FACIAL, NASAL, MAXILLARY, MANDIBULAR, AND ORO-FACIAL HEIGHTS OF ADULT NIGERIANS

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SUMMARY
Objective: The present study determined the normal mean values of facial, nasal, maxillary, mandibular and oro-facial heights in adult Nigerians.
Methods: A total of 200 subjects consisting of 110 males and 90 females randomly selected from the student population of the University of Port Harcourt, Nigeria and whose ages ranged from 18 years to 42 years were recruited into the study. Each parameter was measured several times with a vernier sliding caliper until three consistent values were obtained.
Results: The results obtained indicate a sexual dimorphism, with a significantly higher value of all the parameters in males compared to females ($p<0.05$).
Conclusion: The mean values of these parameters for Nigerians reported in the present study will provide baseline data for anthropologists, functional orthodontics, cosmetic plastic surgeons, and the otolaryngologist in Nigeria.

INTRODUCTION

Beauty, ugliness and handsomeness are subjective attributes ascribed to the facial appearance of individuals. Though the determination of each is personal and subjective, it is obvious that the human face is the most beautiful and attractive of all the mammals. Many authors have proposed that the appreciation of beauty by the human mind leads to an attraction to proportions in harmony with the Golden Section that is 1.618 and its reciprocal 0.618. [1, 2]

Golden proportion has for long been variously used in the bio-medical fields, in geology and the arts. It is a part considered in relation to the whole. Parts of a thing are related to each other with respect to comparative magnitude, quantity or degree, such that if one varies then another varies in a manner dependent on the first. In this way, there is an agreeable or harmonious relation of parts within a whole [2].

Rabanus [2] successfully explained 'Golden Proportions' by stating that it results from the division of a straight line in such a way that the shorter part is to the longer part as the longer part is to the whole. Each ratio equals 0.618. $S/L = L/(S+L) = 0.618$.

Golden proportions are also found in facial and dental elements such as facial height, nasal height, maxillary height, mandibular height and oro-facial heights which comprise the bulk of this study on Nigerians. The facial proportions are related to each other in the manner stated above. Ideal facial proportions are universal regardless of race, sex and age, and are based on a numerical value of 1 to 1.618. The further away a face is from the ideal proportions and profile, the more likely

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that person will have certain medical problems [3]

Knowledge of facial proportion values are employed in facial aesthetics. If the facial height, for example, is increased relative to the upper two thirds, it may be possible to restore an esthetic proportion to the overall face by surgical alteration of the patient's alveolar height and or vertical dimensions [4].

Similarly, decreased facial height at the vertical dimension of occlusion can often be restored at an increased vertical to improve facial aesthetic [5].

Mohindra and Bulman[5] investigated the effect of increasing vertical dimensions of occlusion on facial aesthetics in 96 patients they had treated and concluded that the alternative of having the lower facial height increased should perhaps be considered in some cases before embarking on cosmetic surgery. A combination of increase in lower facial height in addition to cosmetic surgery may achieve a more dramatic and pleasant result.

Cakirer et al [6] studied the relationship between craniofacial morphology and obstructive sleep apnea (OSA) in Caucasians and African–Americans and concluded that for some persons head form may be an important factor in increasing susceptibility to OSA.

The emerging evidence from literature is that orthodontic appliances can change the shape of the mouth by manipulating the upper and lower jaw, and by so doing enhance beauty and eliminate such chronic health problems as sinus infections, headaches, ear aches, breathing disorders and jaw disorders [3].

In the light of the above, this study has been designed to establish the mean value of facial, nasal, maxillary, mandibular and oro-facial height in Nigerians in other to provide a data base for plastic surgeons, and orthodontists who will need them in plastic reconstructive and correction surgeries.

MATERIALS AND METHOD

The main material used for this study is the 15cm Vernier sliding calipers. The subjects included 200 (110 males and 90 females) randomly selected students of University of Port Harcourt, Nigeria. The population distribution according to sex and age group is shown in Table 1. All human subject consented to participate in this non-invasive study which was also approved by the ethics review committee of our college.

