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Anatomy

Sexual Dimorphism in Hand Anthropometric Measurements: A Study in 300 Haryanavi Brahmins

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Abstract: The personal identification particularly sex from extremities become increasingly important in cases of mass disasters. Sex has been determined from skeletal remains and different body parts in different studies in the past. The aim of the present study is to provide a database on right and left hand anthropometric measurements in Haryanvi Brahmins and evaluating its sex differences. The present study was conducted on 300 Haryanvi Brahmins (150 of either sex) of age 18 years and above. Three measurements: hand length, hand breadth & shape index were taken using the sliding calliper. All the data so obtained was recorded, tabulated and statistically analyzed. Mean values of hand length, hand breadth & shape index was more in males as compared to females in Haryanvi Brahmins. The difference in mean values of hand measurements between males & females was highly significant in Haryanavi Brahmins.
Keywords: sex, hand measurements, Haryanavi Brahmins, skeletal remains.

INTRODUCTION

The personal identification from extremities becomes more important in cases of mass disasters, where there is a likelihood of recovering feet (often enclosed in shoes) and hands separated from the body. With regard to personal identification of dismembered hand and foot, somatometry of hand and foot, and its osteologic and radiologic examination can help in the determination of primary indicators of identification, such as sex, age and stature [1].

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 on the internal structure and tissue components which in turn, are influenced by environmental and genetic factors.

Anthropometric data are believed to be objective and they allow the forensic examiner to go beyond subjective assessments such as 'similar' or 'different' [2].

Studies in the past have reported a fair possibility of determining sex from skeletal remains and different body parts. The personal identification from extremities become increasingly important in cases of mass disasters, where there is a likelihood of receiving feet and hand separated from the body [1].

The aim of the present study is to provide a database on right and left hand anthropometric measurements in Haryanvi Brahmins and evaluating its sex differences.

AIM AND OBJECTIVES

- To provide authentic database on hand measurements in males and females of haryanvi brahmins.
- To study sexual dimorphism in hand anthropometric measurements in haryanavi Brahmins.

MATERIALS AND METHODS

The present study was conducted on 300 Haryanvi Brahmins (150 of either sex) of age 18 years and above. The subjects belonged to the Brahmin caste community of the state of Haryana in Northern India. Prior informed consent for this study was obtained from subjects in writing, both in English and vernacular. The study followed the guidelines of the Institutional ethical committee. The subjects with any apparent, physical hand anomalies, inflammation, trauma, deformities and

surgery were excluded because of their unsuitability for this investigation. Subjects having any genetic, psychological, neurological or chronic diseases affecting hand parameters were excluded from the study.

A digital sliding caliper (300mm) was used for all the hand anthropometric measurements All measurements were taken on both hands from palmer side with digits fully stretched touching on flat hard surface and 2nd to 5th digits adducted and thumb slightly extended. All the data so obtained was recorded, tabulated and statistically analyzed.

SOMATOMETRIC MEASUREMENT (in mms)

- HAND LENGTH: Defined as distance between the midpoint of the distal wrist crease and the most anterior projecting point i.e. the tip of the third digit.
- HAND BREADTH: The distance between the outside projections of the distal end of second and fifth metacarpals of the hand, with fingers extended and together.
- SHAPE INDEX: Hand breadth X 100/Hand length

OBSERVATIONS

Table-1: Interpretation of hand parameters (mm) by sex in haryanvi brahmins

PARAMETERS		Sex		p value
		Male	Female	
Hand Length	Right	186.69±10.46	172.09±9.21	≤0.001***
	Left	188.08±11.60	172.69±9.42	≤0.001***
Hand Breadth	Right	84.46±6.52	75.30±5.77	≤0.001***
	Left	82.21±6.58	74.25±6.32	≤0.001***
Shape Index	Right	45.09±2.61	43.70±4.07	≤0.001***
	Left	43.83±2.66	42.89±2.87	≤0.01**

P>0.05 Insignificant; *P≤0.05 Significant; **P≤0.01 Very significant; ***P≤0.001 Highly significant

The values of hand length, hand breadth, shape index were found to be higher in males and their difference was found to be statistically highly significant (Table 1).

DISCUSSION

The human hand is the most used and versatile part of the body is of great scientific importance to investigators in the field of anthropometry, forensic pathology, orthopedic surgery and ergonomics.

The personal identification from extremities becomes more important in cases of mass disasters, where there is a likelihood of recovering feet (often enclosed in shoes) and hands separated from the body. With regard to personal identification of dismembered hand and foot, somatometry of hand and foot, and its osteologic and radiologic examination can help in the determination of primary indicators of identification, such as sex, age and stature .The present study was aimed to study the sex differences in hand. The present data was compared with anthropometric measurements of the previously reported studies both in males and females.

