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Original Research Paper

Anatomy

# SEXUAL DIMORPHISM AMONG MEDICAL STUDENTS OF NORTH INDIA ASSESSED BY CANTHAL INDEX

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| **Dr. Praveen Kumar Sharma** | Medical Officer, Department of Anatomy Dr.R.K.G.M.C. Hamirpur Himachal Pradesh. |
| **Dr. Vishal Kalia*** | Associate Professor, Department of Anatomy Dr.R.P.G.M.C Tanda Himachal Pradesh. *Corresponding Author |
| **Dr. Suman Yadav** | Professor And Principal Dr.R.K.G.M.C Hamirpur Himachal Pradesh. |
| **Dr. Rohit Kumar Sharma** | Senior Resident, Department of Anatomy Dr.R.P.G.M.C. Tanda Himachal Pradesh. |

**ABSTRACT**

**INTRODUCTION:** The human body dimensions are affected by ecological, geographical, racial, gender and age factors[2]. Craniofacial anthropometry has become an important tool used in genetic counseling, reconstructive surgery and forensic medicine[9].

**AIMS AND OBJECTIVE:** medical students of North India and find out gender differences in the mean Innner Canthal Distance, mean Outer Canthal Distance and Canthal Index

**MATERIAL AND METHODS:** The study was carried on 100 MBBS course students of Dr. RPGMC, Kangra at Tanda were involved and the students were of the age group 18-22 years using digital spreading Vernier caliper graduated in mm

**RESULTS:** The mean Intercnathal distance in males was3.44±0.33mm and in females was3.21±0.32mm, the mean Outer Canthal distance in males was9.53±0.45mm and in females was9.09±0.44 mm and mean Canthal index in males was 36.05±2.69mm and females was35.35±3.09mm.

**CONCLUSIONS:** The conclusion of this study came out to be that craniofacial anthropometric parameters are sexually dimorphic. These results could be of importance in age, sex and racial differentiation as well as for clinical and forensic purpose.

**KEYWORDS :** Sexual dimorphism, Craniofacial, Anthropometric parameters, Canthal Index

## INTRODUCTION

Anthropometry is a branch of anthropology concerned with measurements of the human body. The evaluation and measurement of the human body dimensions are achieved by physical anthropometry[1]. The human body dimensions are affected by ecological, geographical, racial, gender and age factors[2]. Craniofacial anthropometry has become an important tool used in genetic counseling, reconstructive surgery and forensic medicine[3,4,5,6,7]. Orbital measurements are important in evaluation of several systemic syndrome, craniofacial abnormalities and also surgical treatment of posttraumatic telecanthus[8]. Among these measurements normal IPD, ICD and OCD are the vital features to be known.

## AIMS AND OBJECTIVES

To assess the mean Inner Canthal Distance ,mean Outer Canthal Distance and Canthal Index of Male and female medical students of North India and find out gender differences of these parameters and thus to contribute the present finding to the available literature

## MATERIAL AND METHODS

This was observational descriptive study in the department of Anatomy Dr.RPGMC Kangra at Tanda (Himachal Pradesh). The measurements were taken at a fixed time between 9 am and 4:30 pm to eliminate the discrepancies due to diurnal variation[75]. The study was carried on 100 MBBS course students of Dr. RPGMC, Kangra at Tanda were involved and the students were of the age group 18-22 years

**INCLUSION CRITERIA:** North Indian MBBS course students of Dr. RPGMC Kangra at Tanda.

**EXCLUSION CRITERIA:** Students who refuse to part of study, Operated cases of head diseases and anomalies ( craniofacial surgeries),All the forms of syndromic disorders, Subjects with craniofacial abnormalities such as ; microcephaly, macrocephaly , telecanthus, epicanthus and hypertelorism etc.

### Anthropometric examination

All the Anthropometric measurements were determined by having the subject look straight in an anatomical position at the examiner, while a round end digital spreading Vernier caliper graduated in mm was used for the measurements, while examiner closing his right eye noted the distance

**The inner canthal distance (ICD)** was measured as the medial angle of the left eye to the medial angle of the right eye between the two inner canthi(ICD).

**The outer canthal distance (OCD)** was measured as the distance from the lateral angle of the left eye to the lateral angle of the right eye instructing the subject to look upward to maximize the contrast between the sclera and the skin.

**Canthal Index (CI)** - Inner Canthal distance (ICD) / Outer Canthal distance (OCD) x 100

## STATISTICAL ANALYSIS

Means and standard deviations were computed for all anthropometric Measurements. The student unpaired t test or Mann Whitney test were applied for parametric and non-parametric data depending upon the nature of data obtained to assess the extent of gender differences.

