

An Estimation of Mento-Labial Angle on Standardized Digital Photographs in Gujarati Population- A Cross Sectional Study

Dr. Romina kapadia¹, Dr. Dharamadev Gadhiya², Dr. Shamil D Diyora³

* Professor, Dept of Orthodontics, KMSDCH, Sumandeep University.

** Post graduate student, Dept. of Orthodontics, KMSDCH, Sumandeep University

Abstract- Aim: To estimate the value of mentolabial angle in local Gujarati adults with acceptable facial profile.

Materials & Methods: A cross sectional study was carried out to estimate the value of mentolabial angle on standardized digital photographs of Gujarati population (25 males and 25 females) between the age 18-25 years having well-balanced, acceptable and symmetrical face as judged by a group of three senior Orthodontists working in K.M. Shah Dental College and Hospital, SV, Piparia, Waghodia, Vadodara. Assessment of mentolabial angle was done using Dolphin imaging software 10.5.

Results: Student's t-test and Pearson's Correlation test were applied. The measure of mentolabial sulcus angle was found higher in males ($129.20^{\circ} \pm 9.0^{\circ}$) than in females ($125.48^{\circ} \pm 10.2^{\circ}$), stating that the local Gujarati males have more obtuse mentolabial angle than that in their female counterparts, but the difference was not statistically significant ($p=0.178$). Poor correlation was found between age and mentolabial angle in overall sample as well as in males and females.

Conclusion: The measure for mentolabial sulcus angle in Gujarati males having normal occlusion and pleasing profile is $129.20^{\circ} \pm 9.0^{\circ}$ and that in Gujarati females is $125.48^{\circ} \pm 10.2^{\circ}$. Gujarati males show higher values i.e. more obtuse mentolabial angle than females, but it is not statistically significant.

Index Terms- Mentolabial angle, Gujarati Adults, digital photographs

I. INTRODUCTION

It has long been established that self-esteem is strongly influenced by facial appearance¹. Facial appearance also influences the overall physical appearance of an individual. Though the perception of an attractive face is largely subjective, with age, gender, race, ethnicity, culture and personality influencing average facial traits; it cannot be overlooked.^{2,3}

Various methods have been used to evaluate facial characteristics, such as anthropometry,⁴ photogrammetry,^{5,6} computer imaging⁷ and cephalometry.^{8,9,10} Interestingly, facial features are usually studied in profile. Lip and chin form an important component of the oro-facial soft tissue profile.

Over the years, several lines and angles have been used to evaluate soft tissue facial aesthetics. Different areas of face play their role in improving facial acceptance. One of such areas is

mentolabial sulcus which is studied by measuring the Mentolabial angle (Li-ILs-Pog') by joining three soft tissue points viz. Li (labrale inferior), ILs (Inferior labial sulcus) and Pog' (soft tissue Pogonion). The morphology of this sulcus and measure of this angle is influenced both by the position of the lower lip and chin along with the inclination of mandibular incisor teeth. An acute mentolabial angle may be a reflection of the Dento-alveolar protrusion or an over-grown chin.

William Arnett and Robert Bergman in 1993¹¹ presented an organized and comprehensive clinical facial analysis and discussed the soft tissue changes associated with orthodontic and surgical treatments of malocclusion. Douglas Nguyen and Patrick Turley in 1998¹² found that Caucasian males who were depicted in the fashion magazines during the twentieth century have mentolabial angle 128.5° with SD of 11.29° . Studies to estimate the Mentolabial angle have also been reported in populations like Croatia¹³, Iraq¹⁴, Saudi Arabia¹⁵ and Lambada population of Andhra Pradesh India.¹⁶

Facial traits vary among various races across the world and in India there are many ethnic races. To the best of our knowledge, any such study on Gujarati population has not been reported anywhere in the literature. Hence there is a need to evaluate the measure of mentolabial angle in local Gujarati population to optimize their facial attractiveness. The mentolabial angle is an important criteria for orthodontic diagnosis and treatment planning. This study will estimate an acceptable value of mentolabial angle in Gujarati population. This estimate of mentolabial angle would serve as a guide for aesthetic treatment goals for both orthodontists and oral and maxillofacial surgeons.

II. AIM OF THE STUDY

Estimation of mentolabial angle in adult Gujarati males and females using standardized digital photographs.

III. OBJECTIVES OF THE STUDY

1. To estimate the mentolabial angle from the digital profile photographs of Gujarati Adult males and females having normal occlusion and acceptable facial appearance.
2. To compare the measures of mentolabial angle between Gujarati males and females.