Table-2: Comparison of right and left mean hand length (mm) of haryanvi brahmins with the previous studies in both the sexes

AUTHOR	POPULATION	MALES		FEMALES		p value
		RIGHT	LEFT	RIGHT	LEFT	
Kulaksiz and Gozil [3]	Ankara (Turkey)	186.92±8.31	187.34±8.10	171.19±7.64	171.44±7.65	<0.001
Kar *et al.* [4]	West Bengal	175.1±8.5	175.9±8.8	160.9±7.0	160.6±7.5	<0.001
Oomen *et al.* [5]	Karnataka	190.60±7.30	190.62±7.10	173.28±8.90	172.46±8.70	<0.001
Agnihotri *et al.* [6]	Mauritius	188.91±8.80	189.00±8.70	172.20±9.20	172.20±9.30	<0.001
Krishan & Sharma[7]	Himachal Pradesh (Rajputs)	182.4±9.00	182.1±9.1	168.3 ± 8.00	168.00±8.30	<0.001
Danborno &Elukpo [8]	Zaria,Nigeria	198.5±8.60	199.30±9.30	185.10±6.60	185.21±7.70	≤0.001
Ibeachu *et al.* [9]	University of Port Harcourt Nigeria	190.2±0.8	190.9±0.7	176.2±0.7	176.9±0.7	<0.001
Krishan *et al.* [10]	Himachal Pradesh	182.70±9.00	182.10±9.00	168.10±8.00	167.70±8.00	≤0.001

In Haryanvi Brahmins ,the mean hand length values in males was 186.69±10.46 on right side and 188.08±11.60 on left side and in female it was 172.09±9.21on right side and 172.69±9.42 on left side (Table 2) .

The mean values were more in males as compared to females and the difference in values between males and females was significant on both the sides. This is in agreement with the studies done by Kulaksiz and Gozi [3], Kar *et al.* [4], Oomen *et al.* [5] (in males), Agnihotri *et al.* [6], Krishan & SharmA [7], Danborno & Elukpo [8], Ibeachu *et al.* [9], Krishan *et al.* [10] (Table 2).

Table-3: Comparison of right and left mean hand breadth (mm) of haryanvi brahmins with the previous studies in both the sexes

AUTHOR	POPULATION	MALES		FEMALES		p value
		RIGHT	LEFT	RIGHT	LEFT	
Kulaksiz & Gozil (2002)[3]	Ankara (Turkey)	85.54±3.99	84.61±4.31	76.61±4.12	75.64±3.93	<0.001
Kar *et al.* [4]	West Bengal	82.3±0.44	80.3±0.41	73.0±0.35	70.7±0.35	≤0.001
Agnihotri *et al.* [6]	Mauritius	84.50±4.00	84.20±4.00	74.8±3.8	74.2±3.7	<0.001
Danborno & Elukpo[8]	Zaria,Nigeria	89.00±9.50	86.80±9.20	78.20±4.90	77.20±4.60	<0.001
Krishan *et al.* [10]	Himachal Pradesh (Rajputs)	82.30±3.90	80.90±4.30	74.00±4.20	72.90±4.30	<0.001
Ibeachu *et al.*[9]	University of Port Harcourt, Nigeria	85.8±0.3	84.3±0.3	76.9±0.3	75.8±0.3	<0.001
Present study	Haryanvi Brahmins	84.46±6.52	82.21±6.58	75.30±5.77	74.25±6.32	≤0.001

In Haryanvi Brahmins ,the mean hand breadth values in males was 84.46±6.52 on right side and 82.21±6.58 on left side and in female it was 75.30±5.77 on right side and 74.25±6.32 on left side

The values were more in males as compared to females and the difference in values between males and females was highly significant on both the sides. This is in agreement with the studies done by Kulaksiz and Gozil [3], Kar *et al.* [4], Agnihotri *et al.* [6], Danborno & Elukpo[8], Ibeachu *et al.* [9], Krishan *et al.* [10] (Table 3).

Table-4: Comparison of right and left mean shape index of haryanvi brahmins with the previous studies in both the sexes

AUTHOR	POPULATION	MALES		FEMALES		p value
		Right	Left	Right	Left	
Kulaksiz and Gozil [3]	Ankara (Turkey)	45.80±1.88	45.19±2.03	44.78±2.08	44.15±1.99	<0.001
Danborno and Elukpo [8]	Nigerian	44.92±5,15	43.65±5.15	42.27±2.67	41.74±2.34	<0.001
Present study	Haryanvi Brahmins	45.09±2.61	43.83±2.66	43.70±2.60	42.89±2.87	≤0.001

In Haryanvi Brahmins ,the mean shape index values in males was 45.09 ±2.61 on right side and 43.83±2.66 on left side and in female was 43.70±2.60 on right side and 42.89±2.87 on left side. The mean values were more in males as compared to females. The difference in values between males and females was highly significant on both the sides which coincided with the studies done by Kulaksiz and Gozil [3] & Danborno and Elukpo [8] (Table 4).

CONCLUSIONS

- Mean values of hand length, hand breadth & shape index was more in males as compared to females in Haryanvi Brahmins
- The difference in mean values of hand measurements between males & females was highly significant in Haryanavi Brahmins.
- Since majority of the subjects use their right hand, it is usually found to be shorter and noticeably wider than the left hand irrespective of handedness of an individual.

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