

## Determination Of Holdway Soft Tissue Norms In Assamese Adults

### Abstract

**Introduction :** Judgment of facial esthetics is subjective and undoubtedly, depends on various culture, social, geographic and psychological background of person.

**Aims And Objectives :** To compare the soft tissue traits of Assamese population with Holdaway's cephalometric norms.

**Materials And Method :** The study was done from the data collected from lateral cephalograms of 70 adult Assamese subjects (35 males and 35 females) within the age group of 18-25 years. Each cephalogram was traced twice and average value of each parameter was taken as the data.

**Results And Observation :** In the comparison 4 variables had significant differences. Statistically significant sex differences are found between Assamese male and female.

**Conclusion :** Holdaway's soft tissue Cephalometric norms for Assamese population were significantly different than that of Caucasian population. The Assamese males and females showed almost similar facial profile with small sex differences and modest signs of sexual dimorphism.

### Key Words

Holdway Soft Tissue Norms, Assamese Adults

### Introduction

Judgment of facial esthetics is subjective and undoubtedly, depends on various culture, social, geographic and psychological background of person. An "excellent" face as constituted by soft tissue profile have been reproduced many time by representatives of several disciplines including artists, physical anthropologist reconstructive surgeon and orthodontists. These profile show large variation in skeletal convexity, soft tissue and lip protrusion, and position of the lower incisor. The inevitable conclusion is that great variation exists in what is considered a good to excellent face within a given culture

As far as orthodontics is concerned, harmonious facial aesthetics and functional occlusion have long been recognized as the two important goals of orthodontic treatment.<sup>[1],[2]</sup> Angle emphasized the importance of soft tissue and facial esthetics in orthodontic treatment. He believed that the harmony and the balance of the face depend largely on form<sup>[3]</sup>

Pioneers in Orthodontics have opened the way for racial studies and formulated cephalometric norms among different race and ethnic groups.<sup>[4],[5],[6],[7],[8],[9],[10],[11]</sup>

Studies have also been carried out by many Indian authors on different racial and ethnic population found in the Indian

subcontinent.<sup>[12],[13],[14],[15],[16],[17],[18]</sup> The conclusion of these studies stimulated the present investigation, as till date no study has been conducted on the population of Assam. It was therefore thought pertinent to undertake such a study for young adult population of Assam and observe various soft tissues cephalometric values by means of Holdaway's analysis with a view to clinical application of the findings

The present study was carried out with the following aims and objectives: To compare the soft tissue traits of Assamese population with Holdaway's cephalometric norms. To investigate the differences between the Holdaway's soft tissue traits of Assamese men and women. Compare the Assamese soft tissue norms with soft tissue norms of other racial groups.

### Materials And Method

The study was done from the data collected from lateral cephalograms of 70 adult Assamese subjects (35 males and 35 females) within the age group of 18-25 years in year 2011. Each cephalogram was traced twice and average value of each parameter was taken as the data.

Sample selected according to the following criteria

1) Subjects who had normal growth pattern, balanced facial profiles with

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competent lips and good facial symmetry determined clinically.

- 2) Subjects who had no history of Orthodontic or prosthodontic treatment.
- 3) Subjects who had full compliment of teeth (except third molars) with class 1 molar and canine relationship with good interdigitation of posterior teeth.
- 4) Subjects who had overjet and overbite relationship within the range of 2-4mm with crowding less than 3mm.
- 5) Subjects who had Orthognathic profile (class 1 skeletal pattern).

### A Panel was formed comprising of

Dr Mitali Bora, Professor and HOD, Department of Orthodontics, Regional Dental College, Guwahati.

Dr Hitesh Baruah, Music Director and an Artiste associated with Assamese Film Industry.

Mrs. Runu Hazarika, Principal, My Fair Lady Training Centre and Advisor, Beauty and Fashion.

