

Original Article

Assessment of Orbital Dimensions on Dry Skulls- An in vitro study

Rajeev Kumar

Assistant professor, Department of Anatomy, Career Institute of Medical Sciences & Hospital Lucknow, U.P., India

ABSTRACT:

Background: The human orbit is a complex anatomic region. The present study was conducted to determine dimension of orbits between males and females. **Materials & Methods:** This study was conducted in the department of Anatomy on 20 dry skulls. The measurements of orbital length, orbital width and orbital index (OI) were performed in both genders. The measurement was done on both left and right side. **Results:** The mean± S.D of orbit length in males was 3.88 ± 0.10 and in females was 3.46 ± 0.21 . The difference was significant ($P < 0.05$). The mean± S.D of orbit width in males was 4.64 ± 0.15 and in females was 4.12 ± 0.15 . The mean± S.D of orbit index (OI) in males was 86.78 ± 7.23 and in females was 86.12 ± 7.25 . The orbital length (mm) on right side was 3.62 as compared to 3.58 on left side. Orbital width was 4.14 on right side and 4.16 on left side. Orbital index was 84.38 on right side and 84.40 on left side. The difference was non- significant ($P > 0.05$). **Conclusion:** Careful evaluation is required which helps in gender identification. Orbit is considered a useful landmark.

Key words: Orbit, Length, Width.

Received: 21 February 2013

Revised: 10 March 2013

Accepted: 12 April 2013

Corresponding author: Dr Rajeev Kumar, Assistant professor, Department of Anatomy, Career Institute of Medical Sciences & Hospital Lucknow, U.P., India

This article may be cited as: Kumar R. Assessment of Orbital Dimensions on Dry Skulls- An in vitro study. J Adv Med Dent Scie Res 2013;1(1):96-99.

INTRODUCTION

Anthropometry 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. The human orbit is a complex anatomic region. The two orbital cavities are situated on either side of the saggittal plane of skull between the cranium and the skeleton of the face. Thus situated, they encroach about equally on these two regions.¹

Each of its four bony walls has its own unique features and is perforated by a number of fissures and foramina that carry important nerves and blood vessels. Each orbital cavity is essentially intended as a socket for the eyeball and also contains associated muscles, nerves, vessels and in essence lodges the visual apparatus. Knowledge of anatomical structure, proportion and mechanical function of the human body and racial variations in ocular anatomy is vital to clinical assessment and treatment of patients. The orbital index (OI), the proportion of the orbit height to its breadth multiplied by 100 is determined by the shape of the

face and varies with race, regions within the same race and periods in evolution.³ It is necessary to determine their reference value in order to help anthropologists, forensic experts and anatomists identify morphological variants of this structure and surgeons and physicians for surgical and cosmetic procedures.⁴ The present study was conducted to determine dimension of orbits between males and females.