IV. MATERIALS AND METHODS

The study was conducted in the Department of Orthodontics, K.M. Shah Dental College and Hospital. Participants were selected from the students and interns of K.M. Shah Dental College and S.B.K.S medical college, SV, Piparia, Waghodia, Vadodara. A total of 50 participants (25 males and 25 females) were selected on criteria mentioned below:

- All the participants included in the study should be in the age range of 18 to 25 years.
- They should be of Gujarati origin for the last two generations.
 - Individuals with well-balanced acceptable symmetrical face (As judged by a group of three Orthodontists)
- Individuals showing normal occlusion of permanent teeth.
- No history of previous orthodontic or facial trauma or facial surgical treatment.

The following equipments were used in the study: Nikon (D3100) Digital SLR camera of focal length 18-55mms, Tripod, Scale, Computer and Dolphin imaging solution 10.5version software.

V. STANDARDIZATION OF PHOTOGRAPHS

As per the design, inclusion and exclusion criteria right lateral profile photographs of the samples were taken. Since it is a photographic study the photographs were standardized in the following way¹⁷:

1. All the photographs were taken by the principal investigator only.

2. The extra-oral photographs were taken with a suitable fixed distance between the participant and camera which was of 110cms.
3. All photographs were taken with the help of a tripod stand.
4. All the photographs were taken by keeping the line from the outer canthus of the eye to the superior attachment of the ear parallel to the horizontal plane.
5. All the photographs were taken in portrait mode without zoom.
6. Right facial profile photographs of subjects with relaxed oro-facial muscles were taken.

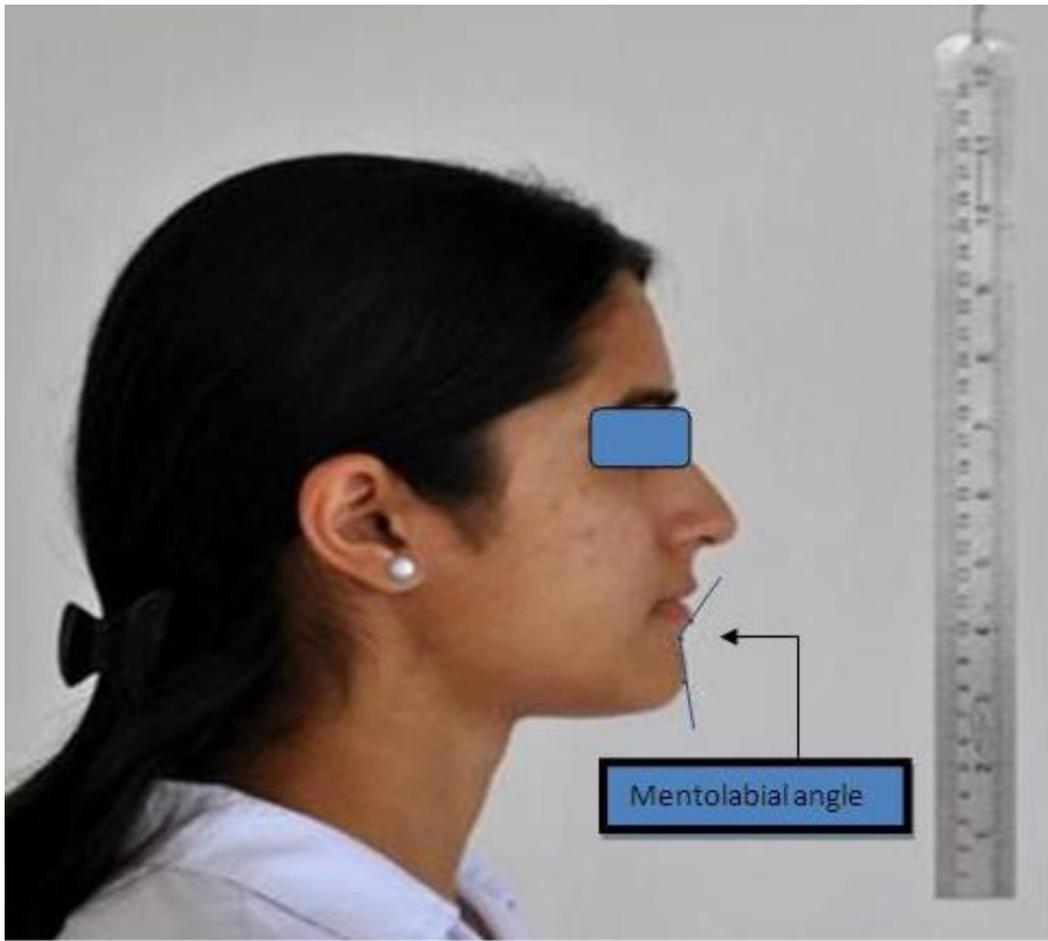
Once the digital image were obtained with the Nikon (D3100) digital SLR camera they were transferred to the computer installed with the software dolphin imaging solution 10.5 version. The digital images were calibrated for elimination of magnification of digital photograph accordingly by placing grids and additionally by DPI calibration in Dolphin Imagine 10.5 version software.

