

SOFT TISSUE PROJECTIONS AS A DETERMINANT OF FACIAL PROFILE ATTRACTIVENESS IN LOCAL POPULATION- A PHOTOGRAPHIC STUDY

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ABSTRACT

Good facial esthetics plays an important role in an individual confidence and self esteem therefore in this study an attempt has been made to define the characteristics of soft tissue profile that make a face attractive. The sample consisted of 100 profile photographs (50 males, 50 females) of subjects (aged 18-25 years). Soft tissue projections for whole sample was measured from new reference line using Nemoceph Software. Sexual dimorphism was assessed using unpaired -t test. The mean linear prominence were greater in males than females for all the parameters. The least and the highest soft tissue prominence were observed for Nation prominence (NaVL) and Nose prominence (PnVL). Conclusion- It was concluded that there was a statistically significant difference in Nasal, Labial, and chin projections between males and females, with males showing more prominent Soft tissue projections.

INTRODUCTION

Good facial esthetics are known to significantly effect an individual's confidence, personality and social behavior. Today esthetically conscious patients make for the bulk of orthodontic practice, regardless of their functional and structural conditions. Considering this, orthodontic treatment plays an important role in delivering esthetically pleasing face, as the position of the teeth, bone and soft tissue can be modified.

In this regard many authors have attempted to define the facial features responsible for pleasant facial esthetics and observed that the constituent parts of a facial profile, when in harmony and balance, were associated with facial pleasantness.(1) Therefore studying facial profile through soft tissues has become subject of interest among professionals in the orthodontic field over the years.(2)

A treatment plan could vary considerably depending on whether treatment is directed at the actual deficiency/excess present or whether it is camouflaging normal adjacent structures that are only relatively over or undersized.(3) Rather than limiting the assessment of the profile to the relationship between surface landmarks, a statement of the actual and relative sizes of the

component parts could be helpful. For example, this would help the practitioner to realize whether, in a concave lower face, the lips are really too recessive or whether the actual disproportionate part is a large pogonion and/or a large nose. This information could help in deciding where to focus treatment for the best esthetic outcome.

Also, a single standard of facial aesthetics and facial profile is possibly not appropriate for application to diverse facial and ethnic groups. Orthodontic treatment planning for any race/group dictates modification to the original specified norms/standards.(1) ***So the present study was designed to assess the soft tissue profile in pleasing individuals and to assess the presence of sexual dimorphism in the soft tissue profile in the local population.***

MATERIALS AND METHODS

The study was carried out on 185 subjects from the local population with pleasant faces who had given consent to be a part of this study. Subjects were screened and a brief questionnaire was completed for all individuals that included name, age, origin and history of previous orthodontic treatment. Subjects of North India between the age group of 18-25 years along with no previous history of

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dental treatment were selected. Subjects with dental or skeletal malformations/assymetry were excluded from the samples.

The Photographic Setup consisted of a tripod (CA16 Tripod Stand Kolkata, West Bengal, India. Maximum Height 1455 mm with platinum finish) that held a 35 mm camera (Nikon, model D3300 18-55 mm; Shimomaru, Tokyo, Japan). The subject was positioned on a line marked on the floor, and framed alongside a vertical scale divided in centimeters. From this vertical scale a plumb line was hung with a thick white thread that indicated the True Vertical (TV). Three Profile photographs (non-smiling) of all the volunteers were taken. The photographic setting were standardized for all subjects. A visual analog scale score sheet was created according to the attractiveness rating of Lundstrom et al⁴ and Johnson et al⁵, with a grading scale. Depending on this grading sheet, all profile photographs were subjected through a selection process by a panel of judges (comprising of an Orthodontist, a layman, an Oral Surgeon, a Professional photographer and a Beautician) with on emphasis to focus on the balance in facial parts, disregarding individual highlights (beautiful eyes, hairs etc.).