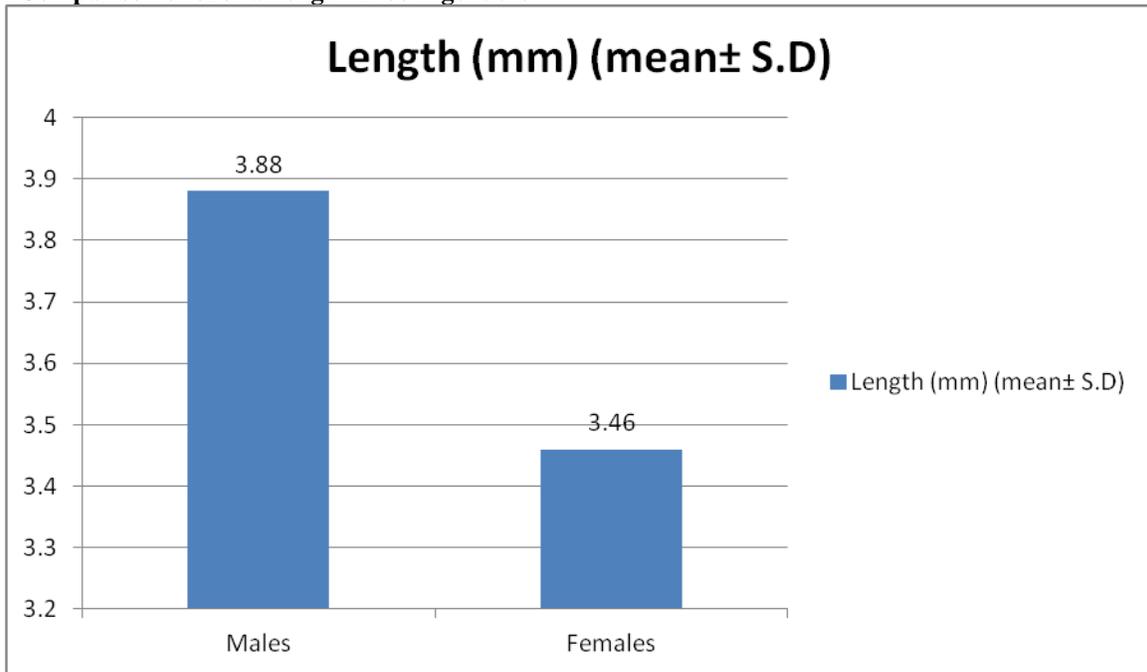
MATERIALS & METHODS

This study was conducted in the department of Anatomy. It included 20 dry skulls (male- 10, female- 10). The study was approved from the institutional ethical committee and approval was obtained prior to the study.

The maximum distance between the upper and lower margins of the orbital cavity was orbital length. Distance between the mid- point of the medial margin of the orbit to the midpoint on the lateral margin of the orbit was orbital width. Orbital index (OI) (Orbital height/ Orbital breadth X 100) was performed with the help of vernier caliper calibrated in millimeters. The measurement was done on both left and right side. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

