

Study of lower lip proportions in north Indian adults

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Abstract

Background: Anthropometry, the science of measurement of living subjects has been shown to be useful in reconstructive surgery and in orthodontics, where the soft tissue morphology of the face can be studied more reliably as compared to radiographs.

Objectives: The purpose of the study was to create base data of the vertical measurements of the lower lips and proportion of lower lip parameters.

Material and methods: The study comprises of lower lip proportion of 600 North Indian adults (300 males and 300 females). Prior informed written consent for this study was obtained from the subjects. The exclusion and inclusion criteria for the subjects were predefined. The measurements were statistically analyzed by using 't test' by SPSS version 15.

Results: The lower lip parameters showed sex dimorphism. The height of cutaneous lower lip, height of vermilion lower lip and total lower lip height was significantly ($p < 0.001$) more in males. Two Lip indices was calculated. The lip index 2 was significantly more in males.

Conclusion: In case of lower lip, less than half of total lower lip height was occupied by cutaneous portion of lower lip and rest was covered by vermilion portion of lower lip. This study highlights the applied significance of observations of present study to forensic namely personal identification, racial and sex dimorphic criteria of identification.

Key words: North Indian, lower lip, sex dimorphism, personal identification

Introduction

Anthropometry, the science of measurement of living subjects has been shown to be useful in reconstructive surgery and in orthodontics, where the soft tissue morphology of the face can be studied more reliably as compared to radiographs. This study seeks to expand scientific research on lower lip proportions for establishing baseline data for forensic, plastic surgeons & orthodontists treating the north Indians anywhere in the world. The objective of this study is to expand the baseline quantitative data of the north Indians including the comparison with available data from literature. In the lower lip the junction of the skin and the red lip area varies greatly in its vertical depth at the centre in different individuals.^[1] The

feature that lower lip is recessed about 30 degrees in relation to upper lip, differentiates the upper and lower lip. The lower lip is usually larger than the upper lip vertically.^[2] Facial anthropometric parameters are affected by various factors including age, sex, ethnicity, socioeconomic status, environment and region.^[3] The lips thin as people age, and the wet line moves caudally, in addition oral commissure begins to downturn.^[4]

The analysis of the human face is a science as well as an art, utilizing both aesthetic and anthropological tools. The shape of human face depends on two factors i.e. the hard bony infrastructure and soft tissue covering it.^[5] The study of the "Anatomy of a beautiful face and smile" highlighted the importance of different

proportions of the face and stated that rational proportion of the physical features is the primary factor in the conscious or subconscious perception of the beauty.^[6]

Material and methods

The present study was conducted on 600 north Indian adults chosen by simple random method and included 300 males and 300 females (aged between 18 to 40 years), having full dentition. Those with anomalies, malformation, deformities, inflammation, trauma and surgical scars (operations for cleft lip) of or around lips were excluded. Subjects above 40 years were excluded because most of the measurements have shown decline after fifth or sixth decade.^[4] A written consent of all the subjects was obtained after explaining the contents of the study to them. For this study all parameters were taken with a digital sliding Vernier calliper. Measurements were taken thrice for each individual to ensure the accuracy. For taking measurement, following somatometric landmarks were selected:

Labiale inferior (li) - It is the point on the lower margin of the lower lip in the mid saggital plane.

Stomion (sto) - It is the point where the slit of mouth with close lips cuts the mid saggital plane.

Sub labiale (sl) - Midpoint of horizontal labiomenal skin ridge the division between lower lip and chin is evident. If the chin contour is flattened, the sublabiale can be identified by inserting a spatula to the bottom of the vestibule and gently elevating the skin surface.

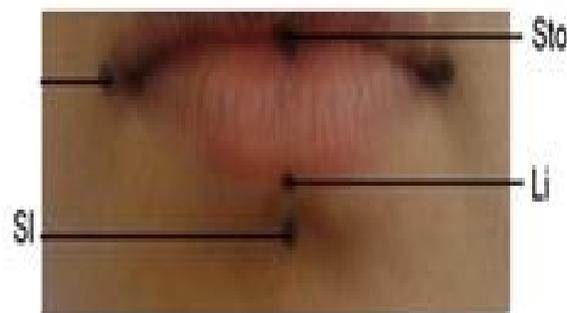


Fig. 1 Somatometric Landmarks

After marking these landmarks, following three parameters pertaining to lower lip were measured- Medial vertical height of cutaneous lower lip- i.e. distance between sublabiale and labiale inferior (Sl-Li), Height of lower vermilion i.e. distance between labiale inferior and stomion (Li-Sto), Height of lower lip i.e. distance between sublabiale and stomion (Sl-Sto).

