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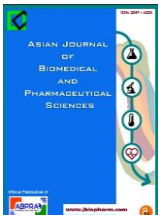

RESEARCH ARTICLE

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A Study of Orbital Morphometry in Indian Dry Skulls

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Abstract
Anthropometry refers to the measurements of the human individual to note the physical variation. The literature shows that there are significant differences in ocular and orbital morphometry among individuals of different age, sex and ethnicity. Sixty-four intact skulls i.e. 128 orbits were measured using digital Vernier caliper. Orbital height (OH), Orbital width (OW), Biorbital distance (BOD) and Interorbital distance (IOD) were measured and the orbital index was calculated. The mean orbital height in the present study was 32.31 ± 2.52 mm. The mean orbital width was observed as 39.46 ± 2.57 mm. hence the Orbital index was calculated as 81.88 mm,can be classified as microseme. The mean Biorbital distance was 95.65 ± 3.48 mm (range – 88.5 – 102.5 mm) and the mean Interorbital distance was19.49 ± 3.35 mm (range – 11.8 – 27.6 mm). Orbital morphometry is important to provide useful baseline data for ophthalmological, maxillary surgeries and reconstructive cosmetic surgeries of face. Detail knowledge of anatomy and its variations will help the surgeons to avoid surgical complications.

Keywords: orbital morphometry, Indain skull, orbital index.

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INTRODUCTION

Anthropometry (Gk. literally meaning measurements of humans) refers to the measurements of the human individual for the purpose of human physical variation. To treat congenital or post-traumatic facial disfigurements successfully, surgeons require access to craniofacial database based on accurate anthropological measurements.(1) The literature shows that there are significant differences in ocular and orbital morphometry among individuals of different age, sex and ethnicity. (2-4)

Patnaik et al (5) stated that in each orbital cavity, the width is usually greater than the height; the relation between the two is given by the orbital index, which varies in different races. (Orbital Index = Orbital height / orbital breadth X100). Taking the orbital index as standard, three classes of orbit have been described.

Megaseme (Large) – The Orbital index is 89 or over. This type is seen in yellow races (6)

Mesoseme (Intermediate) – The orbital index ranges between 89 to 83. This type is seen in the white races. (7)

Microseme (Small) – Orbital index 83 or less. This type is characteristic of black races where the orbital opening is rectangular. (6)

The study was conducted with an aim to collect the anthropometrical data in Indian population and compare it with some of the previous studies conducted in same and different race. The mean, standard deviation and range was calculated for the data.

MATERIALS AND METHODS

Adult skulls of unknown sex collected from Department of Anatomy were examined. Sixty-four intact skulls i.e. 128 orbits were measured using digital Vernier caliper accurate up to 0.01mm, for the following parameters. Orbital height (OH) was measured as the distance between the superior and inferior orbital margins. Orbital width (OW) was the distance between the medial and lateral walls of the orbits. The orbital index was calculated as OH/ OW X 100.

Distance between the right and left most lateral points on the orbit was measured as Biorbital distance (BOD). The ectotheion, which is the intersection of the most anterior surface of the lateral border of the orbit and a line bisecting the orbit along its long axis was used as a landmark for the most lateral point of the orbit.(3) The interorbital distance (IOD) was measured as the distance between the two anterior lacrimal crests.

RESULTS

The OH was observed as 31.97± 2.39 mm in right and 32.66 ± 2.71 mm in left orbital cavities. The mean orbital height in the present study was 32.31 ± 2.52 mm. Orbital width on right side was 39.71 ± 2.65 mm while on left side it was 39.22 ± 2.5 mm. The mean orbital width was observed as 39.46 ± 2.57 mm. hence the Orbital index was calculated as 81.88 mm, which can be classified as microseme type. The bilateral difference in height and width of the orbits was not significant statistically. The mean Biorbital distance was 95.65 ± 3.48 mm (range – 88.5 – 102.5 mm) and the mean Interorbital distance was19.49 ± 3.35 mm (range – 11.8 – 27.6 mm).

DISCUSSION

The orbit is the bony cavity like a pyramid tilted on to one side, with the apex at the back and base forming the opening on the front of the facial skeleton. (8) The measurements of orbit and the orbital index are known to vary with age, sex, race and regions in the same race. (2,3,9)

In the present study of skulls from central India, the mean height of the orbit was observed as 32.31 ± 2.52 mm. Kaur et al.(2) observed it as 32.05± 2.0 mm in North Indian skulls. The orbital width was observed as 39.46 ± 2.57 mm in the present study and 39.25 ±2.3 mm by Kaur et al. (2) Weaver et al.(4) in their CT scan based study in Caucasian subjects observed mean orbital height as 32.09 ± 2.2 mm and orbital width as 37.01 ± 2.0 mm. Ebete and Otikpo (9) in Urhobo (Nigeria) subjects observed mean OH as 32.46 mm and mean OW as 41.43 mm. (Table-1)

The Orbital index which determines the shape of the face differs in different population groups. This means that the orbit with larger width than height will have smaller orbital indices while those with larger orbital index will have narrow faces.(2)

Kaur et al. (2) observed OI as 81.65 which is similar to the observations in the present study (81.88), thus based on these two studies Indian skulls can be classified as microseme. Ebeye and Otikpo (9) in their study observed orbital index as 78.15.

The interorbital distance and biorbital breadth are important for the maintenance of facial symmetry during both reconstructive and cosmetic operations. All these measures have been known to vary with sex and race.(3)

The interorbital distance in the present study was observed as 19.49 ± 3.35mm. Munguti et al. (3) noted it as 18.91 ± 3.18 mm. It was observed as 19.81mm in French (10) and 25.71 mm in Terks (11).

Biorbital distance in present study was 95.65 ± 3.48 mm while study conducted by Munguti et al. (3) showed it as 99.49 ±4.31 mm and it was observed as 98.97 mm in French population (10). The width of upper face is determined by the Biorbital breadth. Difference in IOD and BOD need to be taken into consideration during nasal bridge reconstruction, facial

cosmetic surgeries and in the design of spectacle bridges and frames. (3) This set of measurements can also be used in the design of protective equipment for the eye. (4)

Orbital morphometry is important to provide useful baseline data for ophthalmological, maxillary surgeries and reconstructive cosmetic surgeries of face. Detail knowledge of anatomy and its variations will help the surgeons to avoid surgical complications.

Parameter (mm)	Kaur et al.(2)	Mungiti et al.(3)	Weaver et al.(4)	Ebeye and Otikpo (9)	Present study
Orbital Height	32.05± 2.0		32.09 ±2.2	32.46 ±3.14	32.31 ±2.52
Orbital width	39.25 ±2.3		37.01 ± 2.0	41.53 ±2.96	39.46 ± 2.57
Orbital Index	81.65			78.36	81.88
Biorbital dist.*		99.49 ±4.31			95.65 ± 3.48
Interorbital dist.		18.91 ± 3.18			19.49 ± 3.35

Table 1: Comparison with some of the previous studies
*** - Distance**

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