

A STUDY OF SEXUAL DIMORPHISM IN HEAD DIMENSIONS AMONG HARYANVI ADULTS

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Abstract

Background: The purpose of study was to evaluate sexual dimorphism. **Materials and Methods:** The present study was conducted in Department of Anatomy, on 800 Haryanvi adults comprising of 400 males and 400 females aged 18 to 40 years. Prior informed written consent were obtained from subjects. Inclusion and exclusion criteria for the study were predefined. Two measurements, head length and head breadth were taken by using standard anthropometric instruments. **Result:** Mean maximum head length was 18.75 cm in males and 17.75 cm in females. Mean maximum head breadth was 13.11 cm in males & 12.95 cm in females. **Conclusion:** So all the measurements were more in males as compared to females & were statistically significant ($p < 0.05$). So it revealed that sexual dimorphism exist in adults of Haryanvi Baniyas. These data of the present study will be useful to forensic scientists, anthropologist and anatomists.

INTRODUCTION

Anthropometric characteristics have direct relationship with sex, shape and form of an individual and these factors are intimately linked with each other and are manifestation of the internal structure and tissue components which in turn, are influenced by environmental and genetic factors.^[1,2] The ability to differentiate males from females is fundamental to studies of human evolution and is particularly useful in applied fields such as forensic anthropology and bioarchaeology. Human evolutionists study sexual dimorphism to understand how and why Homo sapiens became less sexually dimorphic as they evolved from their pre-human ancestors. Forensic anthropologists use their knowledge of sexual dimorphism to identify the sex of an individual from his or her skeletal remains.^[3,4] Sexual dimorphism is the difference best observed based on phenotype between males and females of the same species.^[5,6] The sex is best assessed from pelvis but skull also offers a number of very good sex indicators and is usually better preserved.^[7,8] Evidence which supports the nutritional hypothesis has traditionally been found in studies on sexual dimorphism of stature.^[9,10] Human populations native to cold climates have larger and broader skulls in order to preserve heat; in contrast, human populations native to hot climates have smaller and narrower skulls in order to dissipate heat.^[11,12] As the best discriminators for race are not necessarily the best for sex, so skulls of unknown provenance are

best tested first for race and than for sex, using different variables for each purpose.^[13,14]

MATERIALS AND METHODS

The present study was conducted on 800 adult Haryanvi Baniyas (400 of either sex). Prior informed consent both in English & Vernacular were obtained from subjects in writing. The subjects of age group 18-40 years were included in the study. The subjects were apparently healthy and without any cephalo-facial deformity.

A series of four somatometric landmarks and two anthropometric measurements was taken on 800 Haryanvi Baniyas. The methodology for measurements was adopted from [Singh & Bhasin]

Somatometric Measurements

1. Maximum head length- It measure straight distance between glabella and opisthocranium.
2. Maximum head breadth- it is the maximum biparietal diameter and is the distance between the most lateral points on the parietal bone.

RESULTS

Mean Maximum head length in males was 18.75 cm and 17.75 cm in females. The S.D. was 1.386 with a standard error of mean 0.0538 in males while S.D. was 0.847 with a standard error of mean 0.0424 in females. [Table 1]

Mean maximum head breadth in males was 13.11 cm and 12.95 cm in females. The S.D. was 1.098

with a standard error of mean 0.0525 in males while S.D. was 0.832 with a standard error of mean 0.258 in females [Table 2].

The present study has been compared with the previous studies of head length. It has been seen that population of Lativa and various studies conducted on population of Nigeria & South Africa, Turkish, Central India, and Indo-Mauritian showed that mean head length in both the males and females of these

regions are higher than the population of Haryanvi adult Banias. [Table 3]

The mean head length of the present study in males was found to be more when compared with studies done by Mahajan, Ilayperuma (Srilankan Population), Jadav (on Sindhi, Patel, Rabari, Bheel), Agnihotri et al, Hossain Asha and Giurazza et al, Jadav & Shah (on Gujrati Population), Krishan & Kumar (on North Indian Kolis), Kumar (on North Indian Gujjars) and Punjabi population.

Table 1: Mean, Standard Deviation, Standard Error of Mean And Range Of Maximum Head Length In Males And Females (In Cm)

Group	Maximum Head Length			Range	
	Mean	S.D	S.E.M	Min	Max.
Males	18.75	1.386	0.0538	16	22.2
Females	17.75	0.847	0.0424	13.6	20.2

Table 2: Mean, Standard Deviation, Standard Error of Mean And Range Of Maximum Head Breadth (In Males And Females in cm)

Group	Maximum head breadth			Range	
	Mean	S.D	S.E.M	Min	Max.
Males	13.11	1.098	0.0525	10.6	16
Females	12.95	0.832	0.258	10	14.7

Table 3: Studies Showing More Mean Maximum Head Length of Previous Studies As Compared to The Present Study