All the measurements were made with the subject at 'rest position' i.e. the subject is sitting upright with the head unsupported, relaxed and breathing quietly. Each parameter was measured by one person to eliminate inter-observer error. Each parameter was measured several times until at least three consistent readings were obtained.

Mandibular Height (a)

This was measured as the distance between the junction of upper and lower lips and the menton (Figure 1)
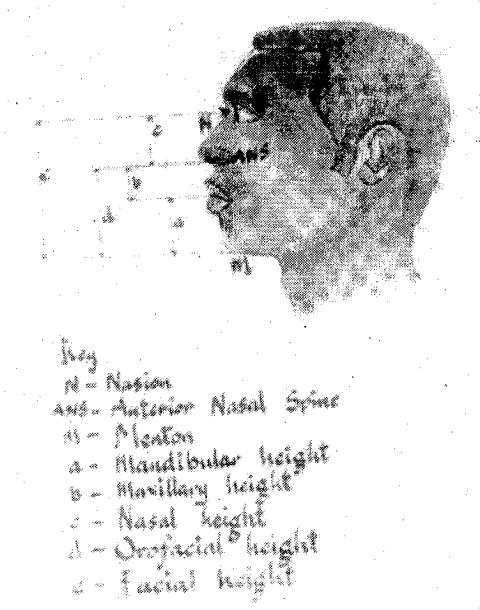

Figure 1: Measured Parameters and some landmarks

Maxillary Height (b)

With the aid of the Vernier caliper, this was measured as the distance between the anterior nasal spine (ANS) and the junction between upper and lower lips (Figure 1).

Nasal Height (c)

Using the caliper this was measured as the distance between the nasion of the nose and the anterior nasal spine (ANS) see Figure 1.

Oro-facial Weight (d)

This is the sum of the mandibular and maxillary height (Figure 1)

Facial height (e)

To measure facial height, the upper and fixed divider arm of the Vernier caliper is placed on the nasion of the nose superiorly and the lower movable arm of the caliper is placed on the lower limit of the chin (menton) inferiorly and the reading of the caliper is recorded (Figure 1).

The student T-Test was used to determine significant difference between male and female values. Results are as presented in tables and graphs.

RESULTS

The population distribution of subjects used in this study is shown in Table 1. More of the subjects studied were between the ages of 18 years to 29 years; this is as expected in a student population.

TABLE 1: AGE AND SEX DISTRIBUTION OF SUBJECTS

Age group (years)	Male subjects	Female subjects	Total
18-20	8	24	32
21-23	24	26	50
24-26	24	22	46
27-29	19	7	26
30-31	6	4	10
32-35	6	2	8
36-38	9	2	11
39-41	10	1	11
42 and above	4	2	6
Total	110	90	200

