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Sexual Dimorphism in Adult Indian Dry Skulls

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Abstract

Identification of skeletal remains play a major role in forensic medicine. It is difficult to identify a mutilated body when constructing a biological profile. Sex determination is the most important and the initial step in individual identification. In this study, 50 adult indian dry skull of unknown sex is studied on the basis of their morphological differences for sex determination. The study of 8 morphological features of the skull (general appearance, supra orbital ridge, orbits, zygomatic arch, mastoid process, palate, mandible and external occipital protuberance) that are commonly used for sex determination is done. Sexual dimorphism plays a major role in forensic anthropology. By determining the sex, various other features can be easily identified.

Keywords-Sexual dimorphism, skull, mastoid process, orbit, palate, zygomatic arch

INTRODUCTION

The main objective of this research is to identify the sex of the person using the individual bones. It is the most common & critical problem faced by anatomist, forensic science experts & anthropologist. Hence it plays an important role in identification. Individual bones have been used for identifying sex of the individual as bones of the body are last to perish after death, next to enamel of teeth. Almost all bones of the human skeleton show some degree of sexual dimorphism. [8,9,10]Sex of the person can be determined using pelvis if cranium is not available for study. In cases where entire skull is not found, mastoid play an important role in sex determination as it is the most dimorphic bone of skull.[1] The mastoid region, a fragmentary piece of skull is ideal for sex determination as it is resistant to damage due to its anatomical position at the base of skull and its toughness. The skull measurements vary significantly in different ethnic groups of the world and number of research/studies are too few for Indian population. In this study, 50 adult human skulls of South Indian population were studied to determine accuracy of mastoid process in sex determination.[2] Comas and Coma also found that cultural activities must be considered when evaluating characteristics, especially those concerning work distribution and activities amongst the social group in question. They concluded that it is rare when identification of sex cannot be established. This is in accordance with the findings of Correa-Ramirez, who concluded that it is possible to achieve a level of 75 to 80% accuracy by cranium examination alone.Studies on sexing skeletons using otseometric measurements have been reported.(3,4) The metrical method has been widely employed in the determination of sex. It involves subjecting the measurements of a set of parameters to various analyses. Discriminant function analysis, however, is a statistical method that explores the differences between groups by determining which combination of variables can best predict sex. In this method, the measurements of the different parameters are taken as independent variables, whereas sex is set as a dependent variable.[5,6] Moreover, this method uses discriminant function equations that are population specific, thus making it the best method for sex determination. As South India is composed of a heterogeneous population rich in ethnic and cultural diversity, and craniofacial growth is influenced by racial, ethnic, sexual and dietary differences(7),
standard data of the local population is fundamental in the evaluation and diagnosis of craniofacial abnormalities.[11,12]