Study	Population	Sex	Head length
Chiba & Terazawa	Turkish population	M	18.844
		F	-----
Nagle E	Lativa	M	19.31
		F	18.33
Patil & Mody	Central Indian Population	M	20.180
		F	18.679
Aghnihotri et al	Indo-Mauritian Population	M	18.66
		F	18.13
Maina et al	Nigeria	M	19.111
		F	18.353
Present Study	Haryanvi Banias	M	18.75
		F	17.75

Table 4: Studies Showing Less Mean Maximum Head Length Of Previous Studies As Compared To Present Study

Author	Population	Sex	Head length
Jadav & Shah	Gujrati population	M	17.65
		F	-----
Krishan & Kumar	North Indian Kolis	M	16.281
		F	----
Krishan	North indian Gujjars	M	17.832
		F	----
Akhtar et al	Bangladeshi Garo females	M	-----
		F	17.49
Mahajan	Punjabi students	M	18.58
		F	17.90
Ilayperuma	Srilankan Population	M	18.00
		F	17.192
Jadhav	Gujarati males	Sindhi	18.56
		Patel	18.66
		Rabari	18.22
		Bheel	17.96
Agnihotri et al	Indo- Mauritian Population	M	18.66
		F	18.13
Asha & Prabha	South Indian population	M	18.17
		F	17.50
	North Indian population	M	18.26
		F	17.51
Seema & Mahajan	Punjabi population	M	17.81
Giurazza et al	Caucasian men Rome (Italy)	M	18.2
		F	17.5

Present Study	Haryanvi Baniyas	M	18.75
		F	17.75

Table 5: Studies Showing Comparison Of Mean Maximum Head Breadth Of Previous Studies With The Present Study

Study	Population	Sex	Head breadth
Krishan & Kumar R	North Indian Koli's	M	13.01
Nagle	Latvia	M	15.42
		F	14.58
Mahajan	Punjabi students	M	15.68
		F	14.72
Pelin et al	Turkish Population	M	15.603
		F	-----
Ilayperuma	Srilankan Population	M	14.015
		F	13.615
Jadhav	Gujarati males	Sindhi	15.34
		Patel	15.01
		Rabari	14.64
		Bheel	13.67
Agnihotri et al	Indo-Mauritian Population	M	15.45
		F	14.48
Maina	Nigeria	M	13.59
		F	13.547
Hossain	females during 1975-79, 1998-2001 Japanese adults	M	15.50
		F	15.462
Asha & Prabha	South Indian Population &	M	14.73
		F	14.63
	North Indian Population	M	15.11
		F	14.52
Present study	Haryanvi Baniyas	M	13.11
		F	12.95

The mean head length of the present study in females was more than the previous studies conducted on Punjabi students, Bangladeshi Garo females, Srilankan females, South Indian females, North Indian females and Causcasianfemales,^[15-17] but when the present study was compared with studies on Indo-Mauritian females & Punjabi females ,the head length was less than the previous studies. The differences in these parameters can be attributed to genetic, geographical and environmental factors. [Table 4]

The mean head breadth in present study of Haryanvi adult Baniyas is 13.11 cm in males and 12.95 cm in females. The results when compared for head breadth with the previous studies shows that the population of Latvia, Nigerian, Turkish, Japanese, Srilanka& Indo-Mauritian have broader heads than Haryanvi Bania the present study when compared with previous Indian studies conducted on South Indian & North Indian Population, Gujarati males (Sindhi, Patel, Rabari and Bheels) & Punjabi students in Punjab showed that they have broader heads then Haryanvi Baniyas but almost similar to North Indian Kolis. [Table 5]

DISCUSSION

The mean values of maximum head breadth were 13.11 cm in males and 12.95 cm in females. The mean values were more in males as compared to females and is statistically significant ($p < 0.05$). The skull is traditionally considered to be best skeletal indicator of ancestry and the second-best indicator of sex next to pelvis, refer to as the

nutritional hypothesis. Throughout human evolution, females have become less affected by nutritional fluctuations due to selection of hormonal mechanism which support the nutritional demands of pregnancy and breast feeding.^[18,19]

The sexual dimorphism observed can also arise due to the difference in levels of testosterone between males and females, because testosterone bring about a direct increase in size and mass of muscles and bone.^[20,21] These differences that exist between males and females have been reported to be likely due to difference in genetic makeup and inheritance which menifest as sexual dimorphism.^[22-27]

CONCLUSION

It was concluded from above study that the mean value of maximum head length was 18.75 cm in males & 17.75cm in females and mean value of maximum head breadth was 13.11 cm in males & 12.95 cm in females. i.e both measurements were more in males as compared to the females & are statistically significant ($p < 0.05$). So it revealed that sexual dimorphism exist in adults of Haryanvi Baniyas. The data of the present study will be useful to forensic scientists, anthropologist and anatomists.

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