## RESULTS

### Demographic Data

| Table.1 | | | |
|---|---|---|---|
| **Demographic profile** | | | |
| **Parameters** | **Male** | **Female** | **Total** |
| Sex of medical student | 50(50%) | 50(50%) | 100 |
| **Age** | | | |
| Mean age (years) | 18.84 | 18.80 | 18.82 |
| **Back ground** | | | |
| Urban background | 28(61%) | 18(39%) | 46(100%) |

| | | | |
|---|---|---|---|
| Rural background | 22(41%) | 32(59%) | 54(100%) |
| **Place of living** | | | |
| Hilly Area residents | 21(37%) | 36(63%) | 57(100%) |
| Plains area residents | 29(67%) | 14(33%) | 43(100%) |

### Craniofacial Anthropometry

**Table .2**

**Inner Canthal Distance(ICD) and Outer Canthal Distance (OCD)**

| Parameters | Male | Female | Total | P value |
|---|---|---|---|---|
| **Inner Canthal Distance(ICD)** | | | | |
| Mean ICD (cm) | 3.440.33 | 3.210.32 | 3.320.32 | 0.000 |
| Minimum ICD(cm) | 2.88 | 2.54 | 2.54 | |
| Maximum ICD(cm) | 4.22 | 3.96 | 4.22 | |
| **Outer Canthal Distance(OCD)** | | | | |
| Mean OCD (cm) | 9.530.45 | 9.090.44 | 9.310.44 | 0.004 |
| Minimum OCD(cm) | 8.35 | 8.15 | 8.15 | |
| Maximum OCD(cm) | 10.5 | 9.98 | 10.5 | |

**Table.3**

**Canthal Index(C.I.)**

| Parameters | Male | Female | Total | P value |
|---|---|---|---|---|
| Mean Canthal Index (C.I.) | 36.052.69 | 35.353.09 | 35.72.89 | 0.00 |
| Minimum Canthal Index | 30.05 | 29.28 | 29.28 | |
| Maximum Canthal Index | 41.32 | 41.15 | 41.32 | |

## DISCUSSION

The present study investigated mean values of Craniofacial Anthropometric Parameters of North Indian medical students of Dr. RPGMC Tanda (Kangra). The presence of sexual dimorphism in this study agreed with other studies and also showed significant difference in the craniofacial parameters of North Indian male and female medical students of Dr. RPGMC Tanda (Kangra) at a significant level of p value < 0.005. In our study we chose subjects age range between 18-22 years because measurements become stable in the mid to late twenties[5,10,11.]

The reason behind the existence of sexual dimorphism seen in male and female is due to the predominant role played by X/Y linked genes which codes for sexually dimorphic traits such as body size and organ development[12] and another influence on the distinguishing feature can be as a result of the male sex hormone, testosterone which causes an increase in the dimension and mass of muscles and bones[13.] The retrieved data of this study will be of immense role in Forensic science and Anthropology in future

Because a single normative data in all measured parameters cannot be use full for all the ethnic groups and this is due to the stastical significant difference observed

from this study. Discriminant function analysis of Wilks' Lambda test was used for predictability into group membership of male and female craniofacial parameters. It revealed that all the predictors add certain predictive power to the discriminate functions showed significant difference at P<0.001, which confirms accurateness and predictability of the statistical significant difference of male and female measured variables. The strength of our study over other similar study was that this kind of study has not been done before in this region of Indian population. The result of this study has helped to establish the mean values for Craniofacial Anthropometric Parameters for medical students of North India and the results showed that craniofacial anthropometric parameters are sexually dimorphic. The parameters measured, which varied with age, could be influenced by nutrition, growth pattern, climate and genetic factors.

**Table.4**

**Inner Canthal distance (c.m.) (Mean±SD) Comparison**

| Authors | Population | Male | Female |
|---|---|---|---|
| Quant and Woo[4](1992) | Chinese | 3.33 | 3.40 |
| Everekliogl et al[2](2001) | Turkish | 2.830.20 | 2.810.19 |
| Present study | North Indian | 3.440.33 | 3.210.32 |
| **Outer Canthal distance (c.m.) (MeanSD) Comparison** | | | |
| Everekliglou et al.[2](2001) | Turkish | 8.700.43 | 8.530.37 |
| Gupta VP et al[14](2003) | Delhi(Indian) | 7.1-10.5 | 7.6-10.5 |
| Erika Nagles et al.[3](2005) | Latvian | 10.630.58 | 10.060.6 |
| Present study | North Indian | 9.530.45 | 9.090.44 |
| **Cranial Index Comparison** | | | |
| Cem et al[15].(2001) | Turkish | 34.67 | 34.66 |
| Oladipo et al[16].(2008) | Ijaw | 37.04 | 33.11 |
| | Igbo | 35.14 | 32.59 |
| Present study | North Indian | 36.052.69 | 35.353.09 |

The comparison of Craniofacial Parameters of this study with other studies which have been done in various countries having different population been shown in table.4

## CONCLUSION

The result of this study has helped to establish the mean values for craniofacial anthropometric parameters of medical students of North India and the results showed that craniofacial anthropometric parameters are sexually dimorphic. These results could be of importance in age, sex and racial differentiation as well as for clinical and forensic purpose.

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