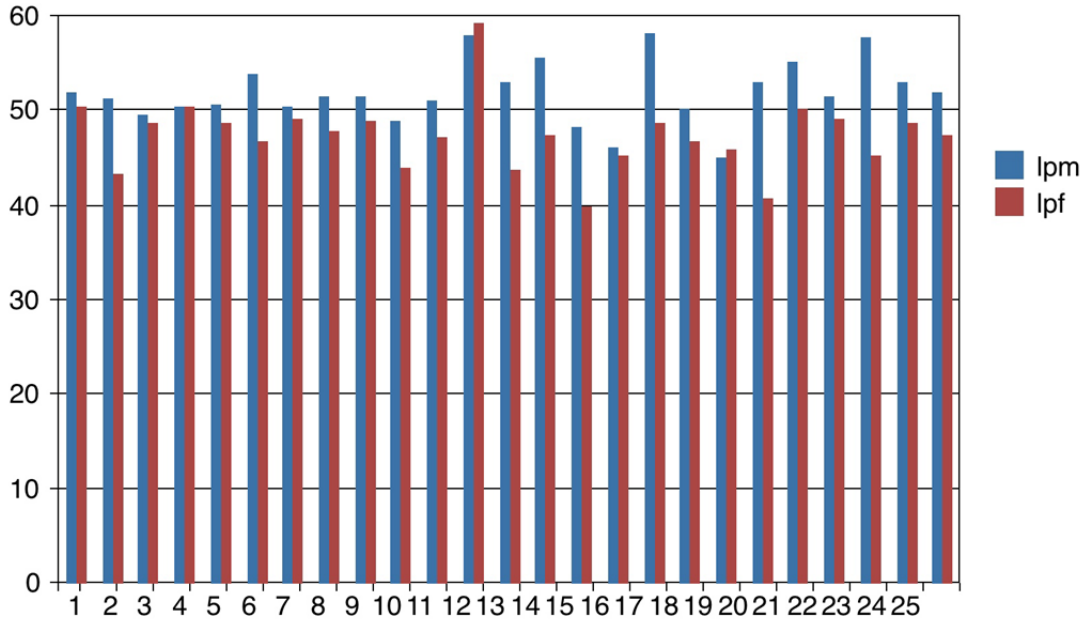
METHODS

Total 50 skulls were examined and parameters such as length of mastoid process , breadth of mastoid process, length of palate, breadth of palate, Bizygomatic breath , orbital length, orbital breath were taken in both male and female skulls. These skulls are examined from Saveetha dental college and hospitals, Poonamalle ,Chennai. Only skulls in good condition and with recorded sex identification were included. Skulls that were damaged, Table incomplete or without sex identification were excluded from the study. Measurements were recorded for each cranium, using digital vernier callipers. All the measurements were obtained with sliding calliper to the nearest millimetre, as per standard anthropological conventions and then Maxilla-Alveolar index, Size of palate was calculated. In skulls with protruding teeth, where it was difficult to take measurement with sliding calliper, spreading calliper was used. All the measurements were taken after taking biometric training and by single observer to avoid any inter-observer error.

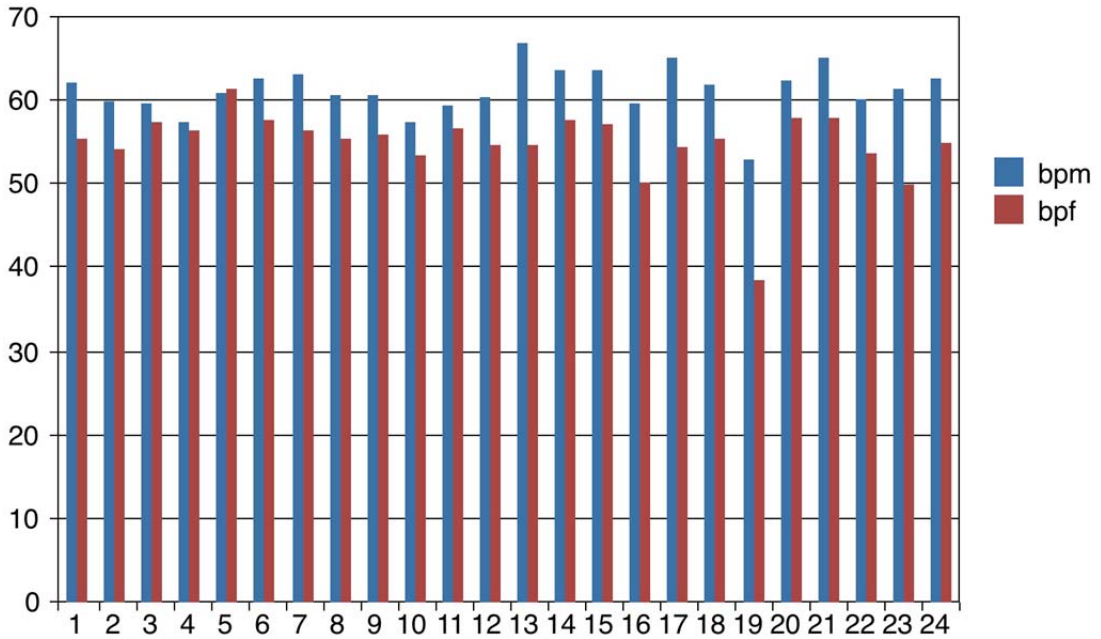
DISCUSSION AND RESULTS

At the end of the study we came to know that the average length of mastoid process in male is found to be 22.52 mm while in female is found to be 22.51and breadth of the mastoid process in male is found to be 12.04 mm while in female it's found to be 8.31 mm. The length of the palate in male is found to be 51.98mm while in female it's found to be 47.48mm, breadth of the palate in male is found to be 61.36 mm while in female it's found to be 55.02mm ,Bizygomatic breadth in male is found to be 120.42 mm while in female it's found to be 108.38, orbital length in male is founded as 32.09 mm while in female it's found to be 34.23,orbital breadth in male is found to be 40.54mm while in female its found to be 38.24. Thus these are overall results.

