

A Study of the Correlation Between Hand Length and Foot Length in Nepalese Medical Students

Rajesh Kumar Das¹, Sanjay Kumar Sah², Manish Kumar Singh³,
Binod Kumar Yadav⁴, Amit Kumar Patel⁵

¹Department of Anatomy, National Medical College, TU, Birgunj, Nepal

²Department of Forensic Medicine, National Medical College, TU, Birgunj, Nepal

³Department of Anatomy, National Medical College, TU, Birgunj, Nepal

⁴Department of Community Medicine, National Medical College, TU, Birgunj, Nepal

⁵Department of Pathology, National Medical College, TU, Birgunj, Nepal

Corresponding Author: Rajesh Kumar Das

DOI: <https://doi.org/10.52403/ijhsr.20240629>

ABSTRACT

Background: Dimensions of foot and hand are important tools for sexual dimorphism. In case of identification from dismembered part of body study of dimension of these body part may be crucial. Their correlation may be helpful in identification of an individual.

Materials and Methods: The present study was conducted on 100 students of both sexes. Hand length, hand breadth and foot length were measured by sliding caliper and measurements were analyzed using SPSS 23.0.

Results: The mean right hand length in male was 17.52 cm and mean right hand length in female was 15.66. The difference was significant ($P < 0.05$). The mean left foot length and right foot length in male were 24.96 and 24.98 respectively and in female 23.29 and 23.35 respectively. The correlation coefficient (R^2) of left hand length and left hand breadth was .443.

Conclusion: There was significant difference of hand and foot dimensions in male and female. There was the largest correlation coefficient of left hand length and left hand breadth.

Keywords: Hand length, Foot length, Identification.

INTRODUCTION

Various body parts of human are distinctive and astonishingly discovered. For forensic anthropologists and anatomists study of body parts like hands and feet has been providing important identification data for several years due to their unique size and shape for individual person.(1) For positive identification of a person big four primary parameters to be determined are gender, height, age and race .In case of dismembered bodies, the dimension of foot and hand could play vital role in positive identification of body due to their strong

correlation with other various body parts.(2-3)

It is easier for forensic experts to examine hand. Determining the hand index from measurement of hand length and breadth could be important tool for determining sexual dimorphism in humans. (4) As a result of hereditary and environmental factors, great variation can be seen in hands and feet of various ethnic groups.(5)

Very few studies have been done in mid central Terai region of Nepal to look dimensions of hand and feet and their association with each other. So this study

aims to find the dimension of hands and feet and assess the correlation between their dimensions.

MATERIALS & METHODS

The descriptive cross-sectional studies among 100 medical student (56 males and 44 females) within the age group of 18-25 was carried out at National Medical College after taking ethical approval from Institution Review Committee with reference number F-NMC/564/078-079. The study was conducted from August 2022- January 2023. Apparently asymptomatic male and females between age group of 18-25 and inhabitants of mid southern region of Nepal were included in this study. The subjects with physical deformities and systemic illness affecting bony growth were excluded from the study. The subjects were informed about their role and responsibility in participation and consent has been taken.

Sliding caliper was used for measurement of hand and foot dimension. All the

measurements were taken between 10:00 to 11:00 AM to eliminate diurnal variation.

Hand length was measured as distance between the midpoint of a line joining the styloid process of radius and ulna bones of forearm to the tip of middle finger. Hand breadth was measured as the distance between the most prominent point on the lateral aspect of hand of second metacarpal and the most prominent point on the medial aspect of the hand of fifth metacarpal.(6) Foot length was measured as the distance between the most anterior and posterior projecting parts of the foot.(7)

STATISTICAL ANALYSIS

Statistically data analysis was done using SPSS 23.0. The significance of sex was tested using independent t-test. Value of correlation coefficient was obtained by regression analysis.

RESULT

Table 1: Assessment of Right hand dimension

Right Hand							
Length				Breadth			
Gender	Mean	N	St. Deviation	Gender	Mean	N	St. Deviation
Male	17.51	56	0.87	Male	7.69	56	0.49
Female	15.66	44	0.98	Female	6.80	44	0.42
Total	16.70	100	1.30	Total	7.30	100	0.63

Table1. Illustrates the mean right hand length and breadth. In males the mean hand length was 17.51 cm and in female mean hand length was 15.66 cm with standard

deviation of 0.87 and 0.98 respectively. Similarly mean right hand breadth was 7.69 in male and 6.80 in female with standard deviation of 0.49 and 0.42 respectively.

Table 2: Assessment of Left hand dimension

Left Hand							
Length				Breadth			
Gender	Mean	N	St. Deviation	Gender	Mean	N	St. Deviation
Male	17.41	56	0.89	Male	7.64	56	0.49
Female	15.71	44	1.02	Female	6.78	44	0.46
Total	16.66	100	1.25	Total	7.26	100	0.64

Table 2. Shows assessment of left hand length and breadth. In Male mean left hand length was 17.41 and mean left hand in female was 15.71. The standard deviation for male and female left hand length was

0.89 and 1.02 respectively. In male mean breadth of left hand was 7.64 and mean breadth of female left hand was 6.78 with standard deviation of 0.49 and 0.46 respectively.

Table 3: Assessment of Foot length

Foot Length							
Right foot length				Left foot length			
Gender	Mean	N	St. Deviation	Gender	Mean	N	St. Deviation
Male	24.98	56	1.08	Male	24.95	56	1.16
Female	23.63	44	1.36	Female	23.29	44	1.36
Total	24.26	100	1.45	Total	24.22	100	1.49

Table 3. Demonstrates mean right foot length and left foot length. Mean right foot length of male was 24.98 whereas mean right foot length in female was 23.63.