All the data pertaining to lower lip parameters was tabulated and statistically analysed by applying 't test' (test of significance) using SPSS version 15 (arithmetic mean and Standard deviation were calculated). The p value (level of significance) was calculated.

- p value >0.05 – Insignificant
- p value ≤ 0.05 – Significant
- p value ≤ 0.01** - Very Significant
- p value ≤ 0.001*** - Highly Significant

Results

The present study establishes the basal values for various parameters of lower lips amongst the local population of the northern region of India (sub Himalayan plains). The results obtained from the present study are given in Table 1 and 2.

Table 1: Comparison of mean medial vertical height (mm) of lower lip parameters of males and females of present study

parameter	population	sex	No. of subjects	Mean ± S.D.	p value
Cutaneous lower lip height	North Indian	M	300	7.91 ± 2.19	<0.001***
		F	300	7.03 ± 1.68	
Vermilion lower lip height	North Indian	M	300	9.70 ± 1.62	<0.001***
		F	300	9.15 ± 1.32	
Total Lower lip height	North Indian	M	300	16.00 ± 2.26	<0.001***
		F	300	14.57 ± 1.77	

Table 2: Comparison of Lip index- 1 & Lip index -2 of males and females of present study

parameter	population	sex	No. of subjects	Mean ± S.D.	p value
Lip index 1	North Indian	M	300	49.12 ± 10.21	0.190 insignificant
		F	300	48.09 ± 8.88	
Lip index 2	North Indian	M	300	61.10 ± 9.53	<0.01**
		F	300	63.23 ± 8.85	

It depicts the various measurements of the two lips in both the sexes. It is seen that values of height of cutaneous lower lip, height of vermilion lower lip and height of total lower lip were significantly more in males as compared to their female counterparts in the present study (p-value < 0.001 in all) (table 1). These results show that sexual dimorphism do exists and further showed that the difference between these sexes in the morphological measurements was statistically significant and can help in differentiating between the two genders. Lip index 2 is more in females (63.23%) as compared to males (61.10%) and the difference is statistically significant (p<0.01) as shown in table 2.

Discussion

The results were compared with the other available data for North white Americans, Caucasians, Malays and Malaysian Indians (Table 3). We have compared males of present study with males of previous studies and females of present study with females of previous studies. The mean values for cutaneous lower lip, vermilion lower lip and total lower lip were more in males in the present study and difference was statistically significant (p<0.001) (Table 3).

Mean vertical height of cutaneous lower lip in males and females of present study were 7.91 mm and 7.03 mm respectively. It was significantly less in females (p < 0.001) as compared to males as shown in table 1.

This coincided with Farkas et al [7] study on Americans as shown in table 3.

Mean vertical height of vermilion lower lip in males and females of present study were 9.70 mm and 9.15 mm respectively. The value was more in males as compared to females, and the difference was statistically significant ($p < 0.001$) as shown in table 1. This study coincided with Ngeow & Aljunid [8] study on Malays, Ngeow & Aljunid [9] study on Malaysian Indians, Milosevic et al [10] study on Caucasians but

disagreed with Farkas et al [7] study on Americans as shown in table 3. American females had more vermilion lower lip height as compared to males.

Mean vertical height of lower lip in males and females of present study were 16.00 mm and 14.57 mm respectively. It was significantly more in males as compared to females ($p < 0.001$) as shown in table 1. This coincides with previous studies done by Farkas et al [7] on Americans, Milosevic et al [10] on Caucasians.

