Study of Canthal Index among Students of Dental College

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ABSTRACT

Introduction: Craniofacial anthropometry is the precise measurement of different parts of human skull and face to find their relative proportions. Canthal index comprising of inner and outer canthal distance is an important anthropometric measurement for the evaluation of different systemic syndromes and craniofacial defects. People with different genetic background and environmental conditions have different craniofacial morphology.

Objective: This study aims to measure inner and outer canthal distance and calculate canthal index among students of Newar and Brahmin ethnic groups and find the mean value of canthal index among total male and female students.

Materials and Method: This descriptive cross-sectional study was conducted among 115 students, each of Newar and Brahmin ethnic group with the age ranging from 18-25 years in the Department of Anatomy, Kantipur Dental College Teaching Hospital, Basundhara, Kathmandu. The inner and outer canthal distance were measured by a digital vernier caliper. Canthal index was then calculated as inner canthal distance/ outer canthal distance × 100.

Result: The mean canthal index was 33.80±2.39 for male students and 33.06±2.34 for female students. Inner canthal distance was measured to be higher in Newar students whereas mean value of outer canthal distance was higher in Brahmin students. The mean canthal index for Newar and Brahmin students were 33.80±2.32 and 32.78±2.33 respectively.

Conclusion: This study concluded with the higher value of canthal index in male students than in female students exhibiting sexual dimorphism. Newar students had higher value of canthal index than Brahmin students.

Keywords: Craniofacial; lateral canthus; medial canthus.

INTRODUCTION

Canthus is the angle of meeting point of upper and lower eyelids. The medial canthus and lateral canthus are called as inner canthus and outer canthus respectively. Canthal index (CI), which includes outer canthal distance (OCD) and inner canthal distance (ICD) is an important part of craniofacial anthropometry. The measurements of canthal distance can be used for the diagnosis of many systemic syndromes and in reconstructive technologies.[1] It helps to identify hypertelorism, traumatic telecanthism and naso-orbitoethmoid injury.[2]

There are very few studies carried out on different ethnic groups of Nepal. Normal canthal values can serve as a guide for the diagnosis and treatment of craniofacial abnormalities.

Thus this study aims to measure the inner and outer canthal distance and find the mean value of canthal index among students of Brahmin and Newar ethnic groups which can serve as a future framework for estimating the canthal index of Nepalese population.

MATERIALS AND METHOD

This cross-sectional descriptive study was conducted among 230 students (160 females and 70 males), 115 of Brahmin and 115 of Newar ethnic group with the age group of 18-25 years from March to June 2019 in the Department of Anatomy, Kantipur Dental College Basundhara, Kathmandu. The study was conducted with the approval of Institutional review committee of Kantipur Dental College.

The students of age group 18-25 years were included as these canthal measurements tend to become constant usually after the age of puberty. The students were initially oriented to the purpose of the study and informed consent was taken before the procedure. Students with no history of craniofacial trauma, surgery, congenital anomaly and no clinical evidence of telecanthus, epicanthus were involved in the study. The students with craniofacial malformation and systemic disease which can alter the craniofacial morphology were excluded from the study. 230 students were included in this study using convenience sampling technique.

The students were seated comfortably on the chair looking forward with their heads in an upright position and eyes looking forward. The canthi are the terminal ends of palpebral fissure which are elliptical spaces between the upper and lower eyelids. Method of taking measurement was clearly described and the students were advised not to move their heads during the procedure. Measurement was taken in a well illuminated room. The inner canthal distance (ICD) was measured from the medial angle of palpebral fissure of one eye to other in mm by a straight vernier calliper. The outer canthal distance (OCD) was measured from the lateral angle of one eye to lateral angle of the other eye. Canthal index (CI) was then calculated as inner canthal distance/ outer canthal distance × 100. The data was entered in Statistical Package for Social Sciences (SPSS) 20.0 version software. Descriptive analysis in the form of number, percentage and mean were calculated.

RESULT

Among 230 students, 70 (30.4%) were male students and 160 (69.5%) were female students with the age ranging from 18-25 years. The study comprised of 115 (50%) students of each Newar and Brahmin ethnic group. The number of male and female students belonging to Newar caste were 60 (52.17%) and 55 (47.82%) respectively whereas 10 (8.69%) male and 105 (91.30%) female students were from Brahmin ethnic group.

The mean canthal index was 33.29±2.37 with confidence interval range of 32.98mm to 33.60mm (Table 1).

The mean value of canthal index was 33.80 ±2.39 for males and 33.06±2.34mm for females. All the other parameters were also found to be comparatively higher in males than in females. (Table 2).

Newar students showed higher mean value of ICD and CI than Brahmin students. But the mean value of OCD was found higher in Brahmin students than in Newar students. Canthal index was calculated to be higher in Newar students than in Brahmin students. (Table 3)

Table 1: Mean and SD of ICD, OCD and CI in total students.