Similarly mean left foot length in male was 24.95 and mean left foot length in female was 23.29 with standard deviation of 1.16 and 1.36 respectively.

Table 4: Correlation hand length and breadth with foot length

Pair	R ²	r	P
Right hand length & Right foot length	.262	.512	.04
Left hand length & left foot length	.300	.548	.001
Left hand length & Left hand breadth	.443	.665	.000

Table 4 shows positive correlation between right hand length and right foot length, left hand length and left foot length, left hand length and left hand breadth with correlation coefficient (R²) .262, .300 and .443 respectively. The difference was significant (P<0.05).

DISCUSSION

Determination of dimensions of various body parts has extensively been used by forensic anthropologist to relate it with gender, ethnicity and stature. In this study male and female within age of 18- 25 years and inhabitants of mid central southern region of Nepal were selected as subjects of this study and dimensions of hands and feet were measured.

In the present study hand length and hand breadth of male are found larger than females and the differences in these measurements was found to be statistically significant. This shows the clear distinction of sexual dimorphism. The smaller dimension of hand of female may be due to the early pubertal growth spurt in female that stops early causing early fusion of epiphyseal joints. Similar findings were reported by Sah SK (8), Moizuddin K (9) Jethva (10). There was no statistically significance in bilateral differences of all these parameters. But the other studies have shown bilateral asymmetry in hand

dimension (11 ,12). This may be due to more use of one of either hands causing strengthen of muscle and bone development. We found the mean length of right foot in male was 24.98 cm and in female 23.35. cm. Similarly mean length of foot in male was 24.95 cm and in female was 23.29 cm. It Suggests significant difference between male and female feet. But non – significant bilateral differences. In one study conducted in Nepal showed mean foot length in male was 23.56 cm and mean foot length in female was 21.78.(13) The result is similar to our study.

In this correlation coefficient for right hand length and right foot, left hand length with left foot length and left hand length with left hand breadth were 0.262, 0.300 and 0. 443 respectively. So largest correlation coefficient of left hand length and left hand breadth reflects significant correlation. Study conducted by Igbigbi PS revealed breadth parameter showed stronger correlation in hand and foot dimensions. (7) This is similar to our study.

CONCLUSION

Determination of foot and hand dimension can be used in forensic and medical investigation for identification of the persons as other parameter like stature and sex can be determined from these body parts. Male hand and foot dimension is

larger than female counterpart. The hand and foot dimensions are also significantly correlated.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Kamboj K, Khan I, Panday K. A study on the correlation between foot length and height of an individual and to derive regression formulae to estimate the height from foot length of an individual [Internet]. International Journal of Research in Medical Sciences. [cited 2022Aug4]. Available from: <https://www.msjonline.org/index.php/ijrms/article/view/3818>
2. Ahmed AA. Estimation of stature from the upper limb measurements of Sudanese Adults. Forensic Science international 2013; 228:178e1-7
3. Soo-Chan J, Sanghyun K, Myung HY. Analysis of stature prediction from foot anthropometry: a south Korean case study. Australian J Forensic Sci. 2015;49.
4. Amitava P, Sujaya D, Piyali S, Payel M, Prakash CD. Estimation of stature from hand dimension in Bengalee population, West Bengal. Indian Egyptian J Forensic Sci. 2016; 6:90-98.
5. Ibrahim MA, Khalifa AM, Hagra AM, Alwakid NI. Sex determination from hand dimensions and index/ring finger length ratio in North Saudi population: Medico-legal view. Egyptian journal of Forensic Sciences. 2016;6(4):435-444. DOI: <https://doi.org/10.1016/j.ejfs.2016.11.002>
6. Khan MA, Bashir SI, Khan MA. Shahdad S. Determination of stature from measurements of hand length and hand breadth. International Journal of Anatomy and Research 2017;5(2.3):3968-75.
7. Igbigbi PS, Ominde BS, Adibeli CF. Anthropometric dimensions of hand and foot as predictors of stature: A study of two ethnic groups in Nigeria. Alexandria Journal of Medicine 2018;54:611-617.
8. Sah SK, Jeelani BA. Hand Index - A forensic tool for Sexual Dimorphism. Journal of Lumbini Medical College. 2018;6(2):5 pages. DOI: 10.22502/jlmc.v7i1.272. Epub: 2019 June 05.
9. Moizuddin K, Saudagar ASH, Hiware SD, Siddiqui FB, Daimi SRH, Badaam AM. To evaluate the correlation of stature with hand and foot width in subjects. Indian Journal of Public Health Research & Development 2020;11(03):2074-76.
10. Jethva N, Patel SV, Patel SM, Vora R and Purmar G. Estimation of stature from hand length in living subjects of Gujrat region. National Journal of Integrated Research in Medicine 2013;4(4):57-60.
11. Rastogi P, Nagesh KR, Yoganarasimha K. Estimation of stature from hand dimensions of north and south Indians. Legal Med 2008;15:479-82.
12. Kanchan T, Krishna K, Sharma A. Menezes RG. A study of correlation of hand and foot dimensions for personal identification in mass disasters. Forensic Sci Int 2010; 199:112, e1-6.
13. Sah SK, Karki Naresh, Jeelani BA. Estimation of height from foot dimensions. Journal of Lumbini Med. Coll. 2018;6(1):27-31.

How to cite this article: Rajesh Kumar Das, Sanjay Kumar Sah, Manish Kumar Singh, Binod Kumar Yadav, Amit Kumar Patel. A study of the correlation between hand length and foot length in Nepalese Medical Students. *Int J Health Sci Res.* 2024; 14(6):199-202. DOI: <https://doi.org/10.52403/ijhsr.20240629>
