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RESEARCH ARTICLE

# Assessment of Intercanthal Distance for Sex Determination Among South Indian Children Aged 6–12 Years

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Abstract: ***Introduction*** - Measurement of intercanthal distance is done between medial or lateral canthi of palpebral fissure bilaterally. Intercanthal distance helps in the evaluation of congenital deformities and posttraumatic telecanthus. It differs between male and female, usually the distance is greater in males as compared to females. The normal in-tercanthal distance is approximately equal to half of the interpupillary width or equal to the width of the palpebral aperture. The average intercanthal distance in males is 29 to 36 mm and in females is 29 to 34 mm. ***Aim*** - The aim of the study is to determine the sex by measuring the intercanthal distance between male and fe-male using vernier calliper. ***Materials and methods*** - The study was involved with 60 subjects - 30 males and 30 females. Intercanthal dis-tance was measured using a digital vernier caliper. Each measurement was carried out twice to reduce bias and to validate the findings. ***Result***- In this study, the intercanthal distance between the male is greater than the female. Minimum intercanthal distance between male is 3.0 and maximum is 3.6 whereas in females the minimum intercanthal distance is 2.4 and maximum is 3.0. ***Conclusion***- This study concludes that the intercanthal distance between the male is greater than that of the female.

Keywords: Females, Intercanthal distance, Males, Sex determination.

## INTRODUCTION

Distance between the two medial canthi of the eyes is defined as intercanthal distance, while measurement be-tween the lateral canthi of the eyes is the other intercanthal distance and the distance between the centers of the pupil is the interpupillary distance [1]. Normal intercanthal distance is approximately equal to palpebral fissure or half of the interpupillary width. In the diagnosis of neural crest migration anomalies such as Waardenburg syn-drome, the standard values of inner intercanthal, outer-intercanthal, and interpupillary distances are very useful. Intercanthal distance usually ranges from 30-35mm whereas interpupillary distance usually ranges from 60-62mm [2].

Traumatic injury to the nasal orbital ethmoid results in traumatic telecanthus. Excess of normative values are re-quired for diagnosis of traumatic telecanthus. Telecanthus is associated with congenital disorders such as down syndrome, turner syndrome, waardenburg syndrome, cri du chat syndrome, klinefelter syndrome, fetal alcohol syndrome [3].

Intercanthal distance, interpupillary distance, outer canthal distance are important in craniofacial anthropometry. Craniofacial anthropometry is used for accurate and systematic measurements of the human skull. For practical purposes, intercanthal distance is considered to be equal to the width of one eye [4]. Abnormal increase in the dis-tance between the medial canthus is referred as telecanthus and increase in interpupillary distance or bony interor-bital distance is referred as orbital hypertelorism [5].

Anthropometric technique is used for the evaluation of several systemic syndromes, craniofacial abnormalities and in surgical treatments of post traumatic telecanthus. In most people the intercanthal distance is equal to the width of each eye [6]. The normal intercanthal distance is approximately 29 to 34 mm in women and 29 to 36 mm in men. In males, the intercanthal distance is greater as compared to females. Measurement of intercanthal dis-tance is important for evaluation of posttraumatic telecanthus and in congenital deformities [7].

By abnormal length or abnormal insertion of medial canthal tendon production of telecanthus is seen. Telecanthus can appear one or in combination with blepharophimosis [8]. The term canthus represents facial trauma, orbitofa-cial deformity and other congenital deformities. The formula used to calculate canthal index is Intercanthal dis-tance/ Outer Canthal distance × 100. The aim of the study is to study the intercanthal distance between male and female.

## MATERIALS AND METHODS

A total number of sixty subjects were selected for the present study in saveetha dental college, where 30 male and 30 female. The subjects were within the age range of 19-21 years with normal craniofacial configuration. Cranio-facial abnormalities were excluded from this present study. For accurate measurements, intercanthal distance of the subjects were measured using digital vernier calipers. Each measurement was carried out twice to reduce bias and to validate

the findings. The digital vernier caliper was positioned between the patient's nasal bridge and used to measure the inner inner-canthal distance while the subject was looking directly at the examiner. By using SPSS, statistical analysis was done.

