

## Anthropometric Measurements of Craniofacial Region in Medical Students of RUHS College of Medical Sciences

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### Abstract

**Introduction:** Background: Anthropometric parameters are important for studying different variations in the human population. The methods involving physical anthropology present high rate of accuracy for human identification and gender estimation.

**Aim:** The aim of the present study is to obtain Anthropometric measurements of craniofacial region in medical students and to observe difference between two genders.

**Materials & Method:** A cross sectional study was conducted among total number of 400 cases were studied which included 200 males and 200 females. These cases were undergraduate medical students, between the ages of 18-25 years. Variables studied through physical anthropometry in both the genders were facial height, nasion-to-menton distance, interzygomatic arch width, and intercanthal width using a digital vernier caliper.

**Result:** A significant and high correlation was found in our study, especially between Facial Height and Pronasale to menton distance ( $r = 0.627$ ,  $P < 0.01$ ). Pearson's correlation analysis revealed a significant and positive correlation between Nasal Length and Pronasale to mention ( $r=0.187$ ,  $P \text{ value} < 0.01$ ), facial height and Pronasale to menton distance ( $r = 0.627$ ,  $P < 0.01$ ), facial height and interzygomatic width ( $r = 0.396$ ,  $P < 0.01$ ), Pronasale to menton distance and interzygomatic width ( $r = 0.346$ ,  $P < 0.01$ ), and interzygomatic width and intercanthal width ( $r = 0.242$ ,  $P < 0.01$ ). This high correlation was especially found between facial height and Pronasale to menton distance and facial height and interzygomatic distance.

**Conclusion:** In this study, significant sexual differences were observed in craniofacial region. Knowledge of mean facial dimensions is important in the evaluation of age, sex and racial differences, in clinical applications and in forensic application too.

**Keywords:** Physical anthropometry, Facial height, nasal length, interzygomatic distance, intercanthal distance.

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## Introduction:

According to the WHO, the anthropometry is an inexpensive and non-invasive technique for assessing the size, proportion, and composition of the human body. The growth of the human is affected by many factors involving biological, geographical, gender, age factors[1].

Knowledge of mean facial dimensions is important in the evolution of age, sex and racial differences, in clinical applications and in forensic application. Thus, plastic surgeon and orthodontist should utilize this knowledge during facial reconstructive surgery and in recommending orthodontic appliances when facial aesthetics is to be improved upon. Marks on bones provide very important information as to how death occurred. With all evidence of skeleton trauma, it is imperative recognize and distinguish the ante mortem, per mortem (around the time of death) post-mortem (after death) details[2]. The Anthropometry is used for identification in natural, intentional and an accidental death of the person[3].

In this study significant sexual differences are observed in craniofacial region. The present study has shown the usefulness of measurements of (nasal Length, pronasal to menton, Facial Height, Interzygomatic distance, Intercanthal distance) amongst medical students of age group between 18-25 years studying in RUHS college of medical sciences, jaipur(Raj.). According to the WHO, the anthropometry is an inexpensive and non-invasive technique for assessing the size, proportion, and composition of the human body. In this study significant sexual differences are observed in craniofacial region. The present study has shown the usefulness of measurements

## Material & Method:

An institutional based cross-sectional study with some analytical components was conducted on undergraduate medical students at RUHS college of medical sciences, in association with Department of Anatomy, RUHS college of medical sciences, Jaipur, Rajasthan, India. A total number of 400 cases were studied which included 200 males and 200 females. These cases were undergraduate medical students, between the ages of 18-25 years. They had completed 18 years of life and were not completed 25 years of age. The above –mentioned age group was considered, because after puberty, the amount of craniofacial growth decrease steadily and almost ceases after the second decade of life. Considering the objective of the study the selection of male and female students was done according to the eligibility criteria. History of congenital craniofacial anomaly (Cleft palate and Cleft lip) Major craniofacial deformities were excluded in our study. Anthropometry measurement of face in all consenting Students of RUHS-CMS were taken. Variable parameters were determined in the study, Nasal length, Pronasal-to-menton, Facial height, Interzygometric Distance, Intercanthal Distance.

All the physical measurements were taken using a digital Vernier calliper after each individual was asked to maintain a neutral, relaxed facial expression without lifting the head and to breathe calmly through their nose. The subjects were asked to sit with their head straight in anatomical position. Ethical clearance was obtained from the research and Ethics and committee of the of the college of Health sciences, Rajasthan university of

Health science, as well as informed consent from each subject before inclusion.