This Panel checked the samples required for the study and gave their consent regarding the fulfillment of the criteria of

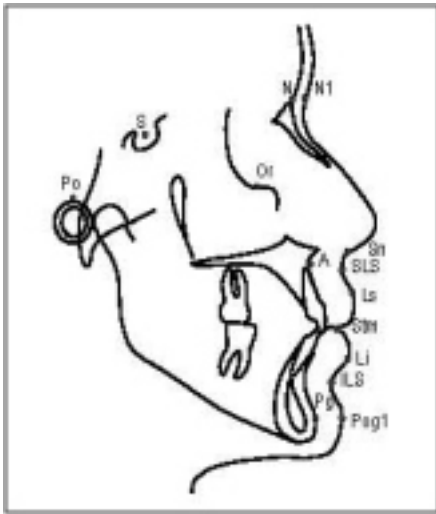


Figure 1 : Points Used In The Study

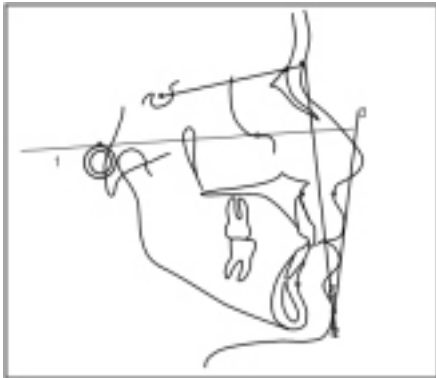


Figure 2 : Planes And Angles Used In Study

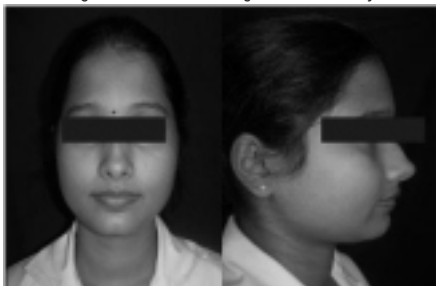


Figure 3 : Extraoral Photograph Of Female Assamese Subject



Figure 4 : Extraoral Photograph Of Male Assamese Subject

the samples, than lateral cephalograms of each subject were taken.

The head films were traced on acetate matt paper using 3H pencil. The tracings were analyzed using linear and angular measurements according to Holdaway's soft tissue analysis to identify the soft tissue pattern. (Table 1) The angular

measurements were done to an accuracy of 0.5 degrees and linear measurements were done to an accuracy of 0.5mm. (Images 1 to 4)

### Results And Observation

The following result is obtained through the student's 't' test applied to compare the measurement differences of male and female. Table 2 shows the descriptive statistics of the male and female and the comparisons of the sex differences. In the comparison 4 variables had significant differences. In H angle ( $P < 0.03$ ), basic upper lip thickness ( $P < 0.00$ ), inferior sulcus to H line ( $P < 0.00$ ), and soft tissue chin thickness ( $P < 0.00$ ) measurements, statistically significant sex differences are found between Assamese male and female. The H angle, basic upper lip thickness, inferior sulcus to H line, soft tissue chin thickness, measurements of the male were larger than those of the female. Other parameter does not have statistically significant difference (Table 3, 4, 5).

### Discussion

In this comparison most of the values Although the Holdaway's analysis

showed highly significant variations. The soft tissue profile of these subjects was found to be more protrusive when compared to the Caucasian subjects, as indicated by the highly significant increase in the H angle.

A similar cephalometric study was done by Dr.Nabanita Baruah et al19, on the Assamese population to establish skeletal & dental parameters for Assamese young adults using Steiner's analysis. The study concluded that in comparison to the Caucasian samples the Assamese samples were more protrusive skeletally and dentally with a greater tendency towards bimaxillary protrusion. These differences indicate that fundamental variation exists in the craniofacial structure of Assamese and the Caucasians. The results of the study support the fact that norms and standards of one racial group could not be used without modification for other racial group and each different racial group would have to be treated according to its individual characteristics.

Table 1 : Mean And Std. Deviation Of Cephalometric Measurements For Adult Assamese Population

Measurement	No. of sample	Minimum	Maximum	Mean	Std. Deviation
Soft Tissue Facial Angle	70	81.25	99.5	89.00357	3.430599
Nose Prominence	70	5.25	21	11.98929	3.458458
Superior Sulcus Depth	70	0	6.5	3.278571	1.405568
Soft Tissue Subnasale To H- Line	70	2	11	6.428571	2.310241
Skeletal Profile Convexity	70	-3	7.75	2.092857	2.528164
Basic Upper Lip Thickness	70	11	21	14.02143	2.104921
Upper Lip Strain	70	-2	3.25	1.2214	1.0369
H Angle	70	9	20.75	15.99286	3.073664
Lower Lip To H-line	70	-2	5	1.071429	1.540012
Inferior Sulcus To H- Line	70	2	10	5.246429	1.826978
Soft Tissue Chin Thickness	70	7.25	17.25	11.03571	1.802417

