Measurements of Lower, Middle and Upper Facial Heights in Different Sex in a Teaching Hospital of Biratnagar

Dr. Ankita Rathi,[1] Dr. Shanti Chhetri[2]

[1,2]Department of Prosthodontics, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal

Correspondence:
Dr. Ankita Rathi. Email: drankitarathi@yahoo.com

ABSTRACT

Introduction: The human face shows wide differences depending on age, sex, race, and ethnicity. The differences can be in terms of harmony, symmetry, soft to hard tissue ratios and upper, middle and lower facial height ratios. Initially it was said that these three ratios are equal. But the studies by various authors in different races revealed that these thirds are rarely equal.

Objective: The main purpose of this study was to provide anterior face height measurements, which will be of great significance in evaluating facial proportions and aesthetics in orthodontics, orthognathic surgery, and prosthetic dentistry in context to Nepali population.

Materials and Method: This was a cross sectional study conducted in 200 subjects in department of Prosthodontics, Nobel Medical College and Teaching Hospital, Biratnagar. The anthropometric landmarks (trichion, glabella, subnasale, and gnathion) were identified on the subjects with careful inspection and then marked on the face with black liquid eye liner and measurements were recorded using stainless steel digital caliper.

Result: In context to study population, we found that the average value of upper facial height was greater (62.12 mm) than lower facial height (59.46 mm) and middle facial height (60.27 mm).

Conclusion: We recommend the utilisation of Nepali norms during clinical examination to avoid making inaccurate diagnostic and treatment plan decisions.

Keywords: Lower facial height; middle facial height; Nepal; treatment planning; upper facial height.

INTRODUCTION

The face is one of the fundamental parts of the body for self-recognition. It is the most important individual factor determining the physical appearance of the individuals.[1] All human faces are unique and contribute to individual identity. The importance of physical and facial attractiveness has been extensively reviewed and related to job recruitment decisions, initial impressions, susceptibility to peer pressure, voting and juror decisions, and social interactions including dating decisions.[2]

The identification of aesthetic facial qualities began with ancient civilisations such as Egyptians and Greeks, who captured their ideals of beauty in art form (Peck and Peck, 1970). The classical Greek canons of facial proportions influenced anatomic scholars of Renaissance period, and many of these, with modifications, are still embraced as the basic foundation of aesthetic facial analysis today.[3]

Because the standards of beauty could vary considerably among persons as well as racial groups, it is essential for a clinician to develop the concept of normal for a particular racial group. It is desirable that studies should be carried out in different ethnic groups in Nepal to establish normal reference values. Hence the aim of this study is to provide anterior face height measurements, which will be of great significance in evaluating

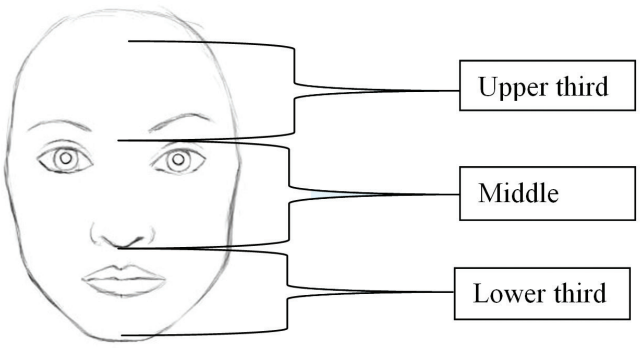
facial proportions and aesthetics in orthodontics, orthognathic surgery, and prosthetic dentistry.

MATERIALS AND METHOD

This is a cross-sectional descriptive study conducted in 200 subjects in department of Prosthodontics, Nobel Medical College and Teaching Hospital, Biratnagar over a duration of six months July to December 2016. The study included undergraduate dental students, dental surgeons and dental staff. The age of the subjects ranged from 18-30 years. This study was approved by institutional ethics committee. The inclusion criteria included: orthognathic profile, a full complement of teeth in both the arches and absence of craniofacial anomalies or other pathologies and no significant skeletal asymmetry. The exclusion criteria included: Subjects with trauma, any maxillofacial surgery; apparent loss of tooth structure due to attrition, fracture, caries, or restorations, and obvious problems that could disfigure or otherwise affect the face and dentition.

The study was well explained and the verbal consent was obtained from all the participants prior to the study. The anthropometric landmarks (trichion,glabella,subnasale, and gnathion) were identified on the subjects with careful inspection and then marked on the face with black liquid eye liner.

Subjects were asked to sit in an upright relaxed position with "natural and normal" erect posture of the head and shoulders, with both arms hanging free beside the trunk for the linear measurements of the face.



The following manual measurements were recorded using stainless steel digital caliper. Every measurement was obtained thrice by the same observer and average of three readings were taken (in mm units):

The following linear distances were measured, recorded and compared.

