



Original Article

A Photographic Analysis of the Soft Tissue Facial Profile in Assamese Population

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Introduction: The purpose of this study was to establish the norms of soft-tissue profile analysis for a sample of Assamese young adults. **Methods:** Facial-profile photographs were taken of 70 Assamese (35males, 35 females) with normal occlusions and balanced faces, ranging in age from 18 to 25 years. The facial-profile variables were measured by computerized means and compared with white American norms by using the independent *t* test. **Results:** Statistically significant differences were found in the Assamese sample compared with the white American norms. Assamese males were found to have more forwardly placed glabellae, deeper lower labial sulci, and more retrusive chin than white American males. Regarding the projection of the nose, upper lip and lower lip, it was found that Assamese males had less prominent noses, less protrusive lips as compared with white American males. Assamese females were also found to have more anteriorly placed glabella, more posteriorly positioned point B' and more retruded position of chin as compared to white American females. Regarding the projection of the nose, upper lip and lower lip, it was found that Assamese females had less prominent nose and less protrusive lips as compared with white American females. **Conclusions:** A singlenorm for facial-profile esthetics does not apply to all ethnic groups. The normative data thus obtained might serve as a useful reference for orthodontists and maxillofacial surgeons for the diagnosis and treatment planning when dealing with the patients of Assamese ethnic group.

Keywords: soft-tissue profile, Assamese young adults, deeper lower labial sulci, singlenorm for facial-profile

1. INTRODUCTION

Soft tissue facial profile analysis plays an important part in the orthodontic treatment planning. Orthodontic treatment according to the accepted hard tissue cephalometric criteria does not necessarily ensure that overlying soft tissue will drape in a harmonious manner and hence, may not result in a pleasing profile.

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Soft tissue of the face requires an independent appraisal in addition to the skeletal and dental analysis in order to deduce a comprehensive diagnosis and treatment planning of the face.

Soft tissue cephalometric norms for esthetically pleasing profile have been established by various researchers by using cephalometric radiographs¹⁻⁴. Of late, many studies have been done on the photographic evaluation of the soft tissue facial profile in some racial groups. Stoner(1955)⁵ started to use analysis of the soft tissues of the face on photographic records. Farkas (1980)⁶ standardized the photographic technique taking the records in natural head position (NHP). The reliability of the photogrammetry was assessed and suggested that measurements of the lips and mouth were most reliable and further suggested that the usefulness of photogrammetry can be increased by developing new better techniques.

Clamanet *al* (1990)⁷, Ferrario *et al* (1994)⁸, Fernandez Riveiro (2002)⁹ and Anic-Milosevic *et al*(2008)¹⁰ described standardized photographic technique for NHP recording. Numerous studies on the photographic facial profile analysis have been reported in the literature. The analyses proposed by Arnett *et al* (1999)¹ and Holdaway (1983)² based on white American population, have been widely adopted by orthodontists and maxillofacial surgeons in diagnosis and treatment planning. It has been recognized that a single standard of cephalometric and facial esthetics, originally obtained from white American samples, might not be appropriate for diagnosis and treatment planning of other racial groups of orthodontic patient^{11, 12}. Till date no study on the photographic analysis of facial profile has been done on the Assamese population, a distinct ethnic group in the north-east states of India. This prompted to undertake the photographic analysis of the soft tissue facial profile in Assamese population.

The study was carried out on the facial profile photographs of Assamese samples taken by a standardized technique with the following aims and objectives: 1.To determine some soft tissue profile normative values in young adults of Assamese population & 2.To compare these values with the standards developed by Arnett's soft tissue analysis and Holdaway's soft tissue analysis for the white Americans.

2. MATERIALS AND METHOD

The sample included 70 Assamese adults (35 males, 35 females) selected by two Assamese orthodontists according to the following criteria: Assamese ancestry (parents or grandparents); age of 18 to 25 years; clinically normal occlusions(except minor crowding); orthognathic profile, closed lip posture (lip sealing) and facial symmetry; no previous orthodontic treatment; no history of trauma, or plastic or orthognathic surgery.

For the standardization of the photographic technique, the subjects were made to stand in front of a mirror with posture upright at a fixed distance of 1.7 meter away from the camera on a platform stand (fig.1). A metric scale was hung in front of the subject to provide the scale factor that was used to correct for magnification differences among the photographs. The subject looked straight into the image of his / her own eyes in the mirror which was fixed at a distance of 2 meter from the subject¹². This should correspond to natural head position and centric relation¹³⁻¹⁷. Photographs were taken with a digital camera (Sony-DSC-HX1) mounted on a tripod, leveled with the optical axis of the lens horizontal and the film plane vertical. The patient's forehead, neck, and ears were clearly visible during recording. The photographs were then digitized into the computer and the soft tissue points were marked over the face with digital ink in photopaint software (fig.2). Measurements were made on the photographs using the parameters taken from the

original Arnett's soft tissue analysis and Holdaway's soft tissue analysis (fig.3).The image/actual-size ratio was calculated with the metric scale image as a reference parameter. The magnification ratio was calculated for each photograph. The value measured from the photograph was multiplied by the magnification ratio to give the corrected value for each measurement. The magnification ratio for all photographs was 1.33.



Fig 1: Subject in standardized position



Fig 2: landmarks used in the study



Fig.3 (a) & (b): measurements used in the study

The parameters used in the present study included i.) TVL-G'ii.) TVL-NT iii.) TVL-ULA iv.)TVL-LLA v.) TVL-B' vi.) TVL-Pog' vii.) NLA viii.) Sn-H-line ix.) LLA –H x.) H-angle.

