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Aesthetic evaluation of lip position with respect to profile divergence: A silhouette based study.

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ABSTRACT… Objective: To determine the mean attractiveness and score of lip position that is rated by orthodontists and lay persons in different levels of profile divergence as seen in silhouette images. **Study Design:** Cross-sectional survey. **Setting:** Punjab Dental Hospital/ de'Montmorency College of Dentistry, Lahore. **Period:** January 2020 to July 2020. **Material & Methods:** Lay people were selected from the hospital and orthodontic postgraduate trainees were selected from the college. An ideal profile image was constructed and converted to silhouette. By changing position of subnasale and soft tissue pogonion horizontally in relation to true vertical line, divergence of profile was changed and 3 forms of straight/normal profile were created. Three sets of profiles were created (1 anterior divergent, 2 straight divergent, 3 posterior divergent) and each set consisted of 5 images with different degrees of lip protrusion. **Results:** There were 50% of both genders in orthodontists and 48% males and 52% females in lay person with mean ages 28.74±2.55 and 34.66±7.30 years respectively were part of the study. There was significant difference found between orthodontists and lay person for anterior divergent profile with normal position (4.54±0.61 and 4.68±0.47 with $P<0.05$). **Conclusion:** The normal lip position is viewed as the most ideal position; however the same does not have any significant bearing to the straight divergent profile, in which the assessments of various groups were uncertain.

Key words: Aesthetic Evaluation, Lay Person, Lip Position, Profile Divergence, Silhouette.

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INTRODUCTION

Most of the people visit orthodontist for improvement in facial aesthetics rather than structural or functional problems.[1] In aesthetically pleasant face, all features like forehead prominence, eyes, nose, lips and chin are in concordance and in balanced proportions with each other.[2] Position of lips is of great concern for orthodontists because they tend to change their position if front teeth are moved forward or backward orthodontically.[3] From all aspects of facial analysis, profile view is more important for treatment planning.[4] Several studies have been conducted all over the world on the position of lips with reference to profile of the patient. Ioi et al[5] concluded that more convex the profile, more retruded in position was preferred. Moderai et al[6] found that ideal position of lower lip is determined by the position of mandible. Divergence of profile is a term which further divides straight profile into anterior and posterior divergent profiles. Orthodontically this divergence is not indicative of any problem and it is merey a relation of position of forehead with lower face.[7]

Aesthetics is a subjective phenomenon and many cultures and societies have their own definition of beauty. Different ethnic groups regard different lip positions as beautiful and aesthetically pleasant.[8] Yehezkel and Turley, after research on aesthetic standards of African-American female profiles, stated that more protrusive lips are considered beautiful in that society.[9] Cephalometric soft tissue analysis, photographic analysis, clinical examinations and silhouettes in profile view are different methods to analyze the profile of a patient. In our society, silhouettes are preferred in order to avoid distraction from other features like

hair style, facial complexion, color of eyes and cheek bone prominence etc.[10]

According to a review of the literature, there are just a few researches on the optimal lip position in relation to distinct profile deviation. Because both orthodontists and laypeople are directly involved in decision-making and treatment, this study involving orthodontists and laypeople was done to determine the preferred lip position in silhouette profiles with varied amounts of divergence.

MATERIAL & METHODS

This cross sectional survey was conducted at Punjab Dental Hospital from Jan 2020 to July 2020 after approval from ethical committee (198/DCD). A sample size of 100 was calculated at 5% level of significance and 1% margin of error and taking expected mean of 2 mm lip retursion was 3.68±1.1 by lay people.[11] Those Lay persons were recruited from OPD of Punjab Dental Hospital/ de'Montmorency College of Dentistry who did not have any knowhow of dentistry or dentistry related work. Postgraduate trainees of Orthodontics who had completed at least 1 year of training were included. Age of raters was 18-50 years. Raters of both genders were selected randomly. Lay people (patients or attendants) were selected from the Punjab Dental Hospital, Lahore and orthodontic postgraduate trainees were selected from the Department of Orthodontics, Punjab Dental Hospital Lahore. Research protocol was explained to all participants. Demographic information like name, age, sex and contact number were obtained. A questionnaire with pictures were given to the participants and they were asked to grade the pictures from 1 to 5, 1 = very unattractive, 5 = very attractive). During rating each rater was seated separately and was given 10 minutes. In order to obtain reliable results, 20% of raters were asked to complete the questionnaires again after 2 weeks.

