Original article

Assessment of Lengths of Fingers Between Male and Female of Right and Left side of Medical Students

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Abstract:

Background:
There exists relationship between stature and different parts of the body as well as fingers also. The relationship between body segments has been the focus of anatomists, anthropologists and scientists for many years. But still very few data is available in this regards.

Objectives:
To find out the variations of anthropometric dimensions of different fingers of hands amongthe students of both sexes of Rangpur Medical College.

Methods:
This cross-sectional, studywas performed in Department of Anatomy, Rangpur Medical College, Rangpur, from January 2018 to December 2018 on 700 medical students (350 male and 350 female) of Rangpur Medical College. Length of five fingers of both hands was measured with the help of digital slide calipers. Paired and unpaired student's t' test were done for statistical analysis by SPSS Version 15.

Result:
Study revealed that lengths of five fingers were significantly higher in male than female ($p<0.001$). When comparison was done between both sides it was observed that mean lengths of thumb was significantly higher in both sexes on right sides but the lengths of other fingers were significantly higher on left side except little finger of female which is higher on right side.

Conclusions:
In both male and female, difference between right and left hand are also signif icant in above parameters.

Key words: Sexual dimorphism, Finger measurements, Anthropometry

Introduction:

Considering the strength of fingers of hands is essential during industrial work, to minimize discomfort and risk of upper extremity injuries and their associated costs anthropometry of fingers are essential[1]. Sex, age, stature and ethnicity are big fours of anthropometry[2]. Among these 'big fours' of anthropometry, determination of stature and sex are two important criteria in establishing the identity of an individual to Anthropologist, Anatomist, Ergonomist, Obstetrician and in medico-legal practice. Anthropometric data of fingers have valuable applications in different areas of design of hand tools and hand equipment's. In these days, in case of mass disasters and assault cases where body is dismembered to conceal identity of the victim, identification of dismembered, mutilated and fragmentary remains is vital[3]. The aim of this study was to provide the authentic database for Anatomist, Anthropologist, Ergonomist, and forensic investigators about thedimensions of fingers of hands and to determine the differences between both hands in both sexes in a sample of Bangladeshi young adult population(medical students of Rangpur Medical College).

Methods:

The cross-sectional study was conducted on 700 students (350 male and 350 female) of Rangpur Medical College. This study was done in the

Department of Anatomy, Rangpur Medical College, Rangpur from January 2018 to December 2018. Samples were collected by convenient purposive sampling as per inclusion and exclusion criteria.The hand dimensions in the categories given below were taken by digital slide calipers in mm. The length of five fingers was measuredfrom the palmer aspect of hand with fingers fully extended, adducted on the flat surface and thumb extended.Length of the five fingers was measured between the tips of the finger to the distal metacarpo-phalangeal crease[3]. After collecting the data, distribution of values of the measurements were determined. Results were prepared from this data, in term of range, mean, standard deviationfor each parameter.All the values of measurement were compared between male and female by unpaired "t" test. In all the statistical analysis unpaired t test, the significance level was set at $p<0.05$.The statistical analysis was carried out using the statistical package for social sciences (SPSS version 15.0). Then tables and diagrams were used to explain the result.

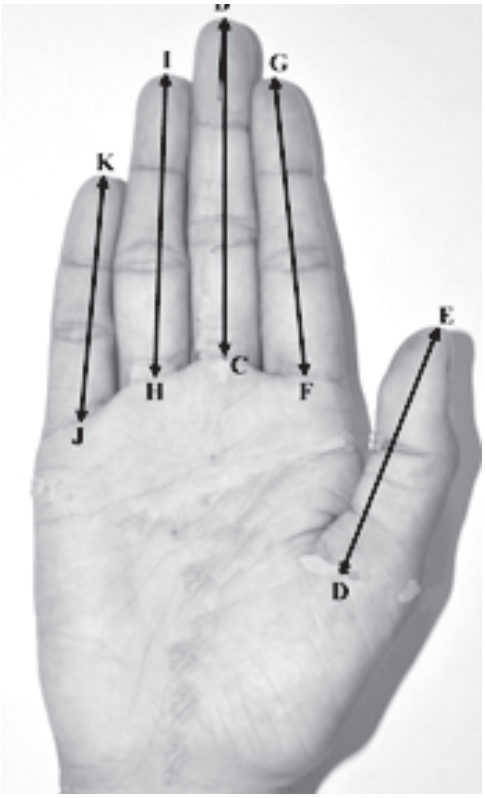


Figure-1: Human hand illustrating the land marks of different finger dimensions

D to E: 1st digit length; F to G: 2nd digit length C to B: 3rddigit length; H to I: 4th digit length; J to K: 5th digit length.

Result:

Table-I showed results of five finger length of both sides in male and female. In males, length of index, middle, ring and little fingers were significantly higher in left side than right side but length of thumb was significantly higher on right side. In female, length of index, middle and ring fingers were significantly higher in left side than right side but length of thumb and little finger were significantly higher on right side. When the values were compared between male and females of both sides, it was observed that values of males were significantly higher than females (Table-II).