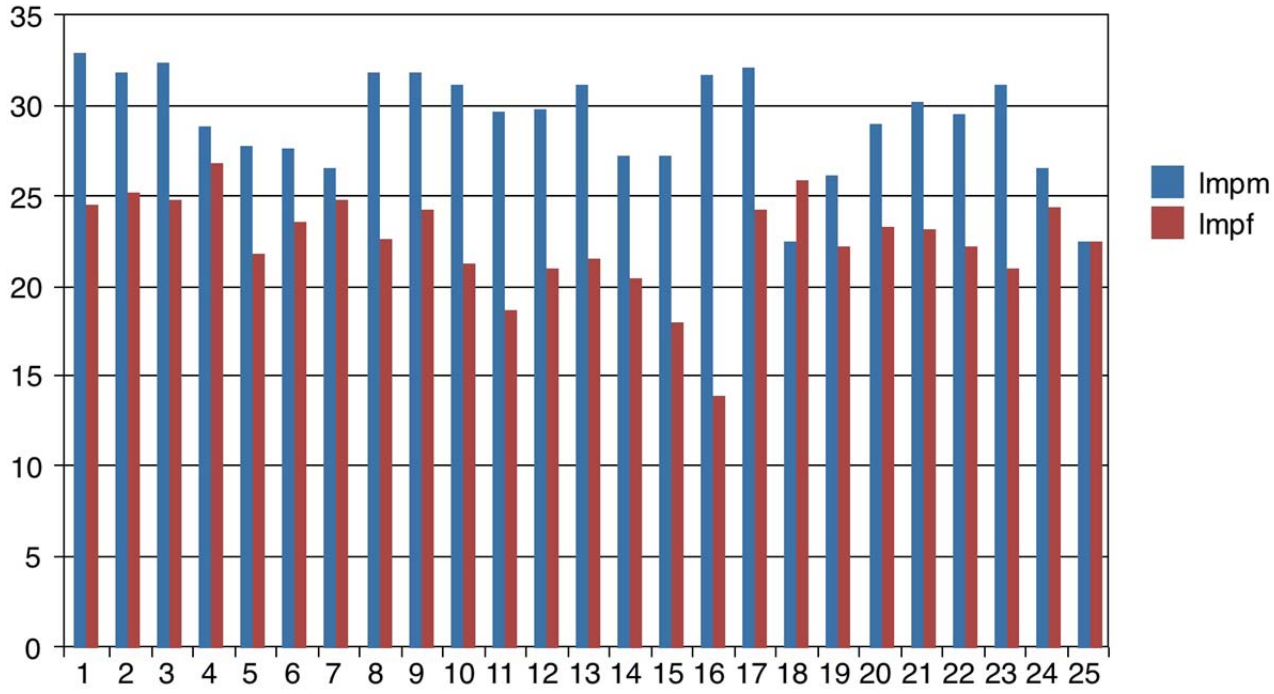
S.No	Parameters	Male(mm)	Female(mm)
1)	Length Of Mastoid Process	22.52	22.51
	Breadth Of Mastoid Process	12.04	8.31
2)	Length Of Palate	51.98	47.48
	Breadth Of Palate	61.36	55.02
3)	Bizygomatic Breadth	120.42	108.38
4)	Orbital Length	32.09	34.23
	Orbital Breadth	40.54	38.24



