$).

DISCUSSION

Soft tissue and bone support is greatly affected by process of aging. The combined effect of bone resorption, muscular atrophy and loss of elasticity of various orofacial tissues result in modification of facial features¹⁴. Loss of lip elasticity and increasing effect of gravity on sagging musculature are some factors responsible for senile facial appearance and compromised dental esthetics^{14,15}. It is therefore important to evaluate and study the effect of aging on dental esthetics and facial attractiveness. The current study was an attempt to investigate the effect of gender, age and lip length on exposure of anterior teeth at rest.

Esthetically restored prosthodontic and restorative work involves a high degree of consideration of anterior teeth display at rest and during smile¹⁶. If this element is overlooked by dental care providers than resultant restoration has compromised esthetic, function and phonetics¹⁷. Teeth display at resting vertical dimension shows variation from person to another person. Gender dimorphism and the effect of age on teeth display have been studied in various parts of the world and variations in the anterior teeth display have been found^{17,18}. Gender difference in the current study was seen and more female participants displayed the anterior teeth as compared to males but the difference was not significant. Similar findings were seen in the study done by Al-Wazzan¹⁹ and Al-Hababeh²⁰ and coworkers. However, in contrast Faiza Khan²¹ and coworker reported significant gender-based difference in incisor display at rest position $p < 0.05$. Likewise, a study carried out on adolescents reported females' predominance in displaying more maxillary teeth than males. They found maxillary lateral incisors $p < 0.005$ and canines $p < 0.03$ to be the most prominent teeth showing gender-based difference. Stephanie²² and coworker in contrast to the results of current study reported significant gender dimorphism in maxillary central incisor exposure where men displaying less incisors. In the current study more mandibular anterior teeth were displayed in females as compared to males.

However, in contrast Vig and Brundo²³ found males with more mandibular teeth display as was by Faiza Khan²¹ and coworker. We believe that the difference of findings with other studies could be explained on the basis of difference between the studied population and the measuring technique.

When assessed the effect of aging on anterior teeth display statistically significant results were obtained $p < 0.05$. Generalized decreased in maxillary teeth display and increased in mandibular anterior teeth display was seen in older age groups. Stephanie²² and coworker stated the similar finding; they found decrease in visibility of anterior teeth with increasing age and this effect was more prominent in males. Dickens²⁴ and coworkers in agreement stated the fact that the maxillary incisors display at rest and in smile position decreases after the 20 years of age. Desai²⁵ and coworker found the similar results after the age of 40 years. Similar findings were reported by Faiza²¹ and coworker in their respective study $p < 0.001$. Vig and Brundo²³ likewise reported increasing visibility of mandibular and decreasing maxillary teeth visibility with age. With aging muscle loose its tonicity and gravity effect strongly pull the upper and lower lips downwards resulting in decrease

anterior teeth visibility in maxillary and increase visibility in mandibular teeth^{26,27}.

Patients with longer lips displayed less teeth as compared to the those with shorter lips. Significant findings were obtained in the current study. Few other studies are in agreement with the results of the current study^{26,27}. Lip length increase with increasing age $p < 0.000$. In younger group the mean lip length seen was 8.99 ± 1.42 , in middle age group 2.02 ± 1.57 and in old age group 10.01 ± 1.42 respectively. Stephanie²² and coworker reported the similar findings claiming that the upper lip length has increased by 2.25mm in men and 0.49mm in women with increasing age. In consistent with the present study Chetan²⁷ and coworkers reported that from age 16 to 55 years increased in the lengths of lips in each gender was seen. They further stated that this was due to the result of poor muscle tone, increasing redundancy and flaccidity with age. Females with shorter and males with comparatively longer lips were reported in the current study $p < 0.05$. Likewise, Miron²⁸ and coworkers stated that the gender dimorphism was seen as women having 3mm shorter lip lengths as compared to males $p < 0.01$. Similar to the results of current study stephanie²² and coworker reported significant difference between lip length of male and female participants; $p < .001$.

Selection of appropriate size, shape and shade of teeth for prosthodontic patients should be done according to patient esthetics considering his age, race, gender and lip length²⁹. As a general rule in complete denture patient 2mm below the relaxed upper lip was considered as gold standard for setting maxillary teeth, however the young patients may show 4 to 5 mm especially if class II div I situation exists³⁰. Shorter lips may display more teeth at rest so treating everyone with same standards therapeutically values regardless of gender, age and lip lengths is unacceptable. The standard general guidelines will have more accuracy if age, gender, race and lip length of upper lip are considered as important factors affecting tooth display in rest position.

CONCLUSION

There was no significant difference in exposure of anterior teeth at rest between gender. Females have shorter lip lengths than males. The upper lip length increases with increasing age. The exposure of maxillary anterior teeth significantly decreases and mandibular teeth increases with increasing age.