Table-I: Comparison of five fingers' length between right & left hand in Male and Female (n=350 each group)

Group	Finger length (mm)	Right	Left	p value
Male	Thumb length	48.03-77.42 64.44±4.42	50.55-75.66 64.35±4.28	<0.001
	Index finger length	61.70-82.69 71.77±3.82	62.55-83.0 71.93±3.83	<0.001
	Middle finger length	67.35-91.05 78.87±4.00	68.03-90.94 79.16±3.99	<0.001
	Ring finger length	61.55-87.35 72.71±3.92	61.99-85.53 72.85±3.92	<0.001
	Little finger length	50.31-70.93 59.59±3.86	50.18-70.59 59.68±3.78	<0.001
Female	Thumb length	41.25-70.14 57.93±4.24	41.88-71.47 57.87±4.16	<0.001
	Index finger length	53.59-74.52 65.38±4.12	53.58-74.57 65.66±4.16	<0.001
	Middle finger length	59.36-86.06 71.72±4.45	59.36-85.80 71.82±4.46	<0.001
	Ring finger length	54.4-77.78 65.95±4.25	53.99-78.52 65.96±4.27	<0.001
	Little finger length	43.16-65.42 53.96±4.03	42.14-64.80 53.86±4.05	<0.001

Results are shown as ranges and mean±SDs. Comparison of five fingers' length between right & left hand in Male and Female were found to be significant at p<0.05 in paired student's "t" test.

Table-II: Comparison of finger length between Male and Female (n=350 each group)

Variable (Finger Length)	Hand	Male	Female	p value
Thumb Length (mm)	Right	48.03-77.42 64.44±4.42	41.25-70.14 57.92.23±4.23	<0.001
	Left	50.55-75.66 64.35±4.28	41.88-71.47 57.87±4.16	<0.001
Index finger (mm)	Right	61.70-82.69 71.77±3.82	53.59-74.52 65.38±4.12	<0.001
	Left	62.55-83.0 71.93±3.83	53.58-74.57 65.66±4.15	<0.001
Middle finger (mm)	Right	67.35-91.05 78.87±4.00	59.36-86.06 71.72±4.45	<0.001
	Left	68.03-90.94 79.16±3.99	59.36-85.80 71.81±4.45	<0.001
Ring finger (mm)	Right	61.55-87.35 72.71±3.92	54.4-77.78 65.95±4.25	<0.001
	Left	61.99-85.53 72.85±3.92	53.99-78.52 65.96±4.27	<0.001
Little finger (mm)	Right	50.31-70.93 59.59±3.86	43.16-65.42 53.96±4.00	<0.001
	Left	50.18-70.59 59.68±3.78	42.14-64.80 53.86±4.05	<0.001

Results are shown as ranges and mean±SDs. Comparison between Male and Female were found to be significant at p< 0.001 in unpaired student's "t" test.

Discussion:

The present study was done with aim to develop sex estimation standards from hand measurements specifically for population in and around geographical region of Bangladesh. It was observed by reviewing of literature that many works have been carried out on anthropometric measurement of hand in foreign countries. But so, fact it is known, there is no published work on finger anthropometry conducted on Bangladeshi Medical students. So, the result of the present study was compared with the findings of other researchers.

In the present study, males showed higher mean values in all the parameters studied, than the females and the differences in these measurements was found to be statistically significant (p<0.001).These statistical significant differences may be due to the early pubertal growth spurt in girls that stops early, under the influence of estrogen, which causes early fusion of epiphysis. In males although the growth spurt occurs comparatively later, they continue to grow for a longer period under the influence of testosterone. This reason necessitates different equations for males and females. As in the present study significantly higher value in male than female found was similar to other studies done in different population of the world[3-6].

In the present study, in male, except the length of thumb, all other finger lengths were significantly higher on left side than right, but thumb length was significantly higher on right side. Again, in female, the length of index, middle and ring fingers were significantly higher in left but thumb and little finger lengths were significantly higher in right side.Whereas, in the study of Zulkifly et al.[7], in Eban people of Malaysia, index finger was longer than ring finger in both sexes, all other study found (including the present) the ring finger was longer than the index finger. Regarding middle finger length, it was highest in the male students of the present study (>79mm). Similar value was found by Moorthy and Zulkifly[4] and Tandon et al.[8]. Again, it was observed that middle finger length was higher in left side than right and reached significant level in the present study. It was found that little finger length was shorter than thumb. Highest value of this finger (>59mm) was found in the male students of the present study and similar value was found by Moorthy and Zulkifly[4] in Malaysian males and Chandra et al.[9] in male workers of Haryana, India.In the human hand, middle finger is the longest and the thumb is the shortest, followed by the little finger. The relative length of the index and ring fingers makes a disputable point. In females, the index and ring fingers tend to be almost equal in length, whereas in males the ring finger tends to be much longer than the index finger. Thus, the index

and ring finger ratio becomes a significant parameter for determining sex[3].

Conclusion:

Over viewing the result of the present study and several such studies carried out in the past for population of different parts of the world, it was found that all finger measurements are sexually dimorphic and all dimensions of right and left hands of males were greater than dimensions of females. It was also found that all fingers of both hands are not symmetric and thumb of both sexes are longer on right side than left. Index, middle, ring and little fingers were significantly higher on left side than right side in male but index, middle and ring finger were significantly higher on left side in female except little finger which is higher on right side.

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