Table 3: Comparison of mean medial vertical height (mm) of lower lip parameters of males and females of present study with previous studies

parameter	population	sex	No. of subjects	Mean \pm S.D.	p value
Cutaneous lower lip height	North Indian	M	300	7.91 \pm 2.1	
		F	300	7.03 \pm 1.7	
	American ^[7]	M	50	11.9 \pm 2.2	<0.001***
		F	39	9.9 \pm 2.4	<0.001***
Vermilion lower lip height	North Indian	M	300	9.70 \pm 1.6	
		F	300	9.15 \pm 1.3	
	American ^[7]	M	50	8.8 \pm 2.0	<0.001***
		F	39	9.0 \pm 1.5	Insignificant
	Malay ^[8]	M	50	12.0 \pm 1.6	<0.001***
		F	50	11.0 \pm 1.2	<0.001***
	Malaysian Indian ^[9]	M	50	11.5 \pm 1.6	<0.001***
		F	50	10.9 \pm 1.0	<0.001***
	Caucasian ^[10]	M	52	8.67 \pm 1.60	<0.001***
		F	58	8.60 \pm 1.35	<0.01**
Total Lower lip height	North Indian	M	300	16.00 \pm 2.2	
		F	300	14.57 \pm 1.8	
	American ^[7]	M	50	18.8 \pm 2.5	<0.001***
		F	39	16.7 \pm 2.0	<0.001***
	Caucasian ^[10]	M	52	18.92 \pm 2.29	<0.001***
		F	58	17.67 \pm 1.73	<0.001***

On comparing present study with previous studies, the mean values of all lower lip parameters were significantly less in present study in both sexes (<0.001***), except in case of Americans & Caucasians, the mean values of vermilion lower lip height were significantly more in present study in both sexes (<0.001***). This may be due to less no. of cases in previous studies as compared to present study.

In present study, the cutaneous part of lower lip on the average, took up less than half of the lower lip height. In females (48.09%), it is slightly less than the males (49.12%) as shown in table 2. On comparing with study done by Farkas et al, [7] the cutaneous part of lower lip on an average took up less than 2/3rd of lower lip and the difference was statistically significant in

both the sexes (table 4). This may be due to racial differences.

In present study, the average lower vermilion height was occupying more than half of lower lip (63.23% in females and 61.10% in males) (table 2). On comparing with studies of Farkas et al [7] on Americans and Milosevic et al [10] on Caucasians, it was more in case of females than in males. In their studies the lower vermilion occupied nearly half of lower lip as shown in table 4. On comparing present study males and females with previous studies, [7, 10] the difference was statistically significant (p <0.001). Lower vermilion occupied greater area of lower lip in females than in males. So, it was toeing in line with Farkas et al [7] and Milosevic et al. [10]

Table 4: Comparison of Lip index-1 and Lip index-2 of males and females of present study with previous studies

Related measurements	Lip Index	Name of Authors	Sex	No. of subjects	MEAN±S.D. (in %)	p value
Medial height of cutaneous lower lip –total lower lip height	Lip Index-1	Present study	M	300	49.12 ± 10.21	
			F	300	48.09 ± 8.88	
		Farkas et al ^[7]	M	50	63.0 ± 9.1	<0.001***
			F	39	61.1 ± 16.7	<0.001***
Lower lip vermilion height- Lower lip height	Lip Index-2	Present study	M	300	61.10 ± 9.53	
			F	300	63.23 ± 8.85	
		Farkas et al ^[7]	M	50	47.0± 9.9	<0.001***
			F	39	52.7 ± 9.3	<0.001***
		Milosevic et al ^[10]	M	52	46.24 ± 8.96	<0.001***
			F	58	48.84 ± 7.31	=0.05

It becomes obvious from the available literature/data that soft tissue relationship

of North Indian adults differs from white standards or others and cannot be applied

on each other. Therefore, these findings suggest that it will help to correct the inappropriateness of using other population data and as different populations needs different standards to carry out the cosmetic surgery. Further researches is very much required to laid down the standards of adopting for the cosmetic surgery, however this preliminary data will provide a useful information.

The mean value for all parameters of lower lip morphometry reported in literature varies in different populations by different scientists. This could be due to several factors such as differences in age, number of subjects, gender of the subjects and geographical conditions, moreover the method was adopted.

Therefore it is concluded that all the measurement of lower lip parameters are higher in males as compared to females and sexual dimorphism exists. Cutaneous lower lip occupied less than half of entire lower lip height while vermilion lower lip occupied more than half of lower lip height. Indian males and females differ significantly in lower lip parameters from that of Malaysian, Indians & North white Americans. It concludes that same standards cannot be used on each other populations for identification and cosmetic surgery.

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