An Anthropometric Comparison Of Inner Canthal Distance, Outer Canthal Distance And Palpebral Fissure Length In Udaipur Zone

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ABSTRACT
Background: This study was conducted to quantify the normal indices of anthropometric measures related to ophthalmology including inner canthal distance (ICD), outer canthal distance (OCD), and palpebral fissure length in normal healthy Udaipur region population.
M**ethods:** Aobservational cross-sectional, comparative study. The study was performed at
Geetanjali medical college and hospital, including 700 healthy Participants (350 males and 350 females) age 18 to 30 years. Measurement of ICD, OCD, and palpebral fissure length were obtained using electronic digital vernier caliper. Statistical analysis was conducted with SPSS version 17.0.
Result: The results demonstrate orbital dimensions in males and females in Udaipur region. The average values of ICD was 30.04 ± 7.71mm in males and 29.34 ± 4.49mm for females, while OCD was 93.40 ± 7.80 mm for males and 90.83 ± 7.61 mm for females. Palpebral fissure length measured 32.00 ± 4.40 mm for males and 30.94 ± 3.30mm for females. While comparing ICD, OCD and PFL among males and females, results indicating that the difference is statistically significant with (P<0.001).
Conclusion: This work has traced out the normal values of ICD, OCD and palpebral fissure length in both genders in Udaipur region population. Which enhance surgical planning and aesthetic assessments in ophthalmologists and also in orbitofacial surgeries.

Keywords: Anthropometric, inner canthal distance (ICD), outer canthal distance (OCD), and palpebral fissure length.

INTRODUCTION: Anthropometry, measuring the human body scientifically, has been a cornerstone in understanding variations in physical features across different populations. Facial morphology, a vital aspect of anthropometry, serves as a window into the genetic, environmental, and evolutionary factors that shape human diversity. The measurements and proportions of facial structures have significant applications in fields like forensic science, clinical diagnostics, orthodontics, and plastic surgery. They also offer information about population-specific characteristics, aiding in anthropological and biological studies (1). Moreover, region-specific anthropometric studies are crucial for clinical and forensic applications. This study aims to analyze facial morphology in the Udaipur zone, establishing a foundation for future research and practical applications in this region. A defining characteristic of every individual is the face, which present as a gateway to identity and emotion. Outspreading from the hairline to the chin, the face encompasses features such as the mouth, mandible, nose, eyes, and forehead, each contributing to its unique expression and character (1).
Faces serve as repositories of social cues, conveying complex information that shapes interpersonal dynamics and guides social interactions. Empirical evidence suggests that both morphological characteristics and socially perceptible cues embedded in facial anatomy are indicative of personality dimensions and behavioural tendencies (2).
No two faces are identical, as each one is distinct and irreplaceable. In the ancient discipline of facial morphology, it is believed that the face reflects the inner state of the individual, and deviations in the face can echo changes within the body (3).
The anthropometric measurements presented may be of help to surgeons, to confirm the estimations performed intraoperatively, postoperatively and to objectify the risk of postoperative distortion (4).In addition, orbital parametric values guide the manufacture of spectacle frames and lenses (5).
Among these measurements normal ICD, OCD and palpebral fissure length are the vital features to be known. In order to have accurate assessment of telecanthus, hyper or hypotelorism we need to know standard values of ICD, OCD and palpebral fissure length.

Variations exist in these parameters as a result of difference in craniofacial growth due to racial, ethnic diversity, gender and age (6).
By definition ICD is described as the distance between the medial canthi of both eyes. The OCD is the distance between the lateral canthi of the palpebral fissures bilaterally. The palpebral fissure length is the distance between the inner canthus and outer canthus.
The present study is a comparative study and investigated the anthropometrics measurements of orbit in males and females. The purpose of the study is to provide normative data that could be used for clinical assessment, craniofacial surgery and anthropologic evaluation for the index population.
To diagnose patients with hypertelorism, hypotelorism or telecanthus we require standard baseline values of above mentioned parameters in Udaipur population. Previously, these conditions were assessed on the basis of clinical evaluation without any standard measurements, which creates a significant source of error in establishing a final diagnosis. We decided to design a study which can help us while working in our orbit oculoplastic clinic, to discrete abnormal patients from normal population.

The **aim** of this anthropometric study to generate baseline data on orbital dimensions in Udaipur zone.

The **Objectives** of the study were:
1. To identify and compare the facial dimensions in males and females.
2. To determine the normal average horizontal proportion of the orbit.

MATERIALS AND METHOD:
Source of Data:
After obtaining the ethical clearance from Human Research Ethics Committee of Geetanjali Medical College and Hospital Udaipur, Rajasthan the present study was done on 700 students from Geetanjali University Udaipur, in which 350 were male and the remaining 350 were female, and they all came from Udaipur, Rajasthan.

Ethical clearance: The ethical clearance has been obtained from the Human Research Ethics Committee of GMCH, Udaipur prior to the study.
Ref: GU/HREC/EC/2021/1850

Duration of Study: Thirty- six months (May 2021 to May 2024).

