

Original Research

Anthropometric Evaluation of Facial Dimensions in Population of Western Maharashtra

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ABSTRACT

Objective: The present study was carried out to evaluate an average ratio between specific soft tissue parameters of the face among the young adult population of Karad, Maharashtra. The soft tissue parameters gauged in the present study are inner canthal distance, outer canthal distance, alar base width and distance between the corners of the mouth. **Rationale:** The average ratio of soft tissue parameters of the face can act as a guideline for effective treatment of teeth and dento facial structures as well as soft tissue outlines. **Materials and Methods:** 1,786 young adults aged between 18 and 20 years from Karad city were initially screened, out of which 1,000 were selected on the basis of the inclusion criteria. The fronto-facial photographs of the selected subjects were captured using a digital camera. The selected facial soft tissue parameters were digitally measured, and the data were subjected to statistical analysis. **Result:** The values of the parameters measured were marginally more in males; however, the ratio among the parameters was similar in both the sexes. The average ratio between the inner canthal distance, alar base width and distance between corners of the mouth was found to be **1:1.3:1.7**, and the average ratio between the outer canthal distance, alar base width and distance between the corners of the mouth was found to be **2.3:1:1.3**. **Conclusion:** The different parts of the human face exist in certain proportions. Establishing the ratio between these parameters is important to facilitate proper diagnosis and treatment planning for the specific population.

KEYWORDS: Facial measurements, Golden proportions, Digital photography

INTRODUCTION

Beauty is a matter of colossal interest for many health-related professionals as well as laypersons. It is believed that beauty affects the various aspects of an individual's life [1,2]. The face is by and large considered to be the most crucial aspect to define the beauty of a particular individual [3]. However, the notion of gradating beauty is very idiosyncratic. It vicissitudes from time to time and from place to place [4]. The Greek portraits illustrating the faces of those considered

to be of supreme beauty in that time may not be considered with the same regard in today's era. Therefore, a standard guideline exclusive for a set of population is essential to gauge the aesthetics of the individuals of that specific place at that particular time period devoid of all bias. In addition, these guidelines will be very helpful for sketching treatment plans that are ought to be undertaken to augment the dento-facial structure of an individual [5]. The aim of the present study is to form such a guideline. To make the study even handed, certain parameters are fixed which are

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inner canthal distance, outer canthal distance, alar base width and distance between the corners of the mouth. The ratio between these parameters was obtained. This ratio serves the purpose of a guideline to determine the degree of aesthetics of an individual.

MATERIALS AND METHODS

Materials used for the study are as follows:

1. Digital camera (Nikon Coolpix L-27)
2. Stainless steel ruler
3. Laptop (Dell inspiron 1545) installed with Adobe Photoshop CS6 and Graph Pad Instat version 3.02 software.

Method

A total of 1,786 young adult individuals from the city of Karad, Maharashtra, were screened. The range of the age of the subjects screened was 18 to 20 years [6]. Out of the total subjects screened, 1,000 individuals were selected for the study based upon the following inclusion and exclusion criteria:

Inclusion Criteria

- Subject should have class I molar or canine relation on both sides according to Angle's classification.
- Subjects should be strictly residents of Karad.
- The subject should have near straight profile.

Exclusion Criteria

- Any obvious facial deformity or apparent facial asymmetry/eye deformity.
- Any scars and/or other soft tissue injuries on the face.
- Individuals with severe crowding or spacing.
- Individuals who have undergone any cosmetic surgery or corrective treatment involving the face.

After obtaining an informed consent, a fronto-facial photograph was taken using a digital camera (Nikon coolpix L-27).

To minimise the errors and to maintain uniformity, the following guidelines were set:

The distance between camera and subject was fixed at 304.8 mm (1 ft). A plain red cloth was placed in the background (Figure 1).