An ideal profile image was constructed and converted to silhouette using software (Photoshop CS, version 8.0; Adobe systems, San Jose California). By changing position of subnasale (base of nose) and soft tissue pogonion (most anterior point on chin) horizontally in relation to true vertical line, divergence of profile was changed and 3 forms of straight/normal profile were created.

These profiles were further modified, and a set of 5 images (A, B, C, D, E) was created by changing lip position in increments for each profile type. Image having average lip position was marked as 'C' and placed in centre of series, lips were then retruded and protruded as increment of 2 mm. There was difference of 8 mm between most retruded (A) and most protruded image (E).Three sets of profiles were created (1 anterior divergent, 2 straight divergent, 3 posterior divergent) and each set consisted of 5 images (A, B, C, D, E) with different degrees of lip protrusion.

Following the collection of all data, Statistical Package Social Sciences (SPSS- Version 19) was used to conduct statistical analysis. For age, the mean and standard deviation were determined. Gender and layperson education level were used to compute frequency and percentages. Data was stratified by age, gender, orthodontist training year, and layperson education level. After stratification, the 't' test was performed, with a p value of ≤0.05 considered significant.

RESULTS

There were 25 (50%) males and 25 (50%) females in orthodontists and 24 (48%) males and 26 (52%) females in lay person with male to female ratios were 1:1 and 1:1.1 respectively. According to age, 50 (100%) persons belonged to 20-35 years to orthodontists while in lay persons, 27 (54%) belonged to 20-35 years and 23 (46%) belonged to 36-50 years. The mean of age of orthodontists was 28.74±2.55 and lay person was 34.66±7.30 years. Nineteen (38%) of orthodontists had 3rd year of training and 31 (62%) orthodontists had 4th years of training. There were 26 (52%) laypersons who had education level below matric and 24 (48%) had education level above matric.

For the anterior diverging profile, no significant differences were identified between the mean ratings of orthodontists and layperson profiles among raters (Table-I). There were no significant differences found between the mean scores of

the orthodontists and lay persons among raters for the straight divergent profile (Table-II). No significant differences were found between the mean scores of the orthodontists and lay person among raters for the posterior divergent profile (Table-III).

On 2 mm retrusion, there was no significant difference in males and significant difference ($P<0.05$) was found in females between orthodontists and lay persons. According to age in 2 mm retrusion, no significant difference was found between orthodontists and lay persons. When the year of training of orthodontists were compared between 3rd year and 4th year, statistically there was no significant difference ($P>0.05$) was found. According to education level of lay person, there was no significant ($P>0.05$) difference between below matric and above matric.

Anterior Divergent	Ortho-dontists	Lay Person	P-Value
4 mm (Retrusion)	1.92±0.85	1.76±0.79	P>0.05
2 mm (Retrusion)	3.68±0.99	3.98±0.89	P>0.05
Normal position	4.54±0.61	4.68±0.47	P<0.05
4 mm (Protrusion)	3.28±1.14	2.49±0.79	P>0.05
2 mm (Protrusion)	1.60±0.80	1.64±0.77	P>0.05

Table-I. Comparison of anterior divergent in both groups. (n = 100)

Straight Divergent	Ortho-dontists	Lay Person	P-Value
4 mm (Retrusion)	1.94±1.11	1.72±0.90	P>0.05
2 mm (Retrusion)	3.66±0.91	3.88±0.94	P>0.05
Normal position	4.28±1.10	4.66±0.51	P<0.05
4 mm (Protrusion)	3.20±1.06	2.96±0.92	P>0.05
2 mm (Protrusion)	1.92±1.12	1.82±0.82	P>0.05