Out of 185 subjects, 100 subjects (50 males and 50 females) were selected for the core sample of the study, that define the soft tissue facial profile of individuals with pleasing faces. The photographs were digitized and uploaded onto

the Adobe Photoshop version CS 7.0. A new reference line was constructed by dropping a perpendicular line from the lateral border of the ala of nose to the ala tragus line. Nemoceph software version 6.0 (copyright©1998~2005 Software Nemotec S.L.) was used to locate the soft tissue landmarks and these linear measurements were recorded for the sample.

1. Reference line to Glabella (GbVL)
2. Reference line to Nasion (NaVL)
3. Reference line to Pronasal (PnVL)
4. Reference line to Labrale superioris (LsVL)
5. Reference line to Labrale inferioris (LiVL)
6. Reference line to soft tissue Pogonion (PgVL)

Mean, standard deviation, and range for the linear measurements were calculated for the whole sample and for males and females separately. Sexual dimorphism was assessed using the unpaired t test.

Table 1: Summary statistics of facial linear measurements of subjects (n=100)

Facial linear measurements (mm)	n	Minimum	Maximum	Mean	SD
GbVL	100	0.00	17.73	5.77	3.94
NaVL	100	0.33	10.26	3.75	2.34
PnVL	100	18.81	34.98	25.66	3.50
LsVL	100	3.64	25.82	16.22	3.17
LiVL	100	8.21	24.08	15.32	3.45
PgVL	100	4.47	24.56	13.59	4.46

RESULTS

Intra-observer reliability

To determine the errors associated with photographic measurements using Nemoceph software, 30 photographs were retraced and identification of landmarks was done in three weeks after the first measurements and all measurements were repeated. The Intra class correlation coefficient (ICC) showed a significant ($p < 0.001$) and high positive correlation (0.783 to 0.985) in both the measurements indicating high reliability of the facial linear measurements.

The mean, SD, of the linear measurements for the parameters is depicted in Fig1, Graph 1

The highest soft tissue prominence was observed for the Pronasale (PnVL=25.66±) followed by upper lip (LsVL) and lower lip (LiVL). The least soft tissue prominence was observed in the Nasion prominence (NaVL), (3.75±2.34mm), followed by glabella prominence (GbVL) which was (5.77±3.90mm). Chin prominence (PgVL) was 13.59±4.46 mm. It was observed that the all the linear

Facial linear measurements (mm)

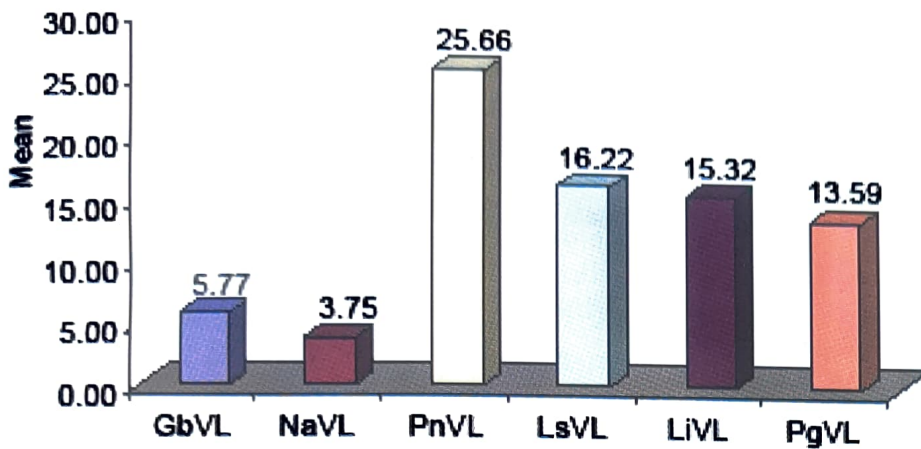


Fig 1. Mean facial linear measurements of total sample.

measurements for all parameters (PgVL) were greater in males (GbVL, NaVL, PnVL, LsVL, LiVL, than in the females. Maximum

