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Original Research Article

TO EVALUATE PRACTICAL METHOD FOR SEX ESTIMATION FROM FOOT ANTHROPOMETRY.

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Abstract:

Background&Methods: The aim of the study is to evaluate practical method for sex estimation from foot anthropometry.Anthropometric measurements of the foot viz. foot length were taken independently on the left and right side of each individual. Stature of each subject was also recorded. Subjects with both lower limbs were included in the present study. All the measurements were taken in daylight. The measurements were taken twice for accuracy.

Results: Mean of foot lengths on right side (22.58±1.83 cm) are less than mean foot length on left side (23.55±2.57 cm) in male subjects. This can be attributed to effect of foot dominance on foot measurements. Foot length on right side (20.29±1.64 cm) was more than left side (20.18±1.92 cm) in female study subjects.

Conclusion: In the present study it was found that there exists a statistically significant correlation between foot parameters and stature in both sexes. The correlation between foot length and stature was found to be more in males than females, therefore indicating foot length to be a better predictor of stature in males than females.

Keywords: practical, sex, foot &anthropometry.
Study Design: Observational Study.

1. Introduction

Anthropometry is a series of systematized measuring techniques that express quantitatively the dimensions of the human body and skeleton.Anthropometry is often viewed as a traditional and perhaps the basic tool of biological and physical anthropology, but it has a long tradition of use in forensic sciences and its finding increased use in medical sciences especially in the discipline of forensic medicine[1]. It is highly objective and reliable in the hands of trained anthropometrists. The significance and importance of somatometry, cephalometry, craniometry and osteometry in the identification of human remains have been described and a new term of 'forensic anthropometry' is coined. Forensic anthropometry incorporates most of the techniques originating from the analysis of human skeletal material from archaeological sites. Since centuries anthropology has widely been used in paleo-anthropology for the purposes of understanding humanphysical variations as well as correlation of various physical with racial and psychological traits[2]. The ultimate aim of

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using anthropometry in forensic medicine/science is to help the law enforcement agencies in achieving 'personal identity' in case of unknown human remains. Forensic medicine is an interdisciplinary science which in everyday practice applies all the knowledge that medical sciences, have accepted as reliable and scientifically solid facts or processes, and qualitative and quantitative definitions with the help of which accurate and reliable statements can be made[3-5].

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[6]. Anthropometric data are believed to be objective and they allow the forensic examiner to go beyond subjective assessments such as „similar' or „different'. With measurement data, the examiner is able to quantify the degree of difference or similarity and state how much confidence can be placed in this interpretation[7].

2. Material and Methods

In the present study individuals of age more than 21 years were included. Bertillon system is based on the principle that after the age of 21 years the dimensions of the skeleton remain unchanged and also that the ratio in size of different parts to one another varies considerably in different individuals.

Anthropometric measurements of the foot viz. foot length were taken independently on the left and right side of each individual. Stature of each subject was also recorded. Subjects with both lower limbs were included in the present study. All the measurements were taken in daylight. The measurements were taken twice for accuracy.

INCLUSION CRITERIA

All cases of post mortem examination where age is more than 21 years, except all exclusion criteria.

EXCLUSION CRITERIA

1. All subjects with skeletal abnormalities and deformities.
2. All subjects with amputated lower limbs.

3. Result

Table 1: Age wise distribution

S. No.	Age	Male No.	Female No.
1	21- 25 years	11	13
2	26- 30 years	10	08
3	31 - 35 years	03	07
4	36 - 40 years	06	05
5	41 - 45 years	04	06
6	46 - 50 years	04	02
7	51 - 55 years	03	02
8	56 - 60 years	03	03

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE1, 2024

9	61 - 65 years	02	01
10	66 - 70 years	02	01
11	71 - 75 years	01	01
12	76 - 80 years	01	01
13	81 - 85 years	00	00
14	86 - 90 years	00	00

Above table shows age wise distribution of the male subjects. In this study maximum numbers of cases were in age group of 21 to 25 years, while minimum numbers of cases were in age group 80 to 85 years and 85 to 90 years.

Table 2: Analysis for foot length study

Variables		**RFL in cm**	**LFL in cm**	**Av. FL in cm**
Mean	Male	22.58	23.55	22.34
	Female	20.29	20.18	20.22
Standard deviation	Male	1.83	2.57	2.61
	Female	1.64	1.92	2.96
Maximum	Male	27.50	28.20	27.50
	Female	24.4	24.4	24.4
Minimum	Male	19.50	19.20	17.55
	Female	16.9	16.8	16.85
Range	Male	19.50-27.50	19.20-28.20	17.55-27.50
	Female	16.9-24.4	16.8-24.4	16.85-24.4

Mean of foot lengths on right side (22.58±1.83 cm) are less than mean foot length on left side (23.55±2.57 cm) in male subjects. This can be attributed to effect of foot dominance on foot measurements. Foot length on right side (20.29±1.64 cm) was more than left side (20.18±1.92 cm) in female study subjects.

Table 3: Correlation between different variables

Variables	**Correlation**	**Correlation**
Correlation between HT&RFL	0.633	Strong, positive, statistically significant correlation
Correlation between HT&LFL	0.419	Moderate, positive, statistically significant correlation
Correlation between HT&AvFL	0.419	Moderate, positive, statisticallysignificant correlation

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE1, 2024

Statistically significant, positive correlation was seen between all the parameters.

4. Discussion

The values of mean foot length were observed in different study groups. The mean foot dimensions were found to be more in males than in females in previous studies. The findings of the present study also showed that the males had longer feet than females with a statistically significant intersex difference. This is because the growth of feet stops about two years earlier in females than in males[8].

Variations were also noted in the foot dimensions in the same sex group belonging to different study populations. All the anthropometric parameters are determined by genetic and environmental factors and hence are known to vary between different ethnic groups [9].

In males growth spurt occurs later and they continue to grow for a longer period under the influence of testosterone. In females the pubertal growth spurt occurs early, but the growth stops early under the influence of oestrogen which causes early fusion of epiphysis [10-11].

The table also shows variation in mean stature between same sex groups of different study groups. The stature is determined by several factors which include genetic and environmental factors. This is the reason for wide variation in mean stature amongst individuals of same sex belonging to different endogamous groups [12].

5. Conclusion

In the present study it was found that there exists a statistically significant correlation between foot parameters and stature in both sexes.The correlation between foot length and stature was found to be more in males than females, therefore indicating foot length to be a better predictor of stature in males than females.

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ISSN: 0975-3583, 0976-2833 VOL15, ISSUE1, 2024

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