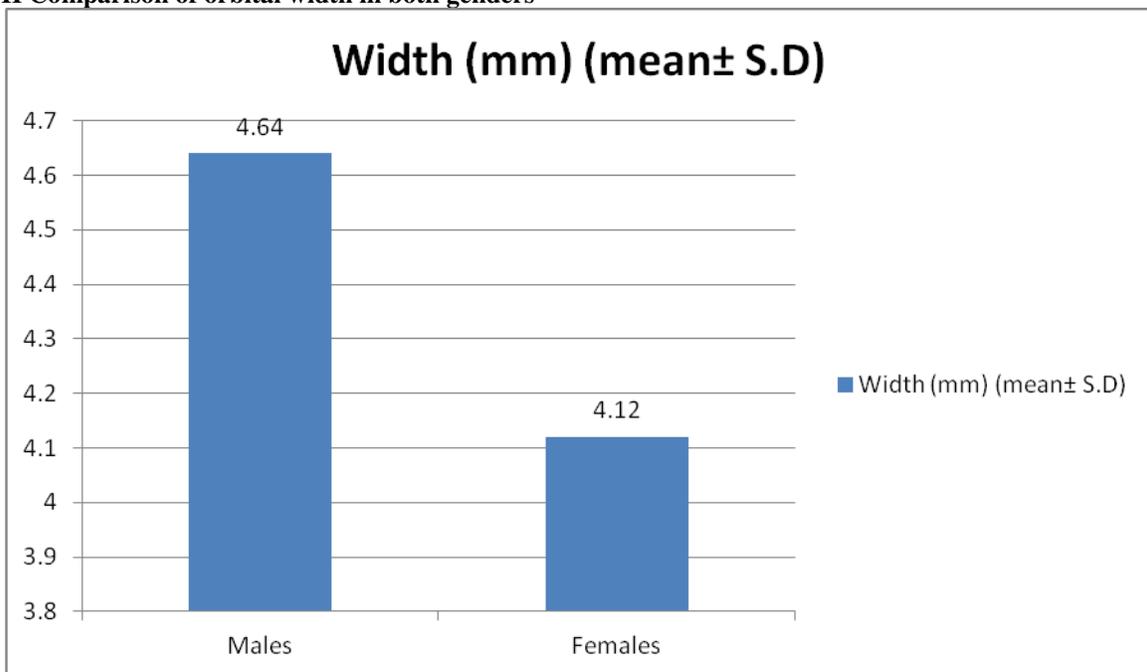
RESULTS

Graph I Comparison of orbital length in both genders



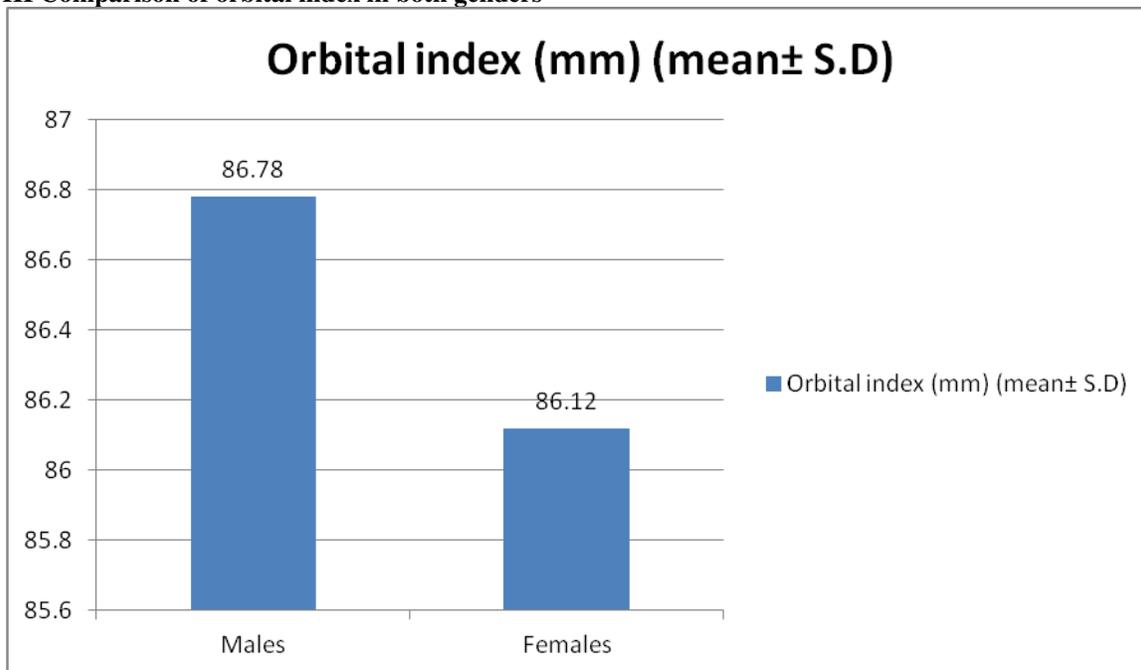
Graph I shows that the mean± S.D of orbit length in males was 3.88 ± 0.10 and in females was 3.46 ± 0.21 . The difference was significant ($P < 0.05$).

Graph II Comparison of orbital width in both genders



Graph II shows that mean± S.D of orbit width in males was 4.64 ± 0.15 and in females was 4.12 ± 0.15 . The difference was significant ($P < 0.05$).

Graph III Comparison of orbital index in both genders



Graph III shows mean± S.D of orbit index (OI) in males was 86. 78± 7.23 and in females was 86.12± 7.25. The difference was non- significant (P-0.06).

Table I Comparison of orbital length, width and index on both sides

Parameters	Right Side	Left side	P value
Orbital length	3.62	3.58	0.5
Orbital width	4.14	4.16	0.2
Orbital index	84.38	84.40	0.1

Table I shows that (mean± S.D) orbital length (mm) on right side was 3.62 as compared to 3.58 on left side. Orbital width was 4.14 on right side and 4.16 on left side. Orbital index was 84.38 on right side and 84.40 on left side. The difference was non- significant (P>0.05).

DISCUSSION

In the orbit, the surrounding fascia allows for smooth rotation and protects the orbital contents. If excessive tissue accumulates behind the ocular globe, the eye can protrude and there can be exophthalmas. Many factors have been concerned in the conversion of the facial skeleton into the adult form. The orbit is the cavity or socket of the skull in which the eye and its appendages are situated.⁵

In present study we compared orbital length, width and index in both genders. In present study, the mean± S.D of orbit length in males was 3.88 ± 0.10 and in females was 3.46± 0.21. Our results are in agreement with Sayee et al.⁶ The mean± S.D of orbit index (OI) in males was 86. 78± 7.23 and in females was 86.12± 7.25. This is similar to Munguti et al.⁷

The volume of the orbit is 30 millilitres of which the eye occupies 6.5 ml. The orbital contents comprise the eye, the

orbital and retrobulbar fascia, extraocular muscles, cranial nerves II, III, IV, V, and VI, blood vessels, fat, the lacrimal gland with its sac and nasolacrimal duct, the eyelids, medial and lateral palpebral ligaments, check ligaments, the suspensory ligament, septum, ciliary ganglion and short ciliary nerves.⁸

Deepak et al⁹ conducted a study are to provide the normal reference orbital parameters for the South Indian population. The results showed that the height and breadth were significantly larger in males than in females. There were no significant differences in height and breadth between the right and left side orbits. There was no significant difference in OI between the genders and also sides. According to the OI, the studied group of Indian population comes under Mesoseme category. This study provided useful baseline orbital morphometry data of south Indian population, which are very important during plastic

surgery, maxillofacial and neurosurgeries and also in the forensic research.