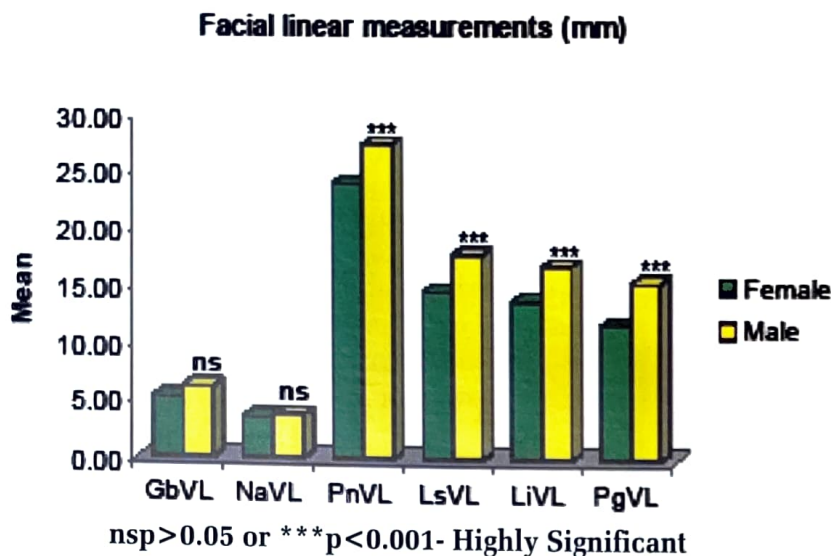
difference of 23.5% was seen in the prominence of the chin (PgVL). Minimum difference of 6.3% was seen in the prominence of Nasion (NaVL). There were no significant difference in the projections of nasion (NaVL) and glabella (GbVL), in males and females. However there were significant gender differences for all the other parameters i.e; (PnVL, LsVL, LiVL, PgVL). (Table 2, Fig 2)

DISCUSSION

Soft tissue profile is one of the most critical areas of interest in the development and selection of a potential orthodontic treatment. The soft tissue profile

Table 2s: Comparison of mean of facial linear measurements (Mean $\pm$ SD) between two genders

Facial linear measurements (mm)	Female (n=50)	Male (n=50)	Change (Male-Female)	Mean change (%)	t value	P value
GbVL	5.30 $\pm$ 3.57 (0.00 to 17.73)	6.23 $\pm$ 4.27 (0.34 to 17.05)	0.93 $\pm$ 5.48 (-9.94 to 14.31)	14.9	1.18	0.242
NaVL	3.63 $\pm$ 2.35 (0.33 to 10.26)	3.87 $\pm$ 2.35 (0.63 to 9.22)	0.24 $\pm$ 3.30 (-6.46 to 8.60)	6.3	0.52	0.608
PnVL	23.95 $\pm$ 2.80 (19.78 to 34.98)	27.37 $\pm$ 3.32 (18.81 to 33.41)	3.41 $\pm$ 4.47 (-8.25 to 12.11)	12.5	5.56	<0.001
LsVL	14.60 $\pm$ 3.11 (3.64 to 21.16)	17.84 $\pm$ 2.30 (13.29 to 25.82)	3.24 $\pm$ 3.58 (-5.57 to 14.22)	18.2	5.92	<0.001
LiVL	13.80 $\pm$ 3.03 (8.21 to 23.07)	16.85 $\pm$ 3.17 (8.24 to 24.08)	3.05 $\pm$ 4.59 (-8.09 to 12.07)	18.1	4.92	<0.001
PgVL	11.78 $\pm$ 3.40 (4.47 to 19.96)	15.40 $\pm$ 4.69 (5.66 to 24.56)	3.62 $\pm$ 5.95 (-12.72 to 15.71)	23.5	4.42	<0.001



Graph 2. Mean facial linear measurements between genders.

has been studied extensively in orthodontics, primarily from lateral cephalometric radiographs, under the assumption that the form of soft tissue outline largely determines the aesthetics of the face.

