



ANTHROPOMETRIC PROPORTIONS IN THE UPPER LIP-LOWER LIP-CHIN AREA OF THE LOWER FACE IN YOUNG BENGALI POPULATION

Dental Science

Dr. Soma Halder Biswas* Assistant Professor Department of Dentistry Medical College, Kolkata. *Corresponding Author

Dr. Jnananjan Chattopadhyay Assistant Professor Department of Dentistry Murshidabad Medical College & Hospital Berhampore.

ABSTRACT

Facial harmony and balance are determined by facial skeleton and its soft tissue drape. So, it is necessary for orthodontist to understand the objective component of beauty, while attempting to maximize facial harmony and balance. Recently, the field of orthodontics has experienced a paradigm shift to focus more on esthetics with specific emphasis on soft tissue around the mouth.

Radiographical cephalometry, which is a important part of anthropometry used in most previous studies to evaluate the facial form and position of the teeth in relation to the skeletal component.

However, sporadic attempts are made to induce an element of soft tissue profile assessment such as Rickett's Esthetics plane, Holdaway's analysis, Burstone's soft tissue analysis, Arnett and co-workers soft tissue cephalometric analysis (STCA) through cephalometry.

Some studies also focused on soft tissue three-dimensional morphometry assessed from facial photograph, three-dimensional camera coupled software assessment but the most basic method of analyzing soft tissue dimensional morphometry is the measurement of soft tissues of face by 'direct measurement'.

KEYWORDS

INTRODUCTION

Esthetics is the study of beauty and together with ethics, logic, politics, and metaphysics, is a branch of basic philosophy. Every single human face is unique - in its look, shape and proportions ,as well as in the specific ways of articulation and expression that are so characteristic for an individual¹

Anthropometry – the terminology first used by Johann *Sigismund Elsholtz* (1654) . He was credited for invention of first anthropometer . Czech anthropologist *Ales Hrdlicka* (1939) defined anthropometry as a science using a system based on observation and measurement. He projected anthropometry as a tool of investigation and not the final target. He described index as a percentage relationship between two dimensions.

Currently there are three methods used for making facial measurements.² These methods are;

1. Manual anthropometry,
2. 2D photography,
3. 3D stereo-photogrammetry

Manual anthropometry makes surface measurements using sliding and spreading callipers and flexible measuring tape . The procedure is simple ,low cost,non-invasive, could be performed with minimal instrumentation and within institutional setting. The uncertainties on the part of the examiner in locating the landmarks were probably the greatest source of error for reference point in soft tissue direct Anthropometric studies.

MATERIALS AND METHODS

A total of 100 dental students, which include 50 adult females and 50 adult males between 18 to 24 years were included . Inclusion criteria was Bengali ethnic group ,whose family should have resided in West Bengal since two prior generation. Balanced facial profile with competent lips, Class I occlusion with minimum or no crowding and normal overjet and overbite. The soft tissue landmarks were located by careful inspection and palpation and a mark is created on that cutaneous portion of the subject with a non-permanent marking pen. A sliding digital caliper was used to measure the shortest linear distance between the marked points on skin . A soft tape was used for arc measurements. A total of twelve linear measurements and two arc measurements were taken. All measurements were taken in millimeter . Chin contour quality is also noted.

The linear measurement of the soft tissue of lower third of the face were done according to the eight following landmarks :

- **Subnasale (sn)** : The midpoint on the nasolabial soft tissue contour between the comella crest and the upper lip.

- **Gnathion (gn)** : In the midline the lowest point on the lower portion of the chin.
- **Stomion (sto)** : The median point of the oral embrasure when the lips are closed.
- **Labiale superius (ls)** : The point at which the upper lip tissue merges with vermillion tissue.
- **Labiale inferius (li)** : The point at which the lower lip tissue merges with vermillion tissue.
- **Sublabiale (sl)** : The point of greatest concavity in the midline of the lower lip between lower vermillion border and soft tissue pogonion.
- **Cheilion (ch)** : Most lateral point in the transverse plane of the lips.
- **Pogonion (pg)**: The most anterior point of the soft tissue chin.