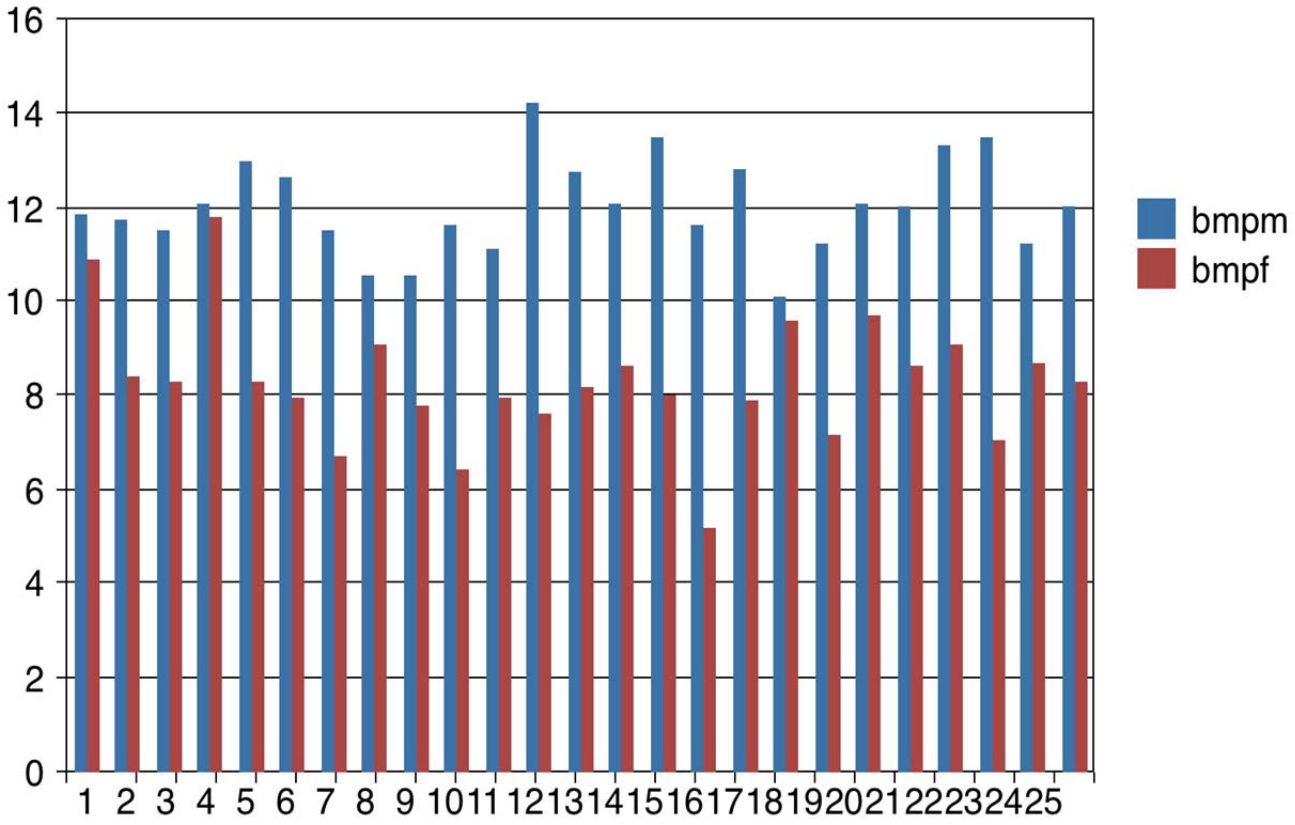
MPM – Length of palate in male
LMPF - length of palate in female