The dimensions of facial parameters obtained in this study for both male and female subjects are shown in Tables 2 and 3 respectively. For male subjects the facial height is 12.28±3.39cm, nasal height 4.50±1.23ccm, maxillary height 2.44±0.66cm, mandibular height 4.49±1.23cm and oro-facial height is 6.90±1.89cm. The figures obtained for female subjects are: facial height 11.77±3.53cm, nasal height 4.48±1.37cm, maxillary height 2.30±0.69cm, mandibular height 4.20±1.26cm and oro-facial height 6.32±1.91cm. The values obtained for males were found to be significantly higher than the corresponding female values ($p < 0.05$).
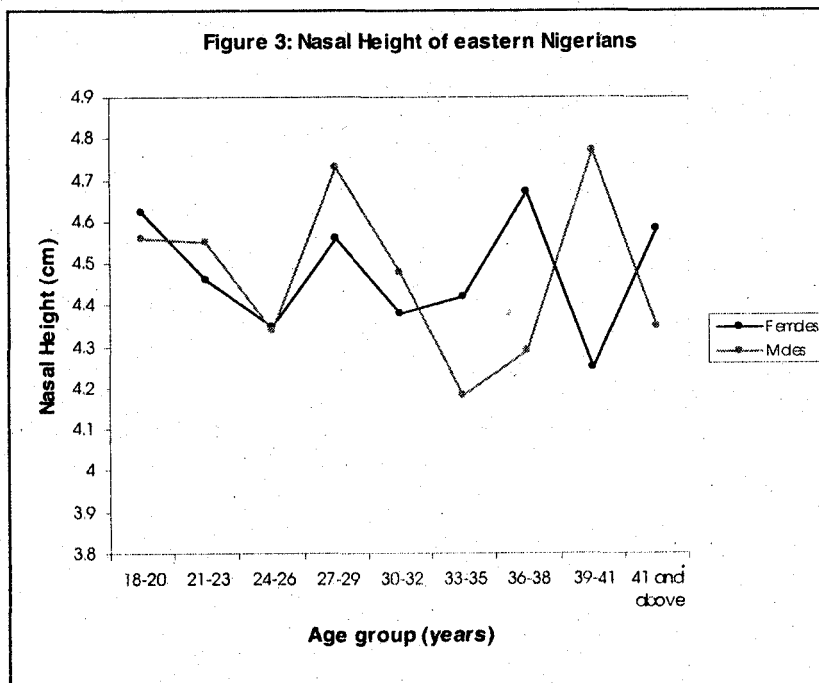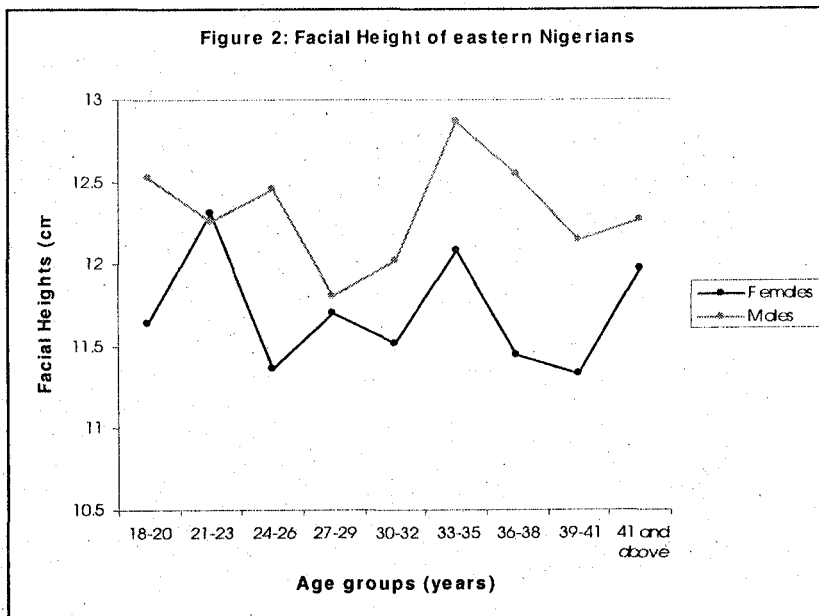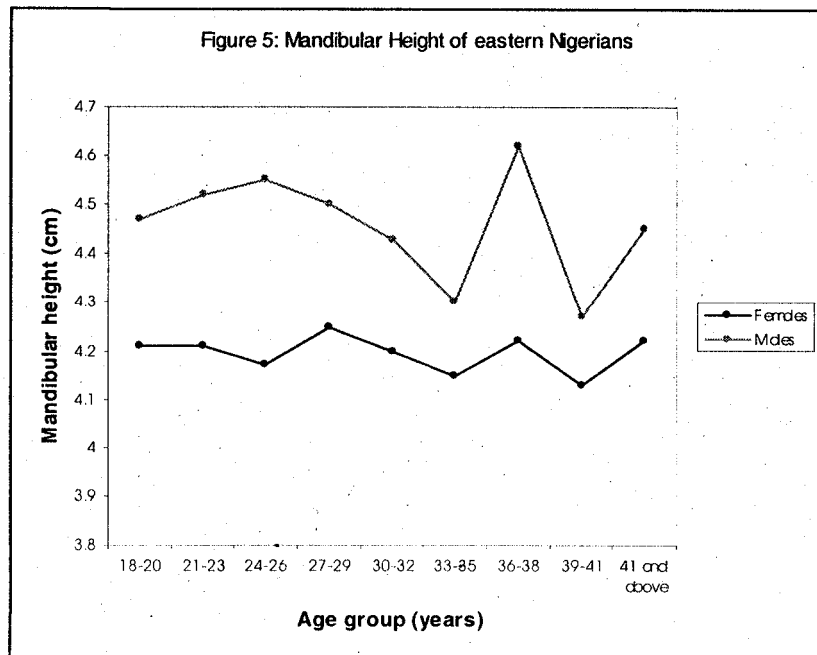
TABLE 2: MEAN FACIAL DIMENSIONS OF MALE SUBJECTS