Authors contribution: RA: Manuscript final reading, MA: Conceived idea, AZ: Statistical analysis, BB & KN: Data collection, AHN: Literature review, SN: Designed research

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REFERENCES

- Al- Saleh SA, Al-Shammery DA, Al-Shammery DA, Al-Shehri NA, Al-Madi EM. Awareness of dental esthetic standards among dental students and professionals. *Clin Cos Inv Dent* 2019; 11:373-382.
- Jeelani W, Fida M, Shaik A. The maxillary incisor display at rest: analysis of the underlying components. *Dent pre J Orthod* 2018;23(6):48-55.
- Romeo G. Smile makeover and the orofacial harmony concept in a new era: relationship between tooth shape and face configuration. *Int J Esthet Dent* 2021;16(2):202-215.
- Ahmad I. Anterior dental aesthetic: dentofacial perspective. *Br Dent J* 2005; 199:81-8.
- Owen EG, Goodacre CJ, Loh PL. A multicenter interracial study of facial appearance, part 2: A comparison of intraoral parameters. *Int J P rosthodont* 2002; 15:283-288.
- Coleman SR, Grover R. The anatomy of aging face: volume loss and changes in 3-dimensional topography. *Aesthetic Surg J*.2006;26: S4-S9.
- Singh B, Ahluwalia R, Verma D, Grewal SB, Goel R, Kumar PS. Perioral age related changes in smile dynamics along with vertical plane. A videographic cross section study. *Angle Orthod* 2013; 83:468-475.
- Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: Part I. Evolution of the concept and dynamic records for smile capture. *Am J Orthod Dentofacial Orthop* 2003;124:4-12.
- Sackstein M. A digital video photographic technique for esthetic evaluation of anterior mandibular teeth. *J P rosthet Dent* 2007; 97:246-247.
- Siddiqui N, Tandon P, Singh A, Haryani J. Dynamic smile evaluation in different skeletal patterns. *Angle Orthod* 2016;86(6):1019-1025.
- Awad MA, Alghamdi DS, Alghamdi A. Visible portion of anterior teeth at rest and analysis of different smile characteristics in Saudi population of Jeddah region. *Int J Dent* 2020;8859376: 17.doi.org/10.1155/2020/8859376.
- Tosun H, Kaya B. Effect of maxillary incisors, lower lip and gingival display relationship on smile attractiveness. *Am J Orthod Dentofacial Orthop* 2020;157(3):340-347.
- Fudalej P. Long term changes of the upper lip position relative to the incisal edge. *Am J Orthod Dentofacial Orthop*. 2008; 133:204-209.
- Swift A, Liew S, Weinkle S, Garacia J, Silberberg MB. The facial aging process from the inside out. *Aesthet Surg J* 2021; 41(10) :1107-1119.
- Cotofana S, Fratila AAM, Schenk TL, Swoboda WR, Zilinsky I, Pavicic T. The anatomy of aging face: A review. *Facial Plast Surg* 2016;32(3):253-60.
- Besford J, Sutton A. Aesthetic possibilities in removable prosthodontics. Part 3: Photometric tooth selection, tooth setting, try-in, fitting, reviewing and trouble shooting. *Br Dent J* 20
- Connor AM, Moshiri F. Orthognathic surgery norms for American black patients. *Am J Orthod* 1985; 87:119-34.
- Peck S, Peck L, Kataja M. The gingival smile line. *Angle Orthod* 1992; 62:91-100.
- Al- Wazzan KA. The visible portion of anterior teeth at rest. *J Contemp Dent Pract* 2004;1:53-62.
- Al-Hababeh R, Al -Shammout R, Al Jabrah O, Al- Omair F. The effect of gender on tooth and gingival display in the anterior region at rest and during smiling. *Eur J Esthet Dent* 2009;4:382-395.
- Khan F, Abbas M. The mean visible length of maxillary and mandibular anterior teeth at rest. *J College Phys Surg Pak* 2014; 24(12):931-934.
- Drummond S, Capelli Jr. J. Incisor display during speech and smile: age and gender correlations. *Angle Orthodontist* 2016.86(4):631-637.
- Vig RG, Brundo GC. The kinetics of anterior tooth display. *J Prosthet Dent* 1978; 39:502-504.
- Dickens ST, Sarver DM, Proffit WR. Changes in frontal soft tissue dimensions of the lower face by age and gender. *World J Orthod* 2002; 3:313-320.
- Desi S, Upadhyay M, Nanda R. Dynamic smile analysis: changes with age. *Am J Orthod Dentofacial Orthop* 2009; 136:310. e1-310.e10.
- Motta AFJ, Souza MMG, Bolognese AM, Guerra CJ, Muccha JN. Display of incisors as functions of age and gender. *Aust Orthod J*. 2010; 26:27-32.
- Chetan P, Tandon P, Singh GK, Nagar A, Prasad V, Chugh Orthod. 2013; 83:90-6.
- Miron H, Calderon S, Allon D. Upper lip changes and gingival exposure on smiling: vertical dimension analysis. *Am J Orthod Dentofacial Orthop* 2012; 141:87-93.
- Mc Cord JF, Grant AA. Registration: stage I: creating and outlining the form of the upper denture. *Br Dent J* 2000; 188:529-536.
- Mac MR. Vertical dimension: a dynamic concept based on facial form and oropharyngeal function. *J Prosthet Dent* 1991;66: 478-485.

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