Table-II. Comparison of straight divergent in both groups. (n = 100)

Posterior Divergent	Ortho-dontists	Lay Person	P-Value
4 mm (Retrusion)	1.54±0.88	1.44±0.70	P>0.05
2 mm (Retrusion)	3.06±1.05	3.24±1.28	P>0.05
Normal position	4.30±0.81	4.52±0.54	P>0.05
4 mm (Protrusion)	3.86±1.03	3.50±0.97	P<0.05
2 mm (Protrusion)	2.24±1.15	2.30±1.07	P>0.05

Table-III. Comparison of posterior divergent in both groups. (n = 100)

DISCUSSION

One of the most essential goals of orthodontic treatment is to produce facial symmetry and acceptable facial and dental aesthetics, which can be done through dentition stabilization.[12] It was necessary to first determine how various persons with orthodontic treatment viewed face harmony and balance in order to meet this objective. The goal of this study was to see how orthodontists and lay people rated the overall attractiveness and lip position in varying levels of profile divergence as visible in silhouette photographs. For both the male and female profiles, most groups favored the original lip positions in the anterior and posterior diverging profiles. The results of the straight divergent profile were varied and dispersed between classes. The orthodontists and dental surgeons chose the 4-mm lip retrusion as the least appealing in the posterior diverging profile, and other groups selected the 4-mm lip protrusion as the least attractive. Both categories agreed that the 4-mm lip protrusion was the least appealing image in the anterior and straight divergent profiles. Some images received widely disparate ratings from the raters. In terms of profile image scores, there was no statistically significant difference between male and female raters.

In previous studies, lay people's concepts, as well as those of orthodontic patients and physicians, were assessed, and the differences between them were examined.[13] In their study, Mousavi et al[14] found that all groups preferred slightly protruded lips (for men) and somewhat less convex profiles (for men/women). The aesthetic lip positions of women may vary by group. Judges' gender might not be a determinant. Shukla et al[15] conducted a study regarding perception of facial aesthetics in young north Indian population, in which 160 students were analyzed and a panel of 5 judges evaluated a set containing one frontal, one frontal during smiling, and one profile photographs. Both males and females with Class I skeletal jaw bases were found to be attractive. Females with short faces; mild facial convexity and lower lip closer to the aesthetic line were found to be attractive. Males with prominent chin; straight profile; prominent nose, increased upper lip thickness,

upper lip length and lower lip length were found to be attractive Shi et al[16] conducted study regarding preferences of color and lip position for facial attractiveness by lay persons and orthodontists, in their study the chromo photograph was chosen as the best way to express the facial profile in both the boy and girl. The profiles with a -4 mm deviation in the boys and a -2 mm deviation in the girls from line E were deemed the most appealing, while the image with a +6 mm deviation from the normal line E was deemed the least attractive. There were statistically significant disparities between the male and girl profiles' preferences.

The main standardised soft tissue measure employed in orthodontics is the facial profile.[17] When it came to soft tissue facial profiles, about 74.48 percent of the dental students thought slightly convex and straight profiles were visually pleasing, with no gender differences. This is consistent with a prior study that indicated a slight convex and straight facial profile to be the preferred soft tissue profile.[18] Because the primary goal of orthodontic treatment in today's soft tissue model is to develop an aesthetic profile, non-orthodontists' perspectives as a population for whom treatment is provided should be taken into account when determining a well-balanced, aesthetic profile.[19]

CONCLUSION

The normal lip position is viewed as the most ideal position; however the same does not have any significant bearing to the straight divergent profile, in which the assessments of various groups were uncertain. At the point when back disparate patients are dealt with, measures ought to be considered to forestall over the upper lip retrusion. Likewise, it was demonstrated that the raters' sex didn't influence their appraisals of images.

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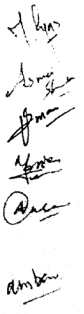
1	Muhammad Ilyas	Head of the study, main study design, critical revision of study.	
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