After calibration of image, the angular measurement of mentolabial angle was measured with the help of the dolphin imaging solutions.

The following landmarks¹⁸ were digitized on the photographs:

- Labrale inferior (Li): The median point on the lower margin of the lower membranous lip.
- Inferior labial sulcus (ILs): The point of greatest concavity in the midline of the lower lip between Li and soft tissue pogonion. Also known as labiomenta sulcus (si).
- Soft tissue pogonion (Pog'): The most prominent or anterior point on the chin in the midsagittal plane.

Fig-1 Shows capturing of subject's photograph and its digitization for measuring mentolabial angle



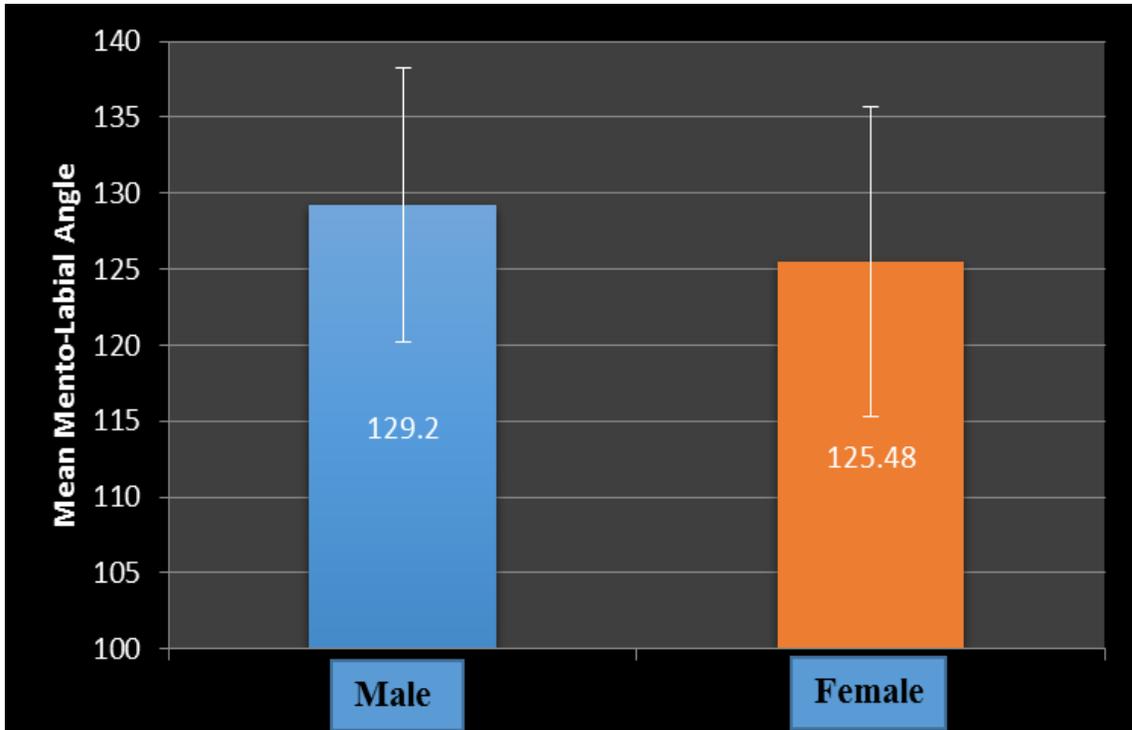
females and $21.52^{\circ} \pm 2.5^{\circ}$ years for males. The mean value of mentolabial angle was found to be $129.2^{\circ} \pm 9.03^{\circ}$ in males and $125.48^{\circ} \pm 10.2^{\circ}$ in females.