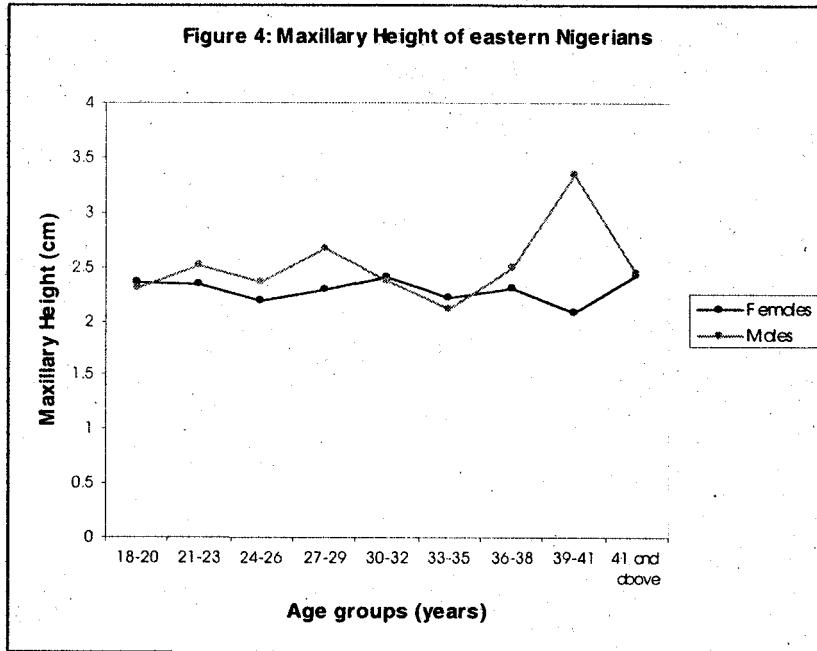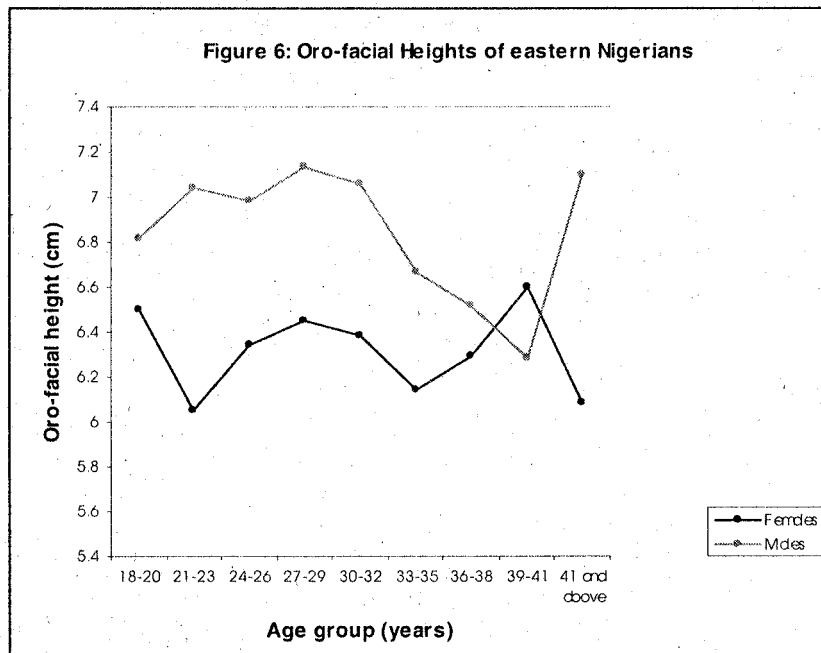| Age group (years)	Facial height (cm)	Nasal height (cm)	Maxillary height (cm)	Mandibular height (cm)	Oro-facial height (cm)
18-20	12.53	4.56	2.31	4.47	6.82
21-23	12.26	4.55	2.51	4.52	7.04
24-26	12.45	4.34	2.36	4.55	6.98
27-29	11.81	4.73	2.66	4.50	7.13
30-32	12.02	4.48	2.38	4.43	7.06
33-35	12.87	4.18	2.12	4.30	6.67
36-38	12.55	4.29	2.50	4.62	6.52
39-41	12.15	4.77	3.34	4.27	6.28
42 and above	12.27	4.35	2.45	4.45	7.10
GRAND MEAN	12.28±3.39	4.50±1.23	2.44±0.66	4.49±1.23	6.90±1.89

