

ORBITAL MORPHOLOGY OF TELANGANA REGION: A DIRECT MEASUREMENT STUDY

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ABSTRACT

Background: Orbit is pyramidal cavity in the facial skeleton with its apex at the optical canal. The dimensions of the orbital cavity vary in populations belonging to different geographical areas. The present study was conducted so as to know such differences which will further aid in anthropological and forensic evaluation of skulls.

Materials: The study involved 100 dry skulls collected from Anatomy department of KIMS, Narketpally and also from medical and dental students. Orbital height (OH) and orbital breadth (OB) of both sides were measured using digital vernier calipers. Orbital index (OI) was then calculated with the formula $OI = OH/OB \times 100$

Results: The mean orbital height was 32.42mm, mean orbital breadth was 36.01mm and mean Orbital Index to be 87.39. Maximum orbits measured were of Mesoseme type.

Conclusion: The orbital dimensions measured in the present study shows the diversity of orbital morphology in different geographical areas. It also may help in better treatment of orbital pathologies.

KEY WORDS: Orbital morphometry, Dry skull, Orbital Index, Mesoseme

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INTRODUCTION

Orbits are the most conspicuous feature of the facial skeleton. Orbital morphometry constitutes important part of measuring facial symmetry and also changes in terms of evolutionary development. Conclusions drawn from such studies by anthropologists and anatomists are helpful not only to ophthalmologists but also to maxillofacial and plastic surgeons [1-3].

As pointed out by many previous studies in various parts of the world orbital dimensions vary

not only with development, sex and race but also with region [4]. Among various criteria for determining the orbital morphology orbital index is appropriate and easily measurable. Orbital index (OI) is nothing but ratio of orbital height to orbital breadth multiplied by 100 [5].

Based on Orbital index, orbits are categorised as 1. Microseme (OI 83 or less) 2. Mesoseme (OI 83 to 89) 3. Megaseme (OI 89 and above) [6].

Mean orbital index of a particular population will

be different from other populations and hence may also differ from others in the above said categories. So the present study was carried out to estimate the orbital index of Telangana region and categorise it to one of the above types.

MATERIALS AND METHODS

Materials: A total of 100 adult skulls collected from Telangana region were included in the study. The skulls were procured from Anatomy dept, KIMS, Narketpally as well as from Medical and Dental students. The bones having pathological lesions and fractures were excluded.

Method: Morphometry of orbit of both right and left side were measured with the help of digital slide callipers. All the measurements were recorded in millimeter.

Orbital Height (OH) defined to be the maximum distance between the superior and inferior margins of the orbital cavity was measured.

Orbital Breadth (OB) defined to be the distance between the midpoint of medial and lateral margins was measured.

Fig. 1: Measurement of Orbital height.



Fig. 2: Measurement of Orbital breadth.



Orbital Index was then calculated using these two parameters by the formula

$$\text{Orbital Index (OI)} = \text{Orbital Height} / \text{Orbital Breadth} \times 100$$

The results were tabulated and mean and standard deviation calculated. A comparison of the mean values between sides was performed using the independent 't'-test, p-value <0.05 was considered statistically significant.

RESULTS

The Range of Orbital Height varied from 29.44 to 35.37 on the right side and from 28.96mm to 36.72mm on left side respectively. The range of Orbital Breadth varied from 34.22mm to 39.62 on right side and from 32.84mm to 40.76mm on left side respectively.

The mean and the standard deviation values of various parameters on each side is shown in the following table.

Table 1: Morphometry of Orbit.

Parameters	Orbital Height Mean ± SD	Orbital Breadth Mean ± SD	Orbital Index Mean
Right side	32.02±1.82mm	37.01±1.50mm	86.52mm
Left side	32.83±2.17mm	35.02±1.89mm	88.26mm

While orbital breadth of the right and left sides showed no significant difference, the orbital height and orbital index of the two sides showed p value <0.05 and hence statistically significant.

Considering all the orbits that were measured the mean orbital height was 32.42mm, mean orbital breadth was 36.01mm and mean Orbital Index to be 87.39.

Table 2: Categories of orbit.

Category	Right	Left
Microseme	13%	12%
Mesoseme	64%	54%
Megaseme	23%	34%

It is observed that the majority of the orbits belonged to Mesoseme category whether right side (64%) or left side (54%).

DISCUSSION

Orbital dimensions of a particular person depend predominantly on the genetic influences. When the Orbital morphology of a population in a geographical area is considered, factors like climate and food habits play a role as well. Hence

the Orbital Index of populations in different geographic areas varies.

Depending on the Orbital Index the multiple researchers have classified different races to be belonging to one of Microseme, Mesoseme and Megaseme category [7].

The orbit of yellow race was found to be of Megaseme variety meaning the orbital height to be more than the orbital breadth. The orbit of white races belonged to Mesoseme category while the black races belonged to Microseme category [8].

In the present study the mean orbital height was 32.42mm. The study conducted on north Indian population by Jaswinder Singh et al [9] it measured to be 32.05mm and while study done by Gosavi et al [10] on skulls of Maharashtra measured it to be 32.31mm.

The mean orbital breadth in the present study was 36.01mm. Jaswinder Singh et al found it to be 39.25mm in north Indian population and Gosavi et al found it to be 39.46mm.

The present study the showed mean Orbital Index to be 87.39mm and thus falls into Mesoseme category. So the orbital index calculated in the present study is consistent with the study of Howale et al [11] one on Maharashtra population. But it differs from studies done by Ebeye et al [12] on Urhobo male and female population in which orbital index was 78.15 and 78.57 respectively, Fathy A Fetouh et al [13] done on Egyptian male where the orbital index was 82.27 and Jaswinder Kaur et al done on North Indian population where orbital index was 81.65 (Microseme). Also, it differs from the study by Ukoha et al [14] done on Nigerian population where orbital index was 89.21 (Megaseme).

Table 3: showing Orbital index of various populations studied by various authors.

Sl.no	Authorities	No.of skulls observed	Race/Region	Mean orbital Index
1	Ukoha et al 2011[14]	70	Nigerian	89.21
2	Ebeye et al 2013 [12]	236	Urhobo (male)	78.15
3	Ebeye et al 2013 [12]	152	Urhobo (female)	78.57
4	Fathy A Fetouh et al [13]	30	Egypt (male)	82.27
5	Jaswinder Kaur et al 2012 [9]	30	North India	81.65
6	Gosavi et al 2014[10]	64	Maharashtra	81.88
7	Deepak Howale et al 2012 [11]	75	Maharashtra	86.4
8	Present study	100	Telangana	87.39

The difference observed between the right and left side could be attributed to the differential growth of the two sides of the brain. This needs further investigation since there were no such observations in the past.

CONCLUSION

The orbital measurements are helpful not only for surgical accuracy but also for preparation of ocular prosthesis. The present study showed the mean orbital index of Telangana region to be 87.39mm and of Mesoseme variety. More such morphometric studies in Telangana region about should be conducted even by employing radiological methods for better diagnosis and treatment as well as racial characterisation.

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Conflicts of Interests: None

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