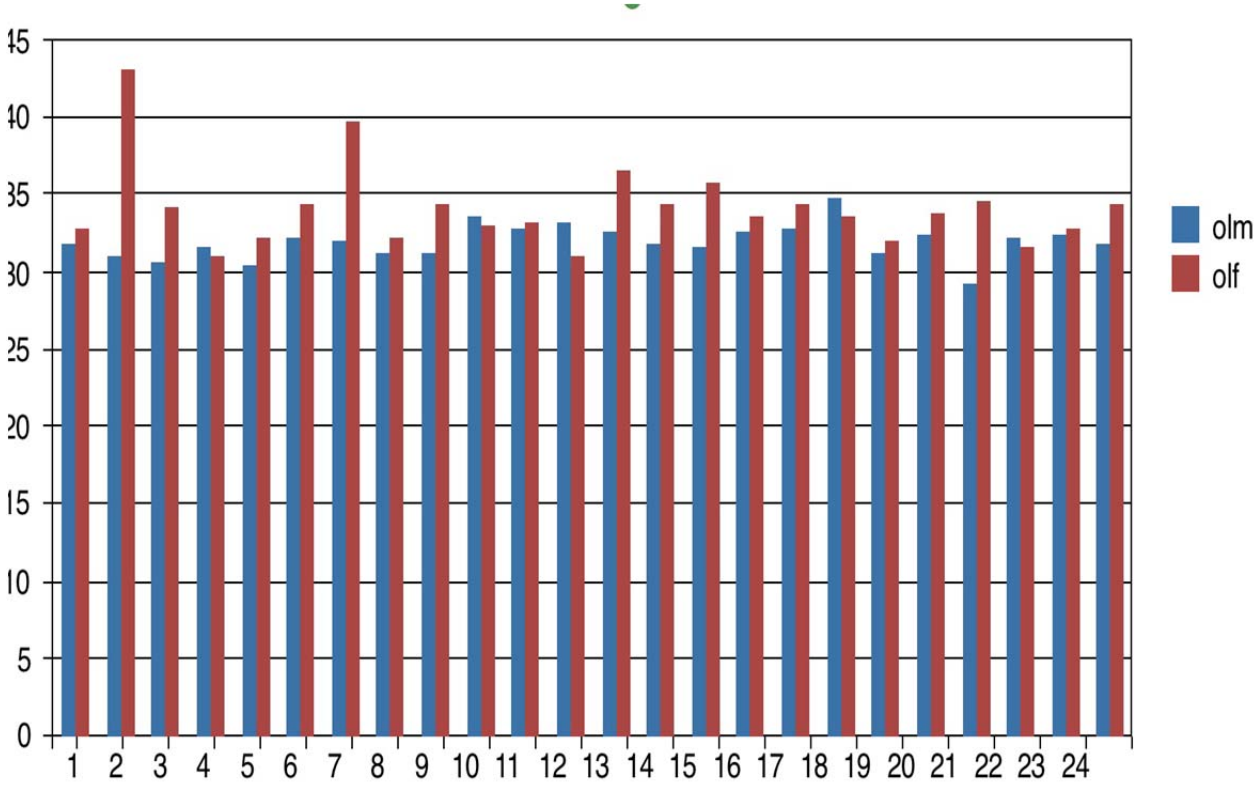
BPM – breadth of palate in male
BPF – breadth of palate in female



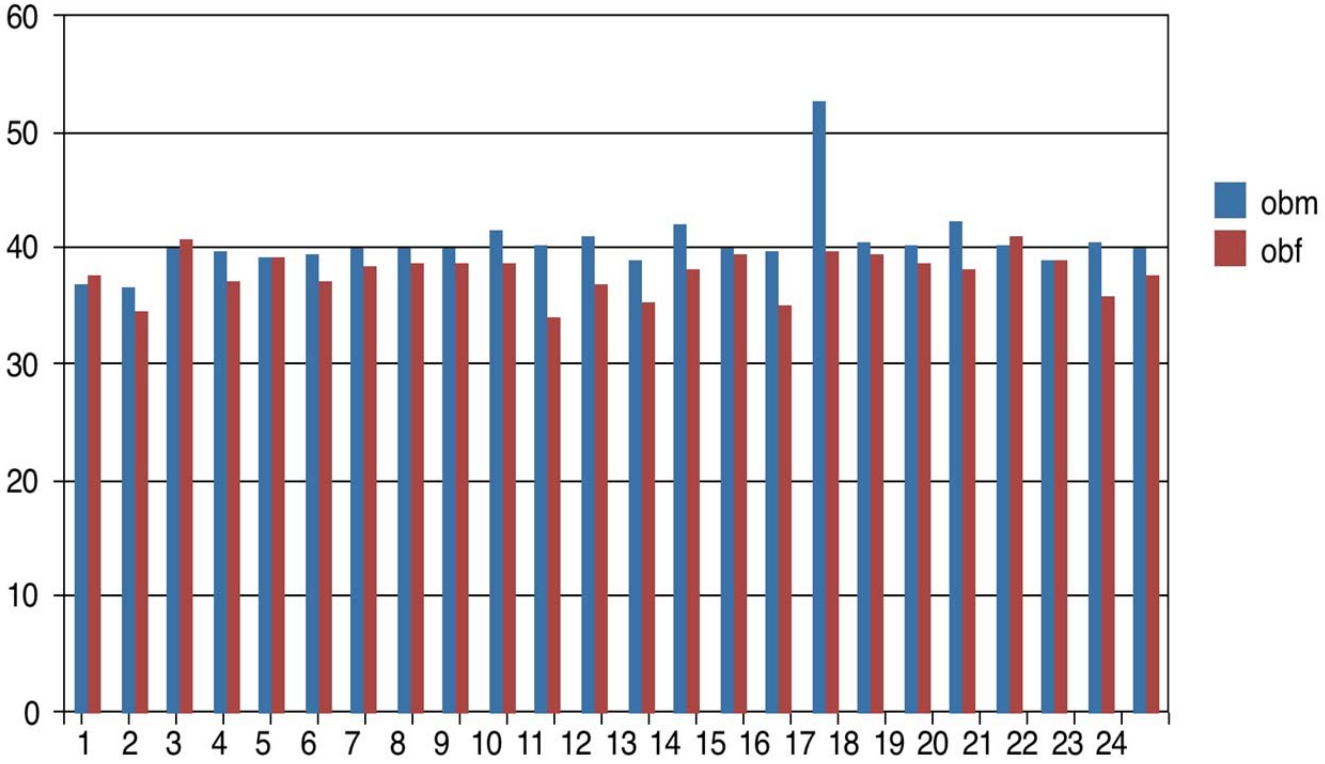
LMPM – length of mastoid process in male
LMPF – length of mastoid process in female