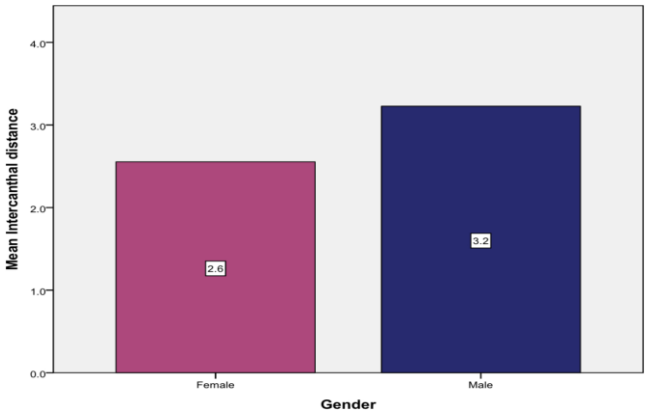
# RESULTS

In this study 60 subjects were taken, 30 male and 30 female. Intercanthal distances were measured using digital vernier calipers. The measurements were carried twice to reduce bias and to validate the findings. By using SPSS, statistical analysis was done. The mean intercanthal value of male and female of the present study is shown below in table 1. As for the relationship between gender and the mean intercanthal distance, it was observed that males have higher intercanthal distance when compared to females. This is shown in graph 1. Figure 1 shows the process of measurement of the intercanthal distance using a digital vernier caliper.

| Intercanthal distance | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Male | 30 | 3.0 | 3.6 | 2.890 | 0.3973 |
| Female | 30 | 2.4 | 3.0 | 2.378 | 0.3367 |

**Table 1** It shows the mean intercanthal value of male and female of the present study

The table shows a minimum value of 3.0 for male and minimum value of 2.4 for females. Similarly, a maximum value of 3.6 for male and 3.0 for females. The mean value of intercanthal distance for male is 2.890 and for females is 2.378. The value of std. Deviation for male is 0.3973 and for female is 0.3367.




**Graph 1** The above graph shows the relationship between gender and the mean intercanthal distance.

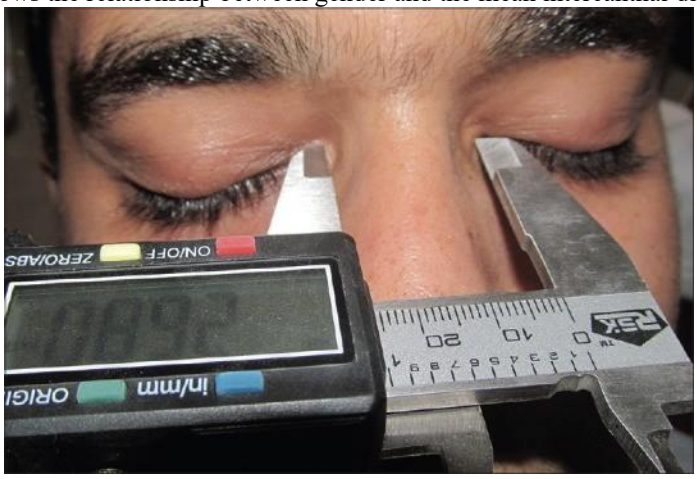



**Figure 1** Measurement of the intercanthal distance using a digital vernier caliper

# DISCUSSION

The distance between the centers of the pupil is the interpupillary distance. Intercanthal distance, interpupillary distance, outer canthal distance are important in craniofacial anthropometry. Normal intercanthal distance is approximately equal to palpebral fissure or half of the interpupillary width. In this present study, the intercanthal distance between male is found to be comparatively more than female.

Similarly, in the previous study conducted it is reported that the intercanthal distance between the male is slightly greater than female [9]. In a previous study conducted on intercanthal distance with respect to age and ethnicity it is reported that the mean intercanthal distance for male is 3.08 and for females is 2.89 [10]. Intercanthal distance usually ranges from 30-35mm whereas interpupillary distance usually ranges from 60-62mm. Intercanthal distance, inter-pupillary distance, outer canthal distance are important in craniofacial anthropometry.

In a previous study conducted on white subjects and a mixed European population, the intercanthal distance has been reported from 25.5 to 30.5 mm in females and 32 to 35 mm in male [11]. In the present study, the mean and std. Deviation value of intercanthal distance in male is 2.890 ± 0.3973 and in females is 2.378 ± 0.3367. In a study conducted previously, it shows the mean and std. Deviation value of intercanthal distance in male is 31.2 ± 3.2 and in females is 30.6 ± 2.5 [12].

In a study conducted in a black population by Walter, it was observed that for the overall group the mean intercanthal distance was 33.9 ± 3.0 mm. The difference between men (35.7 ±3.7mm) and women (33.1 ±2.3 mm) was statistically significant ($p < 0.0001$, unpaired t test) [13]. In a mixed European population it was found that the intercanthal distance to average 33 to 34 mm in the male and 32 to 33 mm in the female [14].

In a Sudanese population, a significant correlation is found between intercanthal distance and maxillary intercanine distance in all subjects (P-value 0.015), and in females who had a (P-value of 0.006) [15]. In another study, inner canthal dimensions in young adult males and females were 42±5 mm and 39 ±3 mm respectively and outer canthal dimensions were 111 ± 14 mm for males, and 120 ± 7 mm for females respectively [16].