Study Design: Observational cross-sectional, comparative study.

Inclusion Criteria:
1. Both men and females should be between the ages of 18 and 30. This age range was selected since growth is steady during this time.
2. Capable of reading, understanding, and responding in both Hindi and English.
3. Originating in the Udaipur area.

Exclusion Criteria:
1. Being born with a congenital craniofacial abnormality
2. Background of prior facial cosmetic or reconstructive surgery
3. A history of severe headache and orofacial injuries
4. Clearly visible facial deformity
5. Delay in mental development
6. People with mixed racial backgrounds

Tools requires for the study
- Digital Vernier caliper
- Pencil
- SPSS software version 17.0

Figure 1: Digital Vernier Calliper

Figure 2: Measurement of ICD among males and female.

Figure 3: Measurement of OCD among males and female length.

Figure 4: Measurement of palpebral, fissure among males and female.

After measuring the parameters, the data was transferred to the excel sheet and the analysis of data was done using SPSS version 17.0 (licensed).

RESULTS:

The average value for the male inner canthal width was recorded as 30.04 ± 7.71mm, while for the female inner canthal width, it was 29.34 ± 4.49mm. The statistical analysis shows a significant value with P<0.001.

Table 1 Comparison of ICD among males and females.

	Inner canthal Distance			
	n	**Mean value (mm)**	**Standard deviation**	**'P'- value**
Male	350	30.04	7.71	0.000*** P<0.001
Female	350	29.34	4.49	

***p*< 0.05, **p*< 0.01, ***p*<0. 001

Table 1 showed the average value for the male ICD was recorded as 30.04 ± 7.71mm, while for the female ICD, it was 29.34 ± 4.49mm. The statistical analysis shows a significant value with P<0.001.

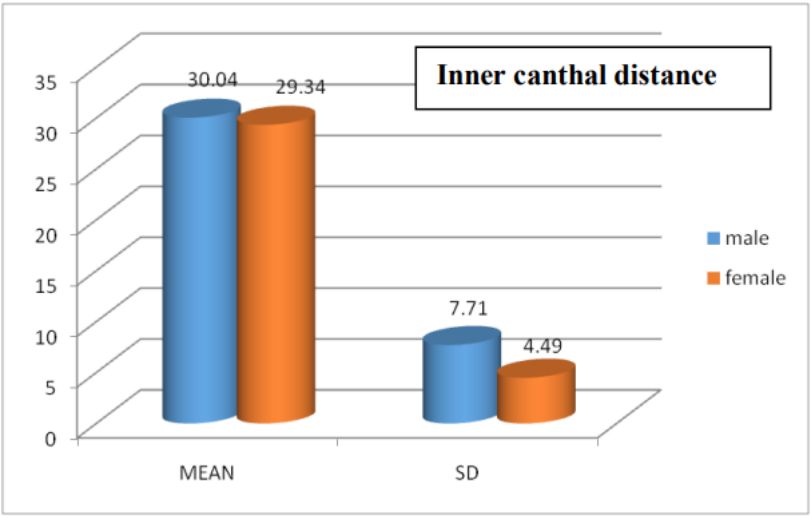

Figure 5: Comparison of ICD among males and females.

Table 2 Comparison of OCD among males and females.

	Outer canthal distance			
	n	**Mean value (mm)**	**Standard deviation**	**'P'- value**
Male	350	93.40	7.80	0.0000119 P<0.001***
Female	350	90.83	7.61	

***p*< 0.05, **p*< 0.01, ***p*<0. 001

Table2 showed the average OCD for males was recorded as 93.40 ± 7.80 mm, while for females, it was 90.83 ± 7.61 mm. The average OCD for males is greater than that for females. The p-value is smaller than the typical significance level, indicating that the difference is statistically significant with P<0.001.

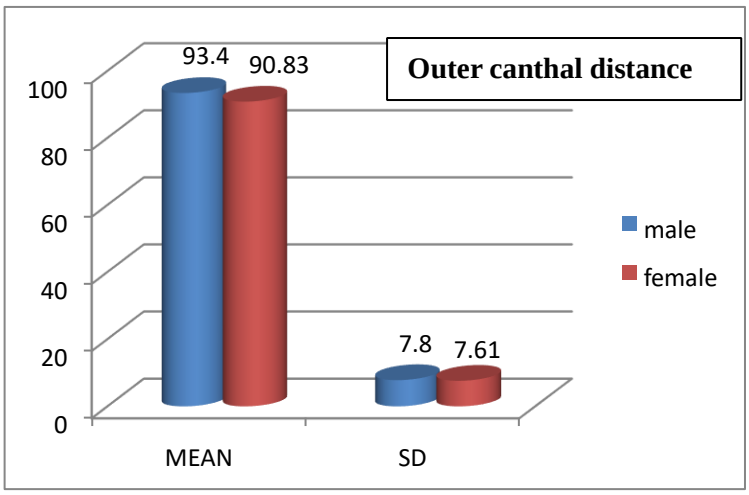

Figure 6: Comparison of OCD among males and females.