### Results:

Anthropometry provides scientific methods and technique's for taking various measurements and making observation on the

living man and the skeleton. The craniofacial features/measurements (Nasal Length), (Facial Height), ( Pronasal to menton) , (Interzygomatic distance), (Intercanthal distance). A cross sectional study has been designed to identify correlation between different craniofacial parameters.

**Table 1: Craniofacial measurements of male and female**

Craniofacial measurements	Male	Female	P value
	Mean $\pm$ SD	Mean $\pm$ SD	
Nasal Length	47.83 $\pm$ 3.67	45.16 $\pm$ 4.77	0.000*
Pronasale to menton (mm)	78.29 $\pm$ 5.16	70.14 $\pm$ 4.76	0.000*
Facial Height (mm)	110.80 $\pm$ 6.28	102.36 $\pm$ 4.65	0.000*
Interzygomatic distance (mm)	120.67 $\pm$ 5.73	115.05 $\pm$ 5.15	0.000*
Intercanthal distance (mm)	29.78 $\pm$ 2.65	27.66 $\pm$ 2.57	0.000*

In the present study, we observed significantly increased ( $P < 0.001$ ) Nasal length with mean  $\pm$  SD of 47.83 $\pm$ 3.67 mm in males while

45.16 $\pm$ 4.77 mm in females. Similarly in all the craniofacial measurements male measurements were significantly increased as compared to females.



**Figure 1: Nasal Length**



**Figure 2: Nasal Length**



**Figure 3: Pronasal to menton**



**Figure 4: Pronasal to menton**



Figure 5: Facial height and Interzygomatic distance



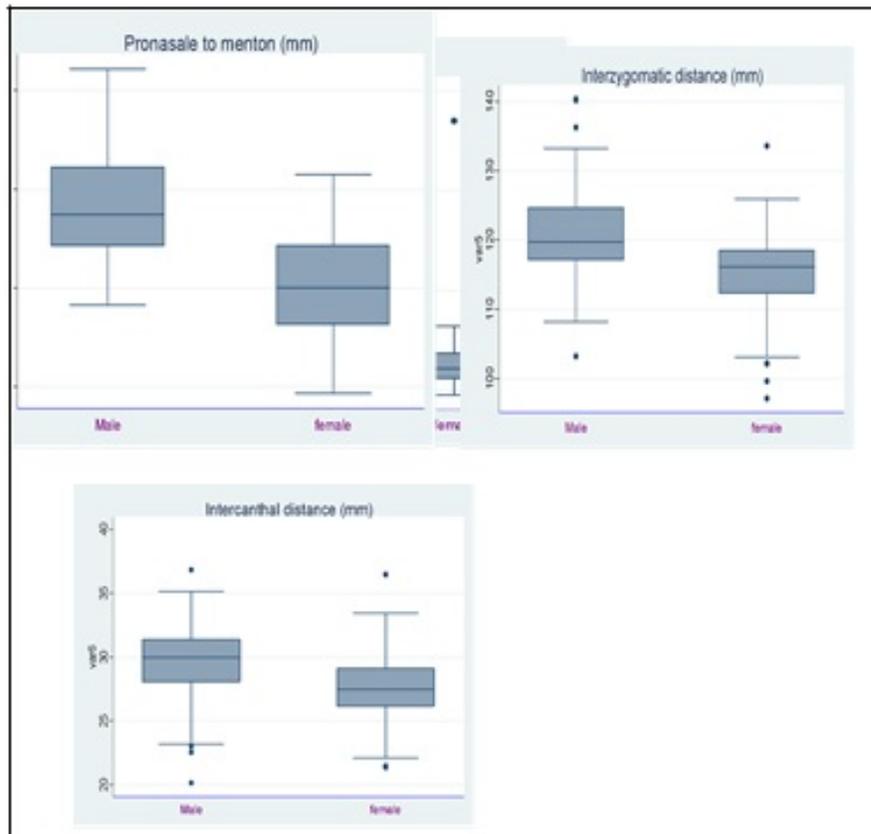
Figure 6: Facial height and Interzygomatic distance