VI. OBSERVATIONS AND RESULTS

Table 1 and Chart-1 shows the mean values for age and mentolabial angle in all the participants. The mean age of participants in the study was found to be $21.0^{\circ} \pm 2.45^{\circ}$ for

TABLE 1							
MEAN AND SD VALUES FOR AGE AND MENTOLABIAL ANGLE IN MALES AND FEMALES							
		AGE IN YEARS			MENTOLABIAL ANGLE IN DEGREES		
Sex	n	Mean	SD	C.V %	Mean	SD	C.V %
Male	25	21.52	2.50	11.63%	129.2°	9.03	6.9874
Female	25	21	2.45	11.66%	125.48°	10.2	8.1211

CHART-1 SHOWS MEAN MENTOLABIAL ANGLE OF THE PARTICIPANTS



In present study Mentolabial sulcus angle is recorded for 25 Males and 25 Females, the angle is found to be slightly higher in males than that in females at both the ends that is minimum

starting measure and maximum ending measure as shown in Chart 2.

CHART-2 CORRELATION OF MENTOLABIAL SULCUS ANGLE IN MALES AND FEMALES

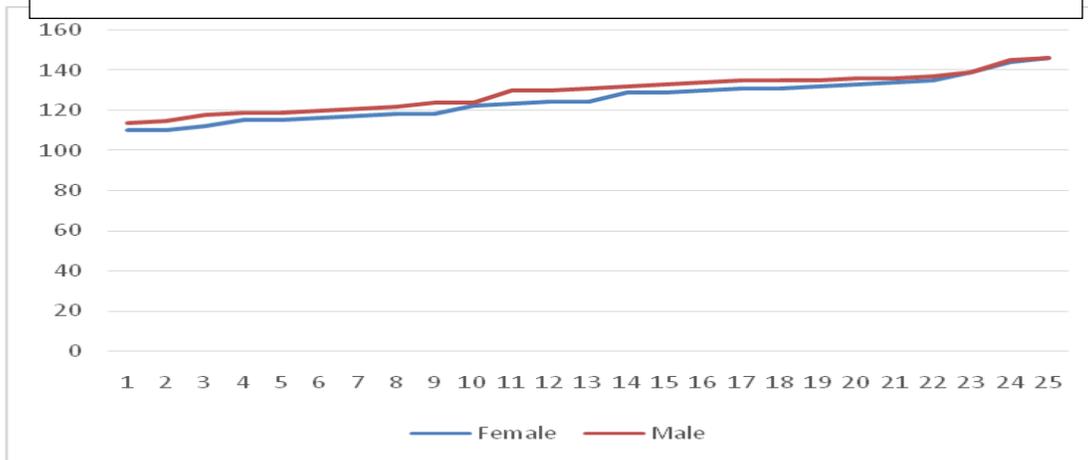


Table 2 shows student's t -test amongst mentolabial angle between male and female participants. Here Parameters show no difference between male and female. ($p = 0.178$)

TABLE 2					
CORRELATION OF MENTOLABIAL ANGLE BETWEEN MALES AND FEMALES					
MALES (n = 25)		FEMALES (n = 25)		t-test	p-value
Mean	SD	Mean	SD		
129.2°	9.03°	125.48°	10.2°	1.366	0.178

Table 3 shows correlation values amongst age and mentolabial angle in males and females. Here Parameters age v/s mentolabial angle show poor correlation at probability with p-

value 0.615 in males and negative correlation in females with p-value 0.950, so it can be concluded that correlations are statistically insignificant.

TABLE 3			
CORRELATION BETWEEN AGE AND MENTOLABIAL ANGLE IN MALES AND FEMALES			
Sex	n	Pearson Correlation	P-value
Male	25	0.106	0.615
Female	25	-0.013	0.950

VII. DISCUSSION

At the end of present study it is concluded that the measure for Mentolabial sulcus angle in Gujarati males having normal occlusion and pleasing profile is $129.20^\circ \pm 9.0^\circ$ while for females it is $125.48^\circ \pm 10.2^\circ$. Males have slightly higher values than female but there is no statistical significant difference between them.

However as per Anic-Milosevic S, Lapter-Varga M, Slaj M¹³ - Croatia, Europe, the value for this angle for males is 129.26° while for females it is 134.50° . (Females have slightly higher values than males), as per Saba H Al-Zubaidi¹⁴ – Mosul – Iraq, the value for this angle for males is 133.40° while for females it is 139.20° (Females have slightly higher values than males), as per Hayder Abdallah Hasmin¹⁵ – Saudi Arabia, the value for this angle for males is 120° while for females it is 124.30° (Females have slightly higher values than males). The same results were found in Lambada population of Andhrpradesh¹⁶ where females showed slightly higher values of mentolabial angle than males. It means in all these studies males had deeper mentolabial angles than their female counterparts whereas in the present study on Gujarati adults, the males showed shallower mentolabial angle than females.