Table 3 Comparison of palpebral fissure length among males and females.

	palpebral fissure length			
	n	**Mean value (mm)**	**Standard deviation**	**'P'- value**
Male	350	32.00	4.40	0.000 P<0.001
Female	350	30.94	3.30	

***p*< 0**.05, **p< 0.01, ***p<0. 001**

Table3 presented the average value for the male eye fissure length was recorded as 32.00 ± 4.40, while for the female eye fissure length, it was 30.94 ± 3.30. The average value of male eye fissure length is greater than female. The p value is smaller than the typical significance level so the p value is significant with P<0.001.

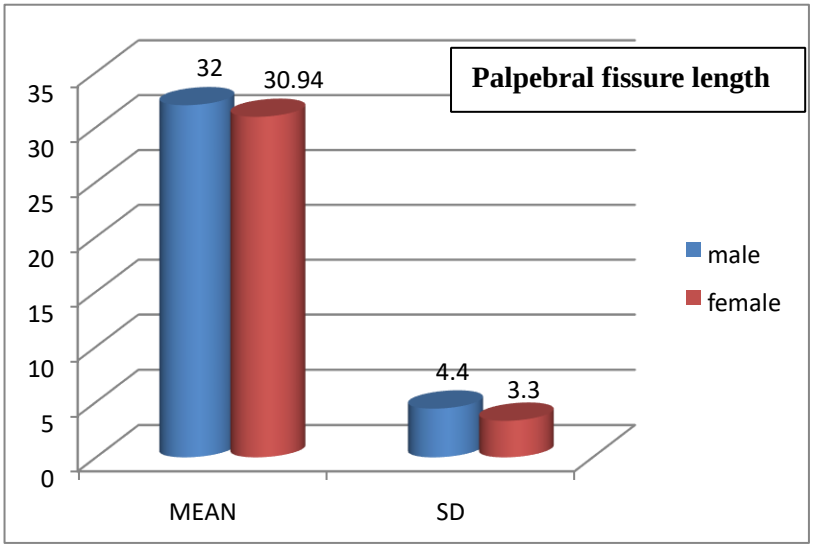

Figure 7: Comparison of palpebral fissure length among males and females.

DISCUSSION:

Our study was carried out among 700Participants (350 males and 350 females) having age between 18 to 30 years. The aim of this study was to provide baseline values for the ICD, OCD and palpebral fissure length for various clinical assessment and craniofacial surgeries. This study provides normative data, comparative statistics and tries to give information regarding the values of ICD, OCD and palpebral fissure length.

In our study, the mean values of ICD in male were 30.04 ± 7.71mm and in female were 29.34 ± 4.49mm. In research conducted by Oladipo *et al* in 2011 the mean inner canthal distances were reported as 3.52 cm (35.2 mm) for males and 3.36 cm (33.6 mm) for females among the studied population. These values indicate a slightly higher ICW in males compared to females, reflecting a common trend observed in many anthropometric studies (7). Similarly, Benwoke and co-workers (2023) reported mean ICW values of 36.64mm ± 1.81 for males and 34.78mm ± 3.25 for females (8). According to Farkas LG the inner-intercanthal distance in males 32.9±2.7 mm is higher than females 32.5±2.4 mm (9).

In present study, the mean values of OCD in male was 93.40 ± 7.80 mm and in female was 90.83 ± 7.61 mm. According toFarkas LG, the mean the outer-intercanthal distance in males 89.07±3.8 mm is higher than females 87.6±4.0 (9). In a study conducted by Mohammad Bayat *et al,* the mean value of OCD in male was 92.59 ± 4.8 mm and in female was 80.29 ± 6.47 (10). In similarly Ngeow WC reported that the mean values of OCD in male was 92.3±4.1mm and in female was 89.6±3.2 mm (11).

the mean eye fissure length was found to be 32.00±4.40 mm in males and 30.94±3.30mm in females. These measurements indicate a consistent gender difference, with males exhibiting larger values than females. In comparison, Vasanthakumar *et al* reported PFL values for South Indian ethnic adults as 31.08±1.79 mm in males and 29.90±2.18 mm in females (12). Similarly, in a study on Malaysian South Indian ethnic adults,

Packiriswamy*et al* (2012) observed mean PFL values of 30.91±1.819 mm in males and 29.62±2.221 mm in females (13).
The variations in the baseline values among the studies are due to racial variation in anthropometry.

CONCLUSION:
This work has traced out the normal values of ICD,OCD and palpebral fissure length in both genders in Udaipur region population. This can help ophthalmologists and other specialty doctors understanding the features of normal population and lead them towards early diagnosis of hyper/ hypotelorism, telecanthus, beneficial in orbital surgeries and management of orbital and facial deformities. This manuscript can be valuable in forensic medicine and crime detection as it explains the features possessed by a large number of people. Geneticists may take advantage in describing anomalies, human migration and evolution.

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AUTHORS CONTRIBUTION:
Ravina Sharma Literature search, anthologized articles according to inclusion & exclusion criteria, writing manuscript

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Concept, Supervision

Saniya K
Literature search, Analysis & Supervision

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