Traditionally the Frankfort horizontal plane is used as the ideal line of reference to calibrate hard and soft tissue parameters. But the reproducibility of this line is quite questionable, especially when tried to be drawn over the photographs for standardization. Even though the tragus is easily seen, assessing the exact infraorbital rim's location on multiple photographs is almost impossible. Therefore the Frankfort horizontal plane should be considered as a standard of reference only so long as one appreciates its limited reproducibility. A consistent reliable reference line should be based on unalterable landmarks and the whole facial profile should be assessed in relation to that reference line.

Therefore in this study, a more reproducible horizontal reference line i.e.; the Campers line 4 was taken. This line is easy to locate on a photograph and has been commonly used by prosthodontists for a number of years. A study done by Kaur et. al.(6), concluded that Campers line is best reliable when it is drawn from mid part of the tragus of lower border of ala of the nose. Not much research has been done to evaluate the enhance facial profile and its contribution to facial attractiveness. Therefore In our study we have derived norms for soft tissue prominences for the entire facial profile, from forehead to the chin.

The mid-third, especially the nose, receives greater attention as it is the most prominent part of the face. On the other hand, the lower third should be taken into account, since a small or retracted chin results in facial disharmony, especially when analyzing the profile.

On comparing the norms between genders, it was observed that the

projections of the upper third of the face was statistically insignificant in males and females (GbVL, $p=0.242$, NaVL, $p=0.608$) (Table 3, Graph 2) However a study done on a Korean population by Hwang et. al, suggested that the forehead was positioned more anteriorly in males than in the females. Similar result was reported in a study done by Yanglem et al., on Assamese population where the point glabella was positioned more anteriorly in males.

Lower third of the face showed significant sexual dimorphism with all the soft tissue measurements parameters (PnVL, LsVL, LiVL, PgVL) having higher value in males than females.

In the current study, on analyzing the nose projections it was observed that males have greater anterior projection than females. This was in agreement to a study done by Janabi. et. al, where the nose projection was significantly more in the males than in females. (7) A study done on Assamese population concluded that the nasal prominence, upper labial and lower labial prominence on average were almost the same for both genders. This could be due to the fact that the vertical reference line used to measure the nasal prominence was taken tangent to the upper lip which is a variable anatomical structure in nature. Similarly absence of sexual dimorphism in terms of nose prominence was concluded in a study done by Skinazi et.al, where in relative size and projections of soft tissue parameters were derived.(8)

In contrast to our findings of previous studies, a study done on Pakistani population concluded that females have greater nasal prominence when compared to the males. However, when the nasal prominence was measured using Canuts esthetic analysis, it was observed that males have greater nasal prominences than females.

On analysis the Sexual dimorphism in upper and lower lip prominences in our study, males had greater prominence of lips. Which was in concordance with the results obtained in the study done by Tikku et al.(9) However a study carried out in white Caucasians reported that the lower lip in female was significantly more protrusive than in males when calibrated by Steiners' and Ricketts' analysis, with a similar result being reported in a study carried out in Anatolian Turkish adults with normal occlusion.(10)

On assessing the chin prominence in males and females, in the present study it was observed that males have more forwardly placed chin in comparison to females. This suggests that the criteria for attractiveness in our population points towards males having a prominent chin and females have a retruded chin. These results are in agreement to studies done by Ijaz. et al.(11), which could be due to similar ethnicity of the sample used for both the studies.(6)

The larger values of the soft tissue projections in males in our study could be justified by the fact that

males are in a homogeneous way, larger than females in nearly every physical aspects which has been highlighted in various studies.

CONCLUSION

The study thus conducted leads us to concluding that

- Norms for soft tissue projections for an esthetic profile were derived in this study
- There was a statistically significant difference in nasal, labial and chin projections between males and females.
- Males showed more prominent nasal, labial and chin projections as compared to female standards.

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