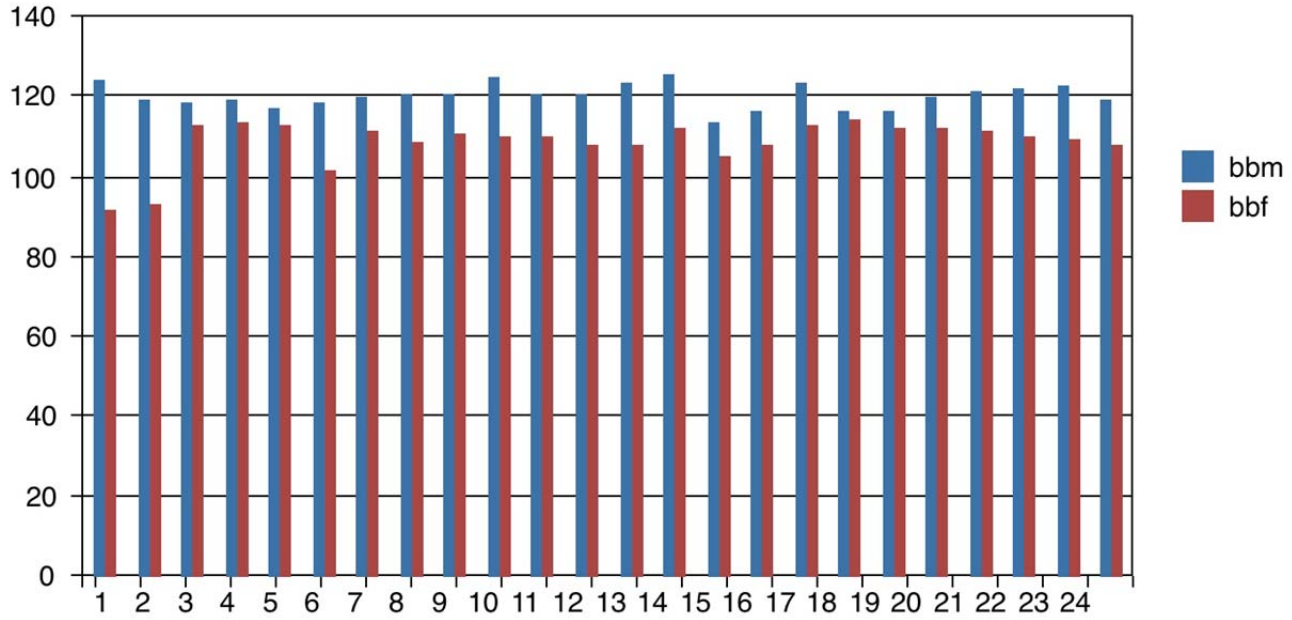
BMPM – breadth of mastoid process in males
BMPF – breadth of mastoid process in females



OLM – orbit length in males
OLF – orbital length in females



OBM – orbital breadth in male
OBF – orbital breadth in female



BBM – bizygomatic breadth in males
BBF – bizygomatic breadth in females

CONCLUSION:

In the present study, sex determination using craniofacial morphometry parameters was established for the South Indian population. Our findings could be of clinical importance, interest to forensic anthropologists and value in genetic studies. The craniofacial parameters derived for sexual dimorphism serves as a framework for future studies comparing the craniofacial anatomy of indigenous racial groups.

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