Table 2 : Comparison Of Assamese Norms With The Holdaway's Norms

Measurement	Holdaway's norms	Assamese norms		Test Of Significance
		Mean	Std dev	
Soft tissue facial angle	91 ± 7 degrees	89.00357	3.430599	$P < 0.000$ **
Nose prominence	14 to 24 mm	11.98929	3.458458	$P < 0.000$ **
Superior sulcus depth	1 to 4mm	3.278571	1.405568	$P < 0.102$ NS
Soft tissue subnasale to H line	3 to 7mm	6.428571	2.310241	$P < 0.000$ **
Skeletal profile convexity	-2 to +2mm	2.092857	2.528164	$P < 0.000$ **
Basic upper lip thickness	15mm	14.02143	2.104921	$P < 0.000$ **
Upper lip strain	No norms	1.2214	1.0369	
H-angle	7 to 15 degrees	15.99286	3.073664	$P < 0.000$ **
Lower lip to H-line	-1 to +2mm	1.071429	1.540012	$P < 0.003$ **
Inferior sulcus to H-line	No norms	5.246429	1.826978	
Soft tissue chin thickness	10 to 12 mm	11.03571	1.802417	0.869 NS

NS : Not significant; \* :  $P < 0.05$  Significant; \*\*  $P < 0.01$  Highly Significant

Table 3 : Comparison Of Mean, Standard Deviation And Standard Error Of Cephalometric Measurements Between Males And Females

Measurement	Male (N=35)			Female(N=35)			Significance	
	Average	S.D.	S.E.	Average	S.D.	S.E.	't' Value	'p' Value
Soft Tissue Facial Angle	88.24	2.98	0.50	89.76	3.71	0.63	1.89	0.06
Nose Prominence	12.63	3.17	0.54	11.35	3.66	0.62	-1.56	0.12
Superior Sulcus Depth	3.19	1.25	0.21	3.37	1.56	0.26	0.55	0.58
Soft Tissue Subnasale To H- Line	6.69	2.30	0.39	6.17	2.32	0.39	-0.93	0.36
Skeletal Profile Convexity	2.44	2.43	0.41	1.75	2.62	0.44	-1.14	0.26
Basic Upper Lip Thickness	15	2.15	0.36	13.04	1.54	0.26	-4.37	0.00
Upper Lip Strain	0.99	1.01	0.17	1.45	1.03	0.17	1.878	0.65
H Angle	16.78	2.72	0.46	15.21	3.24	0.55	-2.20	0.03
Lower Lip To H-line	0.81	1.55	0.26	1.34	1.51	0.25	1.45	0.15
Inferior Sulcus To H- Line	6.34	1.63	0.28	4.16	1.29	0.22	-6.19	0.00
Soft Tissue Chin Thickness	11.76	1.81	0.31	10.31	1.50	0.25	-3.63	0.00