Parameters	Mean±SD	95% confidence interval of the difference	
		Lower	Upper
ICD	32.75±2.47 mm	32.43 mm	33.07 mm
OCD	98.38±3.15 mm	97.94 mm	98.79 mm
CI	33.29±2.37	32.98	33.60

Table 2: Mean and SD of ICD, OCD and CI in both genders.

Parameters	Sex	
	Male	Female
ICD (Mean±SD)	33.45±2.24 mm	32.44±2.51 mm
OCD (Mean±SD)	99.02±3.08 mm	98.10±3.16 mm
CI (Mean±SD)	33.80±2.39	33.06±2.34

Table 3: Mean and SD of ICD, OCD and CI in Newar and Brahmin students.

Parameters	Caste	
	Newar	Brahmin
ICD (Mean±SD)	33.08±2.60mm	32.42±2.22mm
OCD (Mean±SD)	97.81±3.04mm	98.95±3.18mm
CI (Mean±SD)	33.80±2.32	32.78±2.33

DISCUSSION

Anthropometry is the measurement of physical sizes and shapes of human body. It is affected by different factors like age, sex, environmental condition and genetics. This helps to know the differences in biological make up in different races. The standard value of any indigenous ethnic group can be useful in the evaluation and diagnosis of craniofacial defects.[3] This can also be utilized in the treatment and reconstruction of congenital or posttraumatic deformities of the craniofacial regions.[4]

The present study showed that Newar students had higher inner canthal distance (ICD) and canthal index (CI) than in Brahmin students. But outer canthal distance (OCD) was measured to be higher in Brahmin students. The mean value of canthal index was comparatively higher in male (33.80±2.39) than in female (33.06±2.34) students. The present study was similar to a study conducted among Ibibios males and females with mean CI of males (31.64) higher than females (31.47). Ibibio males and females had inner canthal distances as 3.52cm and 3.36 cm respectively and outer canthal distance was measured to be 11.15cm for male Ibibios and 10.73 cm for Ibibios indicating the measured parameters as sexually dimorphic.[5] Igbos males also showed the value of canthal index higher than in females. Mean ICD was 43.90±0.41mm for Igbo males and 41.77±0.34mm for females. OCD for males and females were recorded as 118.34±0.66mm and 114.76±0.34mm respectively.[6] Higher value of canthal index in males might have occurred due to hormonal influence resulting in increased dimension of bones in males and thus exhibiting sexual difference in craniofacial measurements.[7]

This study had higher mean CI for both Newar (33.80±2.32) and Brahmin (32.78±2.33) students than the mean CI for Indo-Nepalese (25.92±9.80), Tibeto-Nepalese (24.03±3.93) and Indigenous (23.14±4.05) participants of a study conducted by Shah et al.[8] Mean CI of students of both ethnic groups in my study was lower than the mean CI (43.95±8.23) of Chinese young adults[9] and students (36.81±2.84) of Ebonyi State University, Abakaliki, Nigeria.[10] The present study resulted with the value of CI lower than the study conducted on Ikwere school children (35.89±3.29) in Nigeria.[11] Mean canthal index in this study was calculated to be lower than the mean canthal index of Indian (34.89±3.53) and Nepalese (36.30±5.65) medical students of Nepalgunj Medical College.[12] This study showed the value of CI higher than the value of CI of the study conducted on Urhobo and Itsekiri population. Urhobo males and females showed mean canthal indices of 24.38 and 29.38 respectively while Itsekiri males and females had mean canthal indices of 26.03 and 27.07 respectively.[13]

This study had higher value of CI than the study conducted among Ogonis ethnic group of Rivers State with mean value of CI as 28.41±1.79 and in Nigerian population with CI as 20.04±5.02.[14]

This present study showed the effect of ethnicity on the variation of orbital features. The differences in values of canthal index in students of Newar and Brahmin ethnic group might have been attributed by difference in their genetic background, culture, dietary habits and environmental surroundings.

This study was conducted on only two ethnic groups so future studies could be conducted including other indigenous groups also. New studies could be performed regarding the difference in canthal index with respect to age. Other parameters such as interpupillary distance could be measured and interobserver variability in measurements might occur in future studies.Further studies in larger population are needed to make the obtained value representative for that specific race.

CONCLUSION

The normal values of canthal index could be used in the field of genetics, ophthalmology, forensic medicine and in successful reconstruction of canthal areas as it possesses the data for measured parameters specific for race and sex. It can help ophthalmologists in early diagnosis of orbital defects. Congenital and post-traumatic orbital deformities can be well treated with the knowledge of the standard values so further studies with larger sample size is recommended.

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Conflict of interest: None

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