Statistical analysis

The mean values and standard deviations of each parameter were determined for both the Assamese male and female samples. The profile normative values thus obtained for the Assamese samples were compared with the values established for white Americans. Comparisons were made between Assamese males and females to evaluate gender dimorphism (using Student's t-test). The error of method was calculated using Dahlberg's formula¹⁸ at a significance of 5%.

3. RESULTS: The following tables show the various comparisons of findings of the study.

Table 1.Comparison of Assamese facial profile variables using Arnett analysis and Holdaway analysis between male and female (t test)

Parameters	Male		Female		Significance
	Mean	SD	Mean	SD	
TVL-G'	-3.94	2.97	-5.82	3.47	0.02
TVL-NT	13.96	1.23	13.39	1.56	0.09
TVL-ULA	2.26	1.59	2.33	1.04	0.82
TVL-LLA	-1.49	2.49	-1.03	2.00	0.39
TVL-B'	-9.31	2.98	-7.57	2.18	0.01
TVL-Pog'	-6.98	5.39	-6.13	2.61	0.40
NLA	100.90	11.54	103.07	7.78	0.36
Sn-H	5.14	2.09	4.42	1.40	0.10
LLA-H	1.78	1.39	0.60	1.60	0.00
H-angle	15.29	2.88	13.94	2.34	0.04

The level of significance was set at P<0.05.

Table 2: Comparisons between Assamese male and White American male samples (t test)

Parameters	Assamese		W. American		Significance
	Mean	SD	Mean	SD	
TVL-G'	-3.94	2.97	-8.00	2.50	0.00
TVL-NT	13.96	1.23	17.40	1.70	0.00
TVL-ULA	2.26	1.59	3.30	1.70	0.00
TVL-LLA	-1.49	2.49	1.00	2.20	0.00
TVL-B'	-9.31	2.98	-7.10	1.60	0.00
TVL-Pog'	-6.98	5.39	-3.50	1.80	0.00
NLA	100.90	11.54	106.40	7.70	0.00
Sn-H	5.14	2.09	5.00	2.00	0.69
LLA-H	1.78	1.39	0.25	0.50	0.00
H-angle	15.29	2.88	10.00		0.00

The level of significance was set at $P < 0.05$

Table 3: Comparisons between Assamese female and White American female samples (t test)

Parameters	Assamese		W. American		Significance
	Mean	SD	Mean	SD	
TVL-G'	-5.82	3.47	-8.50	2.40	0.00
TVL-NT	13.39	1.56	16.00	1.40	0.00
TVL-ULA	2.33	1.04	3.70	1.20	0.00
TVL-LLA	-1.03	2.00	1.90	1.40	0.00
TVL-B'	-7.57	2.18	-5.30	1.50	0.00
TVL-Pog'	-6.13	2.61	-2.60	1.90	0.00
NLA	103.07	7.78	103.50	6.80	0.75
Sn-H	4.42	1.40	5.00	2.00	0.02
LLA-H	0.60	1.60	0.25	0.50	0.21
H-angle	13.94	2.34	10.00		0.00

The level of significance was set at $P < 0.05$

4. DISCUSSION

The following differences were observed:

1. Soft tissue facial profile values for Assamese population were significantly different from white Americans.
2. Assamese males were found to have more forwardly placed glabellae, deeper lower labial sulci, and more retrusive chin than white American males. Regarding the projection of the nose, upper lip and lower lip, it was found that Assamese males had less prominent noses, less protrusive lips as compared with white American males. Even though the Assamese males had smaller value of nasolabial angle than the white American males, the former had a retrusive profile due to the more

posterior positioning of the chin than the white American males.

3. No significant difference was seen in the measurement of the soft tissue subnasale-H-line between Assamese males and Holdaway's norm for white Americans. Assamese males had a tendency to have convex profile as depicted by the mean value of H-angle.
4. Assamese females were also found to have more anteriorly placed glabella, more posteriorly positioned point B' and more retruded position of chin as compared to white American females. Regarding the projection of the nose, upper lip and lower lip, it was found that Assamese females had less prominent nose and less protrusive lips as compared with white American females. However, the value of nasolabial angle was found to be similar between the two different female ethnic groups.
5. The measurement of the lower lip-H-line for Assamese females was found to be similar to the Holdaway's ideal norm.
6. Within the Assamese population the soft tissue profile measurements that showed significant gender dimorphism were TVL-Glabellae, TVL-point B' and Lower lip - H-line indicating that Assamese males, on average, had slightly more anteriorly positioned glabella than Assamese females and deeper labial sulci. Assamese males had greater mean values of H-angle than Assamese females, suggesting more convex facial profile. The nasal prominence, upper labial prominence, lower labial prominence and chin prominence, on average, were almost of the same in both genders of Assamese population.

5. CONCLUSION

Considering the fact that there is a huge difference in the values of soft tissue profile variables as obtained

from various soft tissue profile studies¹⁹⁻³¹ the present study highlights the fact that, the excellence of facial pattern is peculiar to its racial group and such variations are of relative significance when formulating an orthodontic diagnosis and treatment plan for patients of varying ethnic backgrounds. A universal standard of facial aesthetic is not applicable to diverse populations. The results of the present study might serve as a useful reference for orthodontists and maxillofacial surgeons and also contribute to more satisfactory diagnosis and treatment planning when dealing with the patients of Assamese origin.

However, further investigations with larger sample size could lead to the formulation of more even accurate and applicable soft tissue norms for the Assamese population. Study on different age groups and preferences of the soft tissue facial profile by general public would also be interesting

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