## CONCLUSION

The results of the current study shows that there is a difference between the intercanthal distance between males and females. It was observed that males have more intercanthal distance than females. Therefore, the intercanthal distance can be used as a reliable source for sex determination.

## REFERENCE


1. Al Wazzan KA. The relationship between intercanthal dimension and the widths of maxillary anterior teeth. J Prosthet Dent. 2001 Dec;86(6):608–12.
2. Murphy WK, Laskin DM. Intercanthal and interpupillary distance in the black population. Oral Surg Oral Med Oral Pathol. 1990 Jun;69(6):676–80.
3. Sasieni LS. The Principles and Practice of Optical Dispensing and Fitting. 1962. 384 p.
4. Arumugam V, Doggalli N, Arthanari A, Rudraswamy S. Sex estimation through mandibular ramus flexure using Orthopantomogram and Lateral Cephalogram-A comparative study [Internet]. Vol. 43, Journal of Indian Academy of Forensic Medicine. 2021. p. 18–21. Available from: http://dx.doi.org/10.5958/0974-0848.2021.00005.1
5. Vasanthakumar P. Anthropometric Analysis of Palpebral Fissure Dimensions and Its Position in South Indian Ethnic Adults \\ Oman Medical Journal .- 2013, Vol. 28, No. 1. 2013. 7 p.
6. Adhikari N, Ambekar MN, Kc S. An Anthropometric Comparison of Inner Canthal Distance, Outer Canthal Distance and Canthal Index in the Indian and Nepalese Undergraduate Students of Nepalgunj Medical College [Internet]. Vol. 14, Journal of Nepalgunj Medical College. 2018. p. 12–4. Available from: http://dx.doi.org/10.3126/jngmc.v14i2.21529
7. Gupta VP, Sodhi PK, Pandey RM. Normal values for inner intercanthal, interpupillary, and outer intercanthal distances in the Indian population. Int J Clin Pract. 2003 Jan;57(1):25–9.
8. Anthropometric Assessment of Canthal Distances and Canthal Index of South Indian Region: A Cross-Sectional Study [Internet]. Medico-Legal Update. 2021. Available from: http://dx.doi.org/10.37506/mlu.v21i1.2413
9. Osunwoke E, Didia B. A study on the normal values of inner canthal, outer canthal, interpupillary distance and head circumference of 3-21 years ijaws [Internet]. Vol. 3, American Journal of Scientific and Industrial Research. 2012. p. 441–5. Available from: http://dx.doi.org/10.5251/ajsir.2012.3.6.441.445
10. Ahmed N, Abbasi MS, Khan DA, Khalid S, Jawed W, Mahmood M. DETERMINATION OF THE COMBINED WIDTH OF MAXILLARY ANTERIOR TEETH USING INNERCANTHAL DISTANCE WITH RESPECT TO AGE GENDER AND ETHINICITY [Internet]. Vol. 71, PAFMJ.
11. 2021. p. S164–9. Available from: http://dx.doi.org/10.51253/pafmj.v71isuppl-1.4331
12. Freihofer HP. Inner intercanthal and interorbital distances. J Maxillofac Surg. 1980 Nov;8(4):324–6.
13. Hayat N, Alkhairy S, Cheema A, Ehsan M, Khan MA. Normal interpupillary, inner canthal distance and outer canthal distance in a normal population of Pakistan [Internet]. Vol. 35, Pakistan Journal of Medical Sciences. 2019. Available from: http://dx.doi.org/10.12669/pjms.35.1.288

14. Singh JR, Banerjee S. Normal Values for Interpupillary, Inner Canthal and Outer Canthal Distances in an Indian Population [Internet]. Vol. 33, Human Heredity. 1983. p. 326–8. Available from: http://dx.doi.org/10.1159/000153399
15. Kim SH, Suh YW, Song JS, Park JH, Kim YY, Huh K, et al. Clinical research on the ophthalmic factors affecting 3D asthenopia. J Pediatr Ophthalmol Strabismus. 2012 Jul;49(4):248–53.
16. EL-Sheikh N, Mendilawi L, Khalifa N. Intercanthal distance of a Sudanese population sample as a reference for selection of maxillary anterior teeth size [Internet]. Vol. 5, Sudan Journal of Medical Sciences. 2010. Available from: http://dx.doi.org/10.4314/sjms.v5i2.57803
17. Esomonu UG, Taura MG, Anas IY, Modibbo MH. Anthropomethric Studies of the Interpupillary Distance among the Igbos of South Eastern Nigeria [Internet]. Vol. 5, Bayero Journal of Pure and Applied Sciences. 2012. Available from: http://dx.doi.org/10.4314/bajopas.v5i1.22