1. Upper third - forehead height (trichion to glabella)
2. Middle third - midface height (glabella to subnasale)
3. Lower third - lowerface height (subnasale -gnathion)

Data was collected and analysed in accordance with the current ethical guidelines about personal data and privacy. Facial proportions were compared between sexes by using "Independent t test". Values of $p < 0.05$ were considered as significant.

RESULT

The total number of participants were 200. Of them males were 66 (33%) and females were 134 (67%).

Table 1: Average values of upper facial height, middle facial height and lower facial height.

Variants	Maximum	Mean ± S.D.
UFH (mm)	85	62.12 ± 8.076
MFH (mm)	76	60.27 ± 4.867
LFH (mm)	74.0	59.463 ± 5.3451

Table 2: Average values of upper facial height, middle facial height and lower facial height among both sex.

Variants	Sex	N	Mean ± S.D.
UFH (mm)	Male	66	64.00 ± 8.705
	Female	134	61.20 ± 7.613
MFH (mm)	Male	66	60.77 ± 4.854
	Female	134	60.02 ± 4.872
LFH (mm)	Male	66	60.598 ± 5.5727
	Female	134	58.903 ± 5.1589

DISCUSSION

The human face shows wide differences depending on age, sex, race, and ethnicity. The differences can be in terms of harmony, symmetry, soft to bony tissue ratios and lower facial height ratios.[4] Even though a facial beauty is a relative concept with different meaning to different people, it also has a measurable ratio the golden ratio.[4] Lombardi was the first to propose the application of the golden proportion in dentistry, but he also stated, "It has proved too strong for dental use."[5] Snow stated that the concept of the golden percentage is a useful application in the diagnosis and development of symmetry, dominance, and the proportion for an esthetically pleasing smile.[6]

Vitruvius provided a list of proportions of the face and the body and stated that the distance from the hairline to the inferior aspect of the chin is one-tenth of a man's height.[7] He also stated that the Face:

- From the chin to just under the nostril is 1/3 of the face
- From just under the nostril to the eyebrows is 1/3 of the face
- From the eyebrows to the hairline is 1/3 of the face

These facial thirds are rarely equal. Lower facial height is further divided into upper one-third and lowers two-thirds. Facial features have been evaluated with anthropometric, photogrammetric and cephalometric measurements. In the available literature survey, the study on Caucasians face shows the lower third is greater than the middle and upper thirds, the upper third is more than the middle third.[8] In East Asians, the middle third is greater than the upper third and equal to the lower third and in Indian population lower third of face (55.37%) is greater than middle third (44.63%). [9-10]

Variations in the facial morphology arise through number of factors which include sex, race, dietary, climate, and environment where we live. Results of the studies conducted in certain ethnic groups or regions may not be applicable to the populations elsewhere. Therefore there is a need for systematic study for each ethnic groups or region.[11]

Different methods have been employed for facial measurements of which measurement by anthropometric procedure in simple, robust and non-invasive requiring minimal equipments.[11]

Studies have been conducted to assess the facial height measurements in different population groups including Caucasians, African and Asians.

In current study, upper facial height in men was greater than in female. The middle facial height was slightly higher in females than males. The lower facial height was significantly greater in males than female Baral et al in 2010, had done study to examine the differences in facial height proportions and facial growth patterns, belonging to the Brahmin, Chhetri, Rai and Limbu communities in the Sunsari district of Nepal and revealed that the upper facial height proportion increased and the lower facial height proportion decreased initially from 3–15 years of age, after which the upper facial height proportion decreased and the lower facial height proportion increased from 15–18 years of age.[12] The adult proportions were found to be similar to those observed in the 3–5 year age group with no significant difference of facial height proportions between the male and female subject.[12]

The study conducted by Jain et al in India shows that lower third of face is larger than middle face having respective values of 55.37% and 44.63%, which well correlates with the study of Powell and Humphries (1984) on North American population having values for lower and middle third of face 53% and 47% respectively.[10]

In study conducted by Sadaccharan et al, the forehead height is greater in women (54.23 mm) than men (51.95 mm).[13] Husein et al conducted a photographic study on facial height in Indian American women (54.2 mm) stated that midface height of Indian American women (58.1mm) showed lower value.[14]

In the available literature, in Caucasians, the middle third is often less than the upper third, and the middle and upper thirds are less than the lower third. In East Asians, the middle third of the face if often greater than the upper third and equal to the lower third, and the upper third is less than the lower third.[15]

The significant difference in facial proportions between men and women might be indications to increase or decrease face height during surgical procedures like Plastic surgery or Orthodontic or Prosthodontic treatment.

CONCLUSION

In context of our Nepali Population, the upper facial height was more than lower facial height and middle facial height measured least amongst three. These data can be utilised during clinical examination to avoid making inaccurate diagnostic and treatment plan decisions. This will be of great significance in evaluating facial proportions and aesthetics in orthodontics, orthognathic surgery, and prosthetic dentistry in context of Nepali population.

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