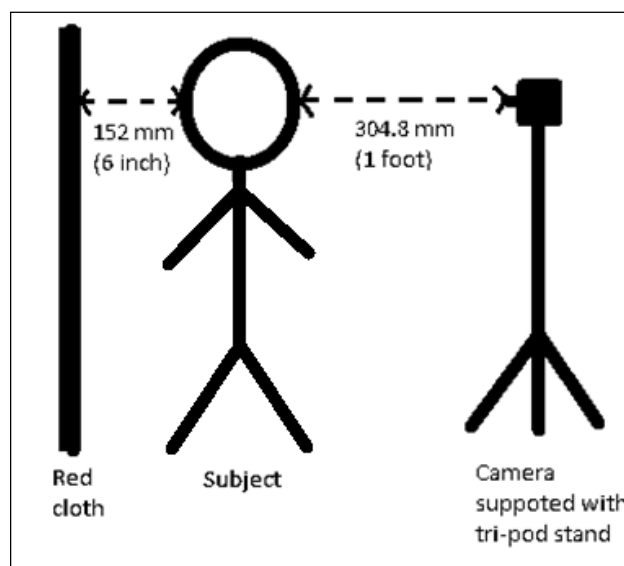


Figure 1: Distance between camera and subject; subject and red cloth used for background

The subject's face was oriented in such a manner that the inter-pupillary line was parallel to the floor. The midline of subject's face was aligned to the central gridline seen on the screen of the camera [7]. The vertical and horizontal halves of the face were seen equally based on the gridlines (Figure 2).

The photographs were then transferred to a laptop and were evaluated through Adobe Photoshop CS6 software. The measurements that were obtained are as follows (refer to Figure 3 for details):

1. The distance between the point at the medial canthi (MC–MC)
2. The distance between the point at the lateral canthi (LC–LC)
3. The distance between the point at the Lateral rims of nose (LN–LN)

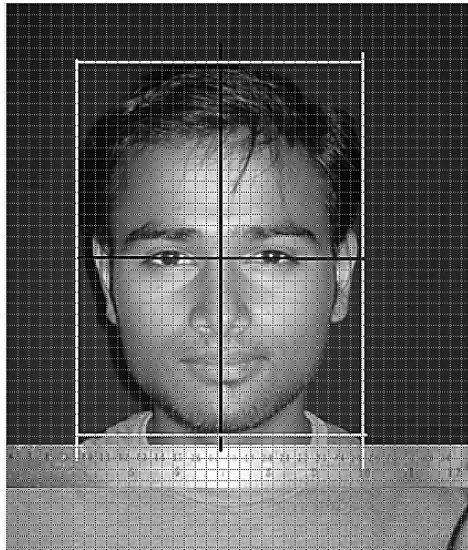


Figure 2: Orientation of the face of the individual while clicking the photograph. The white lines are the tangents representing the horizontal and vertical limits of the subject's face. The black lines are dividing the subject's face into horizontal and vertical halves.



Figure 3: Soft tissue parameters for anthropometric measurement. LC:LC – Distance between lateral canthus of left eye and lateral canthus of right eye; MC:MC – Distance between medial canthus of left eye and medial canthus of right eye; LN:LN – Alar base width and CH:CH – Distance between left and right chelion.

- The distance the points at the corner of the mouth, cheilions (CH–CH)

The results were then tabulated and subjected to Statistical analysis using Graph Pad InStat version 3.02.

RESULT

Sample Characteristics

Out of the 1,000 subjects reviewed, 56.9% were male and 43.1% were female (Table 1).

The range of the age of the subjects was from 18 years to 20 years. 28.9% of the subjects were of 18 years, 40.8% of the subjects were of 19 years and 30.3% were of 20 years in age (Table 2). The mean of the age of all the subjects was 19.01 years (Table 3).

Mean Values of the Measured Parameters

The mean of the values of each soft tissue parameter was found as follows: MC–MC was 27.55 (± 3.94) mm.