TABLE 3: MEAN FACIAL DIMENSIONS OF FEMALE SUBJECTS

Age group (years)	Facial height (cm)	Nasal height (cm)	Maxillary height (cm)	Mandibular height (cm)	Oro-facial height (cm)
18-20	11.64	4.62	2.36	4.21	6.5
21-23	12.31	4.46	2.33	4.21	6.05
24-26	11.36	4.35	2.19	4.17	6.34
27-29	11.70	4.56	2.28	4.25	6.45
30-32	11.52	4.38	2.40	4.20	6.38
33-35	12.08	4.42	2.21	4.15	6.14
36-38	11.45	4.67	2.31	4.22	6.29
39-41	11.33	4.25	2.08	4.13	6.60
41 and above	11.97	4.58	2.42	4.22	6.08
GRAND MEAN	11.77±3.53	4.48±1.37	2.30±0.69	4.20±1.26	6.32±1.91

When we plotted male values against female values according to age groups at 3 year intervals, the male values remained clearly higher than female values (see Figures 2–6).

Figure 2: Facial Height of eastern Nigerians

Figure 3: Nasal Height of eastern Nigerians

Figure 4: Maxillary Height of eastern Nigerians

Figure 5: Mandibular Height of eastern Nigerians

Figure 6: Oro-facial Heights of eastern Nigerians

DISCUSSION

This study was directed mainly towards investigating the normal mean values of facial proportions in Nigerians in a University setting where the ages ranged from 18 years to 42 year. The choice of the study population was deliberate since at that age range facial growth changes in the face are minimal. Significant changes occur more in the periods between 5-15 years [7].

The mean facial height for males was 12.28±3.39cm and for females 11.77±3.53cm.

The difference between male and female values proved significant (p<0.05).The value for Nigerian males females is within the accepted ideal value of facial height of 12-12.99cm and compares favourably with the value 12.20 for Icelanders [7].

The male mean nasal height of 4.50±1.23cm is slightly higher than the value of 4.48±1.37cm for Nigerian females. The difference in nasal height also proved significant (p<0.05). Similarly the maxillary, the mandibular and orofacial heights were found to be higher in males than females and the difference in each case was found to be significant (p<0.05).

The facial dimensions established here for Nigerians are important to the dentist who specializes in functional orthodontics, the plastic surgeon, anesthetist and the ear, nose and throat surgeon. They are important when facial aaesthetics is to be improved upon. Eighty percent of faces could be made to look 5 to 20 years younger by a functional orthodontic [5]. By manipulating the upper or lower jaw the functional orthodontic practitioner can enhance beauty and eliminate such chronic health problems as sinus infections, headaches, ear aches, breathing difficulties and jaw disorders [3]. Not only that, it has been established that an accurate evaluation of facial vertical dimension for completely edentulous patients is essential for the success of the prosthesis [5]. The prosthodontist in addition, needs the knowledge to determine the vertical dimension of occlusion (VDO) [5].

The result of the present study forms a baseline data for practitioners in the mentioned fields and they are important as anthropological determinants of the age and race of a people.

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