Table 4 : Comparison Of Assamese Norms With Different Racial's Norms

Parameter	Caucasian Holdaway RA Ajodo 1983	Assamese (present study)	Yemini Talat Al-Gunaid Ajodo2007	Chinese Lew KKK JomfS1992	Antolian Turkish F. A Bosacıci Ajodo2003	Persian Amjad Al Taki Angle2009	Japanese Rafael E. Alcalde, Ajodo2000
Soft tissue facial angle(degrees)	91 ± 7**	89 ± 3.43	90.1 ± 2.9**	92.5 ± 7**	87.31 ± 8.84 **	92.13 ± 3.74**	90.16 ± 3.22**
Nose prominence(mm)	19 (14 to 24) **	11.99 ± 3.46	16.7 ± 2.6**	6 ± 2**	18.74 ± 3.59 **	16.72 ± 3.54**	14.54 ± 1.94**
Superior sulcus depth(mm)	3 (1 to 4) NS	3.28 ± 1.41	3.1 ± 1.1 NS	5.5 ± 1.5**	2.97 ± 1.53 NS	3.51 ± 1.15 NS	4.46 ± 2.25 **
Soft tissue Sn to H line(mm)	5(3 to 7) **	6.43 ± 2.31	4.5 ± 2.1**	9 ± 1.5**	5.12 ± 3.33 **	5.71 ± 1.95*	9.06 ± 2.86**
Skeletal profile convexity(mm)	0 (-2 to +2) **	2.09 ± 2.53	3.2 ± 2.5**	1.5 ± 1.5 NS	-0.21 ± 2.31 **	1.56 ± 2.07 NS	2.42 ± 3.22 NS
Basic Upper lip thickness(mm)	15 **	14.02 ± 2.1	17.8 ± 2.1 **	15 ± 1.5 **	16.64 ± 2.43 **	16.53 ± 2.44**	15.11 ± 2.48**
Upper lip strain(mm)	No norms	1.22 ± 1.03	3.8 ± 1.8 **	1.5 ± 0.5 *	2.68 ± 2.39 **	-	2.57 ± 2.73 **
H-angle (degrees)	10 (7 to 14) **	15.99 ± 3.07	15.2 ± 4.1 *	16 ± 1.5 NS	13.75 ± 3.01 **	15.47 ± 4.21NS	15.51 ± 4.28 NS
Lower lip to H-line(mm)	0.5 (-1 to 2) **	1.07 ± 1.54	1 ± 1.6 NS	0.5 ± 1 **	0.03 ± 1.91 **	0.96 ± 1.75 NS	1.62 ± 1.75 **
Inferior sulcus to H-line(mm)	No norms	5.25 ± 1.83	5 ± 1.7 NS	4 ± 1.5 **	6.2 ± 2.3 **	5.30 ± 2.28 NS	3.78 ± 2.03 **
Soft tissue chin thickness(mm)	11 (10 to 12) NS	11.04 ± 1.8	12.2 ± 2 **	9 ± 1 **	12.96 ± 2.05 **	13.48 ± 2.51 **	13.58 ± 2.31 **

NS : Not significant; \* : P<0.05 Significant; \*\* P<0.01 Highly Significant

Table 5 : Comparison Of Male And Female Assamese, North Indian And South Indian Holdaway Analysis.

Variable	Assamese M		Assamese F		South Indian M Valiathan M., Jios 1999		South Indian F Valiathan M., Jios 1999		North Indian M Valiathan M., Jios 1999		North Indian F Valiathan M., Jios 1999	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Soft tissue facial angle	88.24	2.98	89.76	3.71	85.74**	6.25	82.00 **	23.03	91.60**	4.78	87.60 **	3.76
Nose Prominence	12.63	3.17	11.35	3.66	16.36**	3.97	15.00 **	3.83	17.34**	3.57	17.06 **	3.79
Superior sulcus depth	3.19	1.25	3.37	1.56	2.47**	1.69	2.24 **	1.26	4.14**	1.66	2.24 **	1.56
Soft tissue subnasale	6.69	2.3	6.17	2.32	5.57**	2.27	5.37 *	1.45	6.67 NS	2.10	5.27 *	2.52
Skeletal profile con.	2.44	2.43	1.75	2.62	4.47**	1.69	4.00 **	1.64	2.98 NS	1.50	3.13 **	1.75
Basic Upper lip thickness	15	2.15	13.04	1.54	16.59 **	4.31	16.40 **	1.88	14.40 NS	1.95	14.53 **	1.72
Upper lip strain	0.99	1.01	1.45	1.03	2.26 **	2.25	3.40 **	2.31	2.43 **	1.47	2.20 **	1.39
Hangle	16.78	2.72	15.21	3.24	15.67 *	5.08	15.20 NS	2.83	13.94 **	2.86	13.04 **	4.96
Lower Lip toH Line	0.81	1.55	1.34	1.51	1.60 **	1.41	1.80 NS	1.41	0.83 NS	1.59	0.74 *	1.64
Inferior sulcus toH line	6.34	1.63	4.16	1.29	4.63 **	3.79	3.83 NS	4.31	4.56 **	4.07	5.03 **	1.92
Soft tissue chin thickness	11.76	1.81	10.31	1.50	13.20 **	2.24	12.33 **	2.19	13.80 **	1.97	12.13 **	2.55

NS : Not significant; \* : P<0.05 Significant; \*\* P<0.01 Highly Significant

contributes towards successful treatment planning in Caucasian population, studies of other races have indicated that these standards are different enough to warrant closer evaluation. Indian profile has considerable variability and should not be treated with an Orthognathic

profile in mind. Studies by many Indian pioneers in Orthodontics have shown that north Indian population and south Indian population has considerable variability.<sup>[12], [13], [14], [15], [16], [17], [18]</sup> This study provides Holdaway's cephalometric norms for adult