Figure 7: Intercanthal distance



Figure 8: Intercanthal distance



## Correlation

**Table 2: Inter correlation between craniofacial measurements**

Inter correlation between craniofacial measurements					
Craniofacial measurements	Nasal Length (mm)	Pronasal to menton (mm)	Facial Height (mm)	Interzygomatic diastance (mm)	Intercanthal distance (mm)
Nasal Length (mm)	1				
Pronasale to menton (mm)	0.187**	1			
Facial Height (mm)	0.284**	.627**	1		
Interzygomatic distances(mm)	0.134**	0.346**	0.396**	1	
Intercanthal distance (mm)	0.157**	0.229**	0.209**	0.242**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Correlation coefficient was done between craniofacial features and is summarized in Table 2. Pearson's correlation analysis revealed a significant and positive correlation between Nasal Length and pronasale to mention ( $r=0.187$ ,  $P$  value $<0.01$ ), facial height and pronasale to-menton distance ( $r = 0.627$ ,  $P < 0.01$ ), facial height and interzygomatic width ( $r = 0.396$ ,  $P < 0.01$ ), pronasale-to-menton distance and interzygomatic width ( $r = 0.346$ ,  $P < 0.01$ ), and interzygomatic width and intercanthal width ( $r = 0.242$ ,  $P < 0.01$ ).

This high correlation was especially found between facial height and pronasale-to-menton distance and facial height and interzygomatic distance.

**Discussion:**

Anthropometric measurements differ in different races, sexes and ages. Gender difference was statistically significant for all craniofacial parameters; Nasal Length, Facial Height, Pronasale to menton, Inter zygomatic distance, Intercanthal distance, ( $p < 0.001$ ).

**Table 3: Comparison between similar previous studies and present studies**

Workers	Study Conducted on	Sample Description (n)	Age Group (Years)	Statistical software used
O Joy[4]	Nigerian Adults	300 Males and 300 Females	18-69 years	Not mentioned
B.O. Akinbami[5]	Nigeria Pre- pubertal and post-pubertal	200 males and 300 Females	12-16 pre. 17-25 post-pubertal	(SPSS) Version 16 Illinois, chicago
Present study	RUHS-CMS male and (Fe.)	200 males and 200 females	18-25	(SPSS) Version22

Similar finding were reported by B.O. Akinbami[5] et al.in age groups ranging 12-16 and 17-25 years and were categorized into pre pubertal post-pubertal, They observed that the upper facial height was  $62.96 \pm 3.92$  in prepubertal,  $61.66 \pm 3.37$  in post-pubertal

in males, and  $62.16 \pm 3.98$ ,  $61.26 \pm 4.94$ . in River state, Nigeria.

The gender of an individual can be identified accurately in 80% of cases using skull alone and 90% cases using pelvis and skull together[6]. (Ankita Singh, gadiputi sreedhar

<sup>6</sup>(2018). Mar Mar Wai et al.[1] (2014) described a Cross-sectional study was done on 200 college students aged between 18 and 21 years, using convenient sampling method. Large variation in anthropometric criteria between various racial and geographical groups can naturally be expected. Indians would belong to the subgroup of Caucasoid called Indo-Dravidian (Indo-European) Nowsheen Khan[7] et al. 2012

Sex determination is also supposed to be reliable when the remains are from long bones and up to 95% accuracy can be achieved[8].

### Conclusion:

In this study, significant sexual differences are observed in craniofacial region. In males the mean craniofacial parameters (Nasal length, Pronasale to menton, Facial height, interzygomatic and intercanthal distance) observed were highly significant. All craniofacial parameters Nasal length, Pronasale to menton, Facial height, Interzygomatic and Intercanthal distance are significant larger in males as compared to females. There exists a inter-correlation coefficient of craniofacial parameters (nasal length, Pronasale to menton, facial height, interzygomatic and intercanthal distance) in both genders. Intercorrelation coefficient measured craniofacial dimension were found to be statistically significant.

Knowledge of mean facial dimensions is important in the evaluation of age, sex and racial differences, in clinical applications and in forensic application.

**Ethical Consideration:** Ethical clearance was obtained from the research and Ethics committee of the of the college of Health sciences, Rajasthan university of Health science, as well as informed consent from each subject before inclusion.

**Declaration of patient consent:** A written informed consent was taken from

each study participants prior to inclusion in the study. All information collected was kept confidential.

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