Table 1: Demographic characteristics of study participants according to sex

Variable	Number (N)	%
Male	569	56.9
Female	431	43.1
Total	1,000	100

Table 2: Demographic characteristics of study participants according to age

Variable	Number (N)	%
18	289	28.9
19	408	40.8
20	303	30.3
Total	1,000	100

Table 3: Mean of age of the study participants

Gender	Mean (S.D.)
Male	18.92 (± 0.71)
Female	19.14 (± 0.80)
Total	19.01 (± 0.77)

Table 4: Mean and standard deviation of the measured parameters

Variable	MC–MC(mm) (±S.D.)	LC–LC(mm) (±S.D.)	LN–LN(mm) (±S.D.)	CH–CH(mm) (±S.D.)
Male	28.58 (±306)	84.86 (10.04)	37.89 (±3.92)	48.27 (±7.90)
Female	26.20 (±3.76)	77.83 (±8.65)	32.87 (±4.98)	42.81 (±5.14)
Total	27.55 (±3.94)	81.83 (±10.89)	35.70 (±5.06)	45.95 (±7.64)

S.D.: Standard deviation.

LC–LC was 81.83 (±10.89) mm, LN–LN was 35.70 (±5.06) mm and CH–CH was 45.95 (±7.64) mm (Table 4).

Ratio of the Measured Parameters

The ratio between the MC–MC: LN–LN:CH–CH was found to be **1:1.3:1.7** for males and **1:1.3:1.6** for females (Table 5).

The ratio between the LC–LC: LN–LN:CH–CH was found to be **2.2:1:1.3** for males and **2.4:1:1.3** for females (Table 6).

Table 5: Ratio between the measured parameters

Ratio	MC–MC	LN–LN	CH–CH
Male	1	1.3	1.7
Female	1	1.3	1.6
Total	1	1.3	1.7

Table 6: Ratio of the mean of the measured parameters

Ratio	MC–MC	LN–LN	CH–CH
Male	2.2	1	1.3
Female	2.4	1	1.3
Total	2.3	1	1.3

DISCUSSION

In the present study, it can be seen that the individual values of all the soft tissue parameters are more in males than females. Cross-sectional anthropometric studies done by Reddy [8] and Abdullah [9] have reported increase in nose width and inner canthal distance in males in their respective studies. Similar prevalence has been reported in a study by Asghari *et*

al. [10] in Iranian population which is in accordance with the present study.

However, it is evident by the present study that the ratio between these values is practically same in both the sexes. The distance between the corners of mouth is slightly less in proportion with inner canthal distance and alar base width when compared with males. This suggests that females have slightly narrower lips in proportion with other soft tissue parameters. Also the outer canthal distance is slightly more in females in ratio with other parameters. However, the inner canthal distance is same in proportion as in males. Thus, the increased outer canthal distance suggests wider eyes, rather than widely spaced eyes in females.

The mean value of alar base width found in this study (46 mm) is very close to what was reported by Tuncel *et al.* [11] (47 mm). The mean values of amongst Turkish population was found to be 30.7 mm and 91.3 mm in a study conducted by Oztürk *et al.* [12], whereas the mean values for these parameters were found to be considerably less (27.5 mm and 81.83mm, respectively) according to present study.

Borman *et al.* [13] found that the mouth width was greater than 1.5 times the nose in his study, whereas in present study, the ratio was 1.28, thus suggesting the mouth width is slightly less in proportion with nose in Karad population.

In the present study, it was found that the inner canthal distance and alar base width were approximately the same (1:1.3). This was also reported in a study conducted by Proffit and Field [14].

Furthermore, the ratio between the alar base width and inner canthal distance was found to be 2.3 in North Indian females which is similar to the findings reported in a study conducted by Tripathi *et al.* [15] who found it to be 2.252.

CONCLUSION

The human face exists in certain proportions. These proportions can vary for different sets of population. It can vary from time to time and from one geographical place to another. Establishing the ratio amongst the different parameters of face is important for a particular set of population as this will help in better treatment planning for cosmetic or corrective treatments like orthodontic treatments.

Furthermore, extensive descriptive study is required in this field to establish the ratio amongst all the parameters of face for better reference.

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