Assamesepopulation from a selected sample of adult Assamese. The cephalometric measurements obtained from this study will be of value in the development of proportionate templates for the Assamesepopulation. This would provide a baseline aid for the diagnosis, treatment planning and prognosis for orthodontic cases. These analyses included the following linear and angular measurements - nose prominence, superior sulcus depth, soft tissue subnasale to H line, skeletal convexity, upper lip thickness, upper lip strain, lower lip to H line, inferior sulcus to H line and soft tissue chin thickness. Angular measurements were soft tissue facial angle and H angle. Small sex differences and modest signs of sexual dimorphism are obtained in Assamesemale and female. When linear and angular measurements are compared with Caucasian adults, ethnic differences in the skeletal and soft tissue component are noted. The limitation of this study was its sample size which is very less for a population study.

### Soft tissue facial angle

The mean of soft tissue facial angle established for the Assamese population is 89 degrees and standard deviation of 3.43 degrees. The mean value for Assamesepopulation is less than Caucasian Holdaway's norms (mean 91degrees and standard deviation 7degrees). This highly significant statistical difference indicates that chin is slightly more prominent in Caucasian than Assamese.

### Nose Prominence

The mean of nose prominence established for Assamesepopulation is 11.99mm and a standard deviation of 3.46 mm. According to Holdaway, for nose prominence he has given a range of 14mm to 24mm as mean value, less than 14mm is considered to be small and above 24mm is large or prominent range. In Assamesepopulation nose prominence is 11.99mm and a standard deviation of 3.46 mm, which is found to be smaller when compared to Caucasian, Yemini, Antolian Turkish, Persian and Japanese norms and higher than Chinese samples.

### Soft tissue subnasale to H line

The mean of soft tissue subnasale to H line is 6.43mm with standard deviation of 2.31mm for Assamesepopulation. The measurement of soft tissue subnasale to

H line has an acceptable range of 3 to 7mm, with 5 mm being ideal. In Assamesepopulation, soft tissue subnasale to H line is more than Caucasian and shows highly significant statistical difference.

#### **Skeletal profile convexity**

The mean of skeletal profile convexity at point A is 2.09mm with a standard deviation of 2.53 mm for Assamesepopulation. According to Holdaway, skeletal profile convexity has an acceptable range of -2 to 2 mm, with 0mm as ideal. Skeletal profile convexity shows significant statistical difference, which is suggestive of a protrusive profile in Assamese as compared to Caucasian.

#### **Basic upper lip thickness**

This measurement is useful in comparing the lip thickness near the base of alveolar process, measured about 3mm below point A to the outer drape of upper lip. In Assamesepopulation though the basic upper lip thickness was slightly smaller than the Caucasian, yet the subjects had an esthetic profile. The mean of basic upper lip thickness in Assamesepopulation is 14.02mm with a standard deviation of 2.1mm. In Assamesepopulation the basic upper lip thickness is found to be less compared to Caucasian population (15mm), and it shows highly significant statistical significance.

#### **H angle**

The mean of H angle in Assamesepopulation is 15.99 degree and standard deviation is 3.07 degrees. Holdaway said H angle measurement of 7 to 15 degrees were all in the best range as dictated by the patient's skeletal convexity. 10 degrees is ideal when the convexity measurement is 0 mm. This study showed highly significant statistical difference, higher H angle which is suggestive of a protrusive profile in Assamese when compared to Caucasian.

#### **Conclusion**

The following results were apparent:-

1. Holdaway's soft tissue Cephalometric norms for Assamesepopulation were

significantly different than that of Caucasian population.

2. Soft tissue pattern of the Assamesepopulation was found to be protrusive, when compared to standard Caucasian population, as indicated by an significant increase in the values of H angle, skeletal profile convexity soft tissue subnasale to H line and lower lip to H-line with smaller soft tissue facial angle and nose prominence. However balanced and harmonious arrangement between the size of the nose, lips and chin contribute to a balanced facial appearance that is pleasing to the eye.
3. The Assamesemales and females showed almost similar facial profile with small sex differences and modest signs of sexual dimorphism with significant increase in basic upper lip thickness, H angle, inferior sulcus to H line and soft tissue chin thickness in males.
4. On comparison values of Assamese population with norms of other racial group, most of the values showed highly significant variations, which indicated that these standards are different enough to have separate cephalometric norms for different racial groups.

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