To establish the norms for this angle for Gujarati males and females it is desirable that the study can further be expanded with a larger sample size. Further to find out to what extent this angle influences and has its role in acceptance of facial profile, large scaled full-fledged study or dissertation or special research work is required to be done taking the samples of individuals falling in different occlusal categories with and without pleasing and acceptable facial profiles.

VIII. SUMMARY AND CONCLUSIONS

1. Measure for Mentolabial sulcus angle in Gujarati males having normal occlusion and pleasing profile is $129.20^\circ \pm 9.0^\circ$.
2. Measure for Mentolabial sulcus angle in Gujarati females having normal occlusion and pleasing profile is $125.48^\circ \pm 10.2^\circ$.
3. Gujarati males have slightly higher values of Mentolabial angle than females, but it is not statistically significant.

REFERENCES

- [1] Hershon L E, Giddon D B, Determinants of facial profile and self-perception. American Journal of Orthodontics 1980; 78 : 279 – 295
- [2] Mandall N A , McCord J F , Blinkhorn A S , Worthington H V , O'Brien K D Perceived aesthetic impact of malocclusion and oral self-perceptions in 14-15 year-old Asian and Caucasian children in Greater Manchester, 2000;22(2):175-83. Epub 2000/05/24.
- [3] European Journal of Orthodontics 21 : 175 – 183 Sahin Saglam A M , Gazilerli U Analysis of Holdaway soft tissue measurement in children between 9 and 12 years of age . European Journal of Orthodontics 2001; 23: 287 – 294
- [4] Farkas L G Anthropometry of the head and face in medicine. Elsevier North Holland Inc. New York, 1981; p. 285.
- [5] Neger M A. A quantitative method for the evaluation of the soft tissue facial profile. American Journal of Orthodontics 1959; 45: 738 – 751
- [6] Stoner M M. A photometric analysis of the facial profile. American Journal of Orthodontics 1955; 41: 453 – 469
- [7] Guess M B, Solzer W V, Computer treatment estimates in orthodontics and Orthognathic surgery. Journal of Clinical Orthodontics 1989; 23: 262 – 268
- [8] Garner L D Soft tissue changes concurrent with orthodontic tooth movement. American Journal of Orthodontics 1974; 66:367 – 377
- [9] Roos N. Soft tissue changes in Class II treatment. American Journal of Orthodontics 1977; 72:165 – 175

- [10] Czarnecki S T, Nanda R S, Currier G F. Perceptions of a balanced facial profile. American Journal of Orthodontics and Dentofacial Orthopedics 1993; 104:180 – 187
- [11] Arnett GW, Bregman RT., Facial keys to orthodontic diagnosis and treatment planning – part II. American Journal of Orthodontics and Dentofacial Orthopedics 1993; 365-411
- [12] Douglas DN, Patrick KT. Changes in the Caucasian male facial profile as depicted in fashion magazines during the twentieth century. American Journal of Orthodontics and Dentofacial Orthopedics 1998; 114 :2: 208-217.
- [13] Anic-Milosevic S, Lapter-Varga M, Slaj M. Analysis of the soft tissue facial profile by means of angular measurements. European journal of orthodontics. 2008; 30 (2):135-40. Epub 2008/02/12.
- [14] SabaH Al-Zubaidi; The skeletal and soft tissue facial profile in adolescent and adult. Al-Rafidain Dent J. 2009; 9(1) : 149-155
- [15] Hayder Abdallah Hashim; Cephalometric soft tissue profile analysis between two different ethnic groups: A comparative study. J Contemp Dent Pract. 2003 May; (4)2: 060-073.
- [16] Thomas M, Reddy VD, Lakshmi HV. Soft-tissue cephalometric norms for the Lambada population in Telangana Region of Andhra Pradesh. Indian journal of dental research: official publication of Indian Society for Dental Research. 2012;23(3):353-8. Epub 2012/10/13.
- [17] John Paul Vetter; Techniques for dental photography; “Biomedical Photography”. Focal Press, 1992
- [18] Alexander Jacobson; Radiographic Cephalometry: From Basics to 3D Imaging. Quintessence Pub Co.; p. 320.

AUTHORS

First Author – Dr. Romina Kapadia , Professor, Dept of Orthodontics, KMSDCH, Sumandeep University.

Second Author – Dr. Dharamadev Gadhiya, Post graduate student, Dept. of Orthodontics, KMSDCH, Sumandeep University.

Third Author – Dr. Shamil D Diyora, Post graduate student, Dept. of Orthodontics, KMSDCH, Sumandeep University