Vertical profile measurements

1. Height of lower face (Subnasale –Gnathion)
2. Height of lower third of face (Stomion-Gnathion)
3. Height of cutaneous lip (Subnasale - Labiale superius)
4. Height of upper vermillion (Labiale superius - stomion)
5. Height of upper lip (subnasale - stomion)
6. Height of lower vermillion (stomion – labiale inferius)
7. Height of cutaneous lip (labiale inferius - sublabiale)
8. Medial vertical height of lower lip (stomion - sublabiale)
9. Medial vertical height of upper chin (sublabiale - pogonion)
10. Medial vertical height of lower chin (pogonion – gnathion)
11. Medial vertical height of entire chin (sublabiale - gnathion)

Horizontal linear measurement :

Length of labial fissure (cheilion - cheilion)

Vermillion arcs measurements

Upper vermillion arc (cheilion - labiale superius - cheilion)
Lower vermillion arc (cheilion - labiale inferius - cheilion)

Chin contour quality

Deep and indented / Deep and curve / Shallow and curve/ Flattened.

Fifteen Indices which were derived from the above measurements are :

1. Medial height of the cutaneous upper lip / Upper lip height
2. Upper lip vermillion height / Upper lip height
3. Medial Height of the cutaneous lower lip / Medial vertical lower lip height
4. Lower lip vermillion height / Lower lip height
5. Medial upper chin height / Medial lower chin height
6. Medial upper lip vermillion height / Medial lower lip vermillion height

lower face segments. But significant sex difference found only in four indices, Upper lip proportion, upper and lower lip total and vermilion proportion and upper lip proportion with total face height.

L.G. Farkas et al (1984)⁵ found significant interrelationships (r) among all lower face segments except in upper and lower chin relationship (index 5). In his study one third of the upper lip (32% -39%) was occupied by the vermilion and two thirds by the cutaneous portion. In the lower lip, on the average, about half of the total height (47% - 52%) was taken by the vermilion and the remainder by the skin area.

In our study, almost half of the upper lip (44% -47%) was occupied by the vermilion and in the lower lip, about two-third of the total height (61% - 62%) was taken by the vermilion and the remainder by the skin area. In both cases index value of upper lip and lower lip vermilion are higher in male. Upper portion of chin was moderately smaller (86% -88%) than lower portion of chin in both sexes. So we can conclude, more prominent vermilion and smaller upper chin height in Bengali population in both sexes. The upper lip occupied about one third of the lower half of the face and the lower lip took more than one third of the lower third of the face.

Francesca and Pacioli^{8,9} divided the lower face in three equal proportions: upper lip, lower lip and chin and the proportion of those with the labial fissure 66% of the way up the lower face. Dürer¹⁰ divided the lower face in four equal proportions: upper lip, lower lip and upper chin and lower chin. The proportion of those with the labial fissure 75% of the way up the lower face.

Analysis of sample in our study did not reveal any one subject with the three or four equal segments proposed by Francesca, Pacioli, and Dürer. The only two segments of the lower face in the study group that were almost equal were the upper and lower lips. The labial fissure level was positioned 79%(male) - 83%(female) of the way up the lower face. So Bengali faces does not fit into any neoclassical canon.

The labial fissure level was positioned 66% of the way up the lower face as indicated by Francesca or Pacioli. This study confirmed the finding of Legan and Burstone¹¹ that the upper lip occupies one third of the space between the columella base (subnasale) and the chin point (gnathion).

CONCLUSION

Now, a paradigm shift in Orthodontic diagnosis and treatment plan emphasizes more importance to soft tissue in diagnosis and treatment plan. The variability of the soft tissue integument in people with different ethnic origin makes it necessary to study the soft tissue standard of particular community.

This study provided the normative esthetic guideline to assess the facial discrepancy in the lower third of face of the young Bengali population, through a simple, non-invasive, economically reasonable three-dimensional soft tissue facial analysis method.

This study concluded:

- A definite sexual dimorphism found in all linear, arc measurements and also in all index values.
- Height of the lower face, height of the upper lip is near to ideal in comparison to other studies and other populations.
- The normal ratio of upper to lower lip is 1:1.95 (male) to 1:2.16 (female). Female shows more harmonious lip proportions.
- Almost half of the upper lip (44% -47%) was occupied by the vermilion. More prominent vermilion found in Bengalee population in both sexes.
- In both males and females, the deep and curved chin was found mostly. Lower third of the face of young Bengali do not fit into any Neoclassical Canon.

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