Megaseme is when the orbital index is 89 or above. This type is seen in yellow races. If orbital index range between 89 and 83, is called mesoseme (intermediate). Microseme is when the orbital index is 83 or less. This type is characteristics of the black races where the orbital opening is rectangular. The importance of orbital index lies in its use for the interpretation of fossil records, skull classification in forensic medicine and the explanation of trends in evolutionary and ethnic differences.¹⁰

The orbital index which determines the shape of the face differs in different population groups. This means that the orbits with larger widths than height will have smaller orbital indices while those with larger orbital indices will have narrow faces. This index varies with race, regions within the same race and periods in evolution. The mean \pm S.D orbital length (mm) on right side was 3.62 as compared to 3.58 on left side. Orbital width was 4.14 on right side and 4.16 on left side. Orbital index was 84.38 on right side and 84.40 on left side. Similar findings were seen in study by Leko.¹¹

Ebeye¹² found that 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. The mean Biorbital distance was 95.65 ± 3.48 mm and the mean interorbital distance was 19.49 ± 3.35 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.

CONCLUSION

Careful evaluation is required which helps in gender identification. Orbit is considered a useful landmark.

REFERENCES

1. Patniak, V.V.G., Bala Sanju, Singla Rajan K. Anatomy of the bony orbits- some applied aspects. J. Anatomical Soc. Ind. 2001; 1: 59-67.
2. Evereklioglu, C., Doganay, S., Gunduz, A, Tercan, M., Balat, A. and Cumurcu, T. Craniofacial anthropometry in a Turkish population. Cleft Palate Craniofacial J. 2002; 39(2): 208-218.
3. Xing, Song, Victoria Gibbon, Ronald Clarke, and Wu Liu. Geometric morphometric analyses of orbit shape in Asian, African, and European human populations. Anthropological Science 2012; 1:1-11.
4. Fawehinmi, H.B., Ligha, A.E. and Chikwu, P. Orbital dimensions of Nigerian adults. Jobiomed. Afr. 2008; 6: 1-2.
5. Novit, M. Facial, upper facial and orbital index in Batak, Klaten and Flores students of Jember University. Dent. J. 2006; 39: 116-119.
6. Sayee Rajangam, Kulkarni R.N, Lydia Quadrilos, et al. Orbital dimensions. Indian Journal of Anatomy 2012; 1:5-10.
7. Munguti Jeremiah, Mandela Pamela, Butt Fawzia. Sex differences in the cranial and orbital indices for a black Kenyan population. Int. J. Med. Sci 2012; 2:81-84.
8. Ukoha U., Egwu OA., Okafor IJ., et al. Orbital dimensions of adult male nigerians: a direct measurement study using dry skulls. Int J Biol Med Res.2011; 2: 688-690.
9. Deepak S. Howale, Jain L. K, Kanaklata Iyer, et al. Orbital and Nasal indices of Maharastra region: A direct measurement study using dry skulls. International Journal of Current Reasearch 2012; 4: 158-161.
10. Kaur J, Savita Yadav, Zora Singh. Orbital dimensions- A direct measurement study using dry skulls. J. Acad. Indus. Res 2012; 1: 293-295.
11. Leko Bankole J, Douglas Promise, Ukoima H.S, et al. Radiological Assessment of Orbital Dimensions of the Kalabaris and Ikwerres of Rivers State, Nigeria. Afr. J. Biomed Res 2012; 15:197-200.
12. Ebeye O.A, Otikpo O. Orbital index in Urhobos of Nigeria. IOSR Journal of Dental and Medical Sciences 2011; 8(2):51-53.

Source of support: Nil

Conflict of interest: None declared

This work is licensed under CC BY: *Creative Commons Attribution 3.0 License*.