Original Article

Correlation of Index Finger Length (2D) with Height, Weight and BMI in Adult Bangladeshi Male

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Abstract

Background*: Human hand is one of the most versatile parts of the human body which plays an important role in modern medical science and evolutionary biology. By virtue of evolution and genetic arrangements, digital lengths vary from person to person according to age, sex, races, occupation or even environmental influences. It has been found that the digital lengths and their ratios are not same in different sexes and even in both hands of same individual. Specially, index to ring digit lengths and their ratios which already have been proved to represent sexual dimorphism may differ in both hands of an individual and show positive correlations with other morphological attributes like height, weight and BMI.* ***Objectives****: To analyze the variation of index finger (2D) length and its correlation with height, weight and BMI in adult Bangladeshi male.* ***Materials and Methods****: This cross-sectional analytical study was conducted in the department of Anatomy, Dhaka Medical College, Dhaka from July 2012 to June 2013 on 100 male MBBS students (20−25 years of age). With the help of digital vernier caliper measurements of index finger length (2D) was recorded. Height and weight were measured by the stadiometer and weighing scale respectively. BMI was calculated from height and weight. Pearson's correlation analysis was done to find out the correlation of index finger length with height, weight and BMI.* ***Results****: Significant correlation has been found between the lengths of index fingers (2D) and height ($p<0.01$), but there was no significant correlation of index finger length with weight and BMI ($p>0.05$).* ***Conclusion****: In this study, we found variation in index finger lengths of both hands of Bangladeshi male subjects, which needs further study and comparison.*

Key words*: Right finger length (R2D); Left index finger length (L2D); BMI (Body Mass Index)*

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Introduction

It has been known for a long time that any measurements of body parts can change with the alterations in the size of the organs involved or even generalized body size and this concept was first defined by Levinton.[1] Throughout the following decades, measurements of digital length and its sexual variations has been of marked interest among the researchers. The index finger located between thumb and middle finger is the second digit (2D) which is usually the most dexterous and sensitive finger next to thumb of a human hand.[2] Researchers claimed that the relative lengths of digits are set before birth[3] and interestingly in human hands, the relative lengths of the index finger differs between male and female.[4] In the study of Manning et al[4], it is seen that smaller index fingers in men have been associated with higher levels of physical aggression throughout their life.[5] Men with less smaller index finger are reported as being more masculine and dominant in nature and tend to perform better in a number of physical activities.[6] In human, number of physical and behavioral traits depends on index finger

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length (2D) in both sexes, which were statistically proven. For example, males with smaller index finger are more fertile and have high life time reproductive success. Also, they are more aggressive and assertive in nature and have high musical and sports aptitudes.[7] Again, male with excessive smaller index finger often has some attributes like left-handedness, good visuo-spatial ability[8], fast running speed[9], but they may also experience some severe health related problems like autism, Asperger's syndrome, prostatic carcinoma, hepatitis B-related hepatocellular carcinoma, urolithiasis and rheumatoid arthritis and male having longer index finger often has higher risk of early heart disease.[8] In general, the average height of male is more than female.[10,11] During puberty, male deposit adipose and muscle tissue around the upper body whilst females deposit adipose tissue around the thighs and buttocks producing a typical male body shape (android) and female body (gynoid) respectively. The main reason for the stability of sexual dimorphism of height, weight, body mass index (BMI) is the sex-hormone profile of an individual. The length of index finger (2D) is determined by intrauterine sex hormones at prenatal event of life. Also, other physical traits like height, weight and BMI which are largely determined at puberty are mainly influenced by adult sex hormone profile. So, the index (2D) digit lengths could have some relationships with height, weight and BMI among adults.

Materials and Methods

This study was performed on 100 male medical students of Dhaka Medical College, Dhaka aged 20−25 years. Height of the subject was taken by stadiometer. According to the standard procedure the subject stood bare footed. The subject was standing in erect posture so that weight was evenly distributed between both feet on a stadiometer. The position of the head was in the Frankfurt plane (the upper border of the external acoustic meatus and the infraorbital margin on the same horizontal line). The subject was looking straight ahead, shoulder was relaxed, and arms were at sides. Measurement was taken bare footed and weight was measured by the weighing scale in kilogram (kg) while the subject stood on the scale facing forward with both feet placed on the scale and weight evenly distributed between the feet (Fig 1).[12] With the help of a digital vernier caliper the index (2D) lengths were recorded in millimeters. Length was measured by measuring the crease-tip (c-t) length where "c" is the midpoint of proximal crease at the base and "t" is extreme end (tip) of the finger that is furthest from the crease. The distance between these two points indicates the length of index (2D) finger.[9] Measurements were taken three times independently and the maximum length was taken for analysis. Body mass index was calculated by dividing the body weight in kg by the square of the height in meters. Pearson's correlation analysis was done to find out the correlation of index finger length with height, weight and BMI. The study was approved by the Ethical Review Committee (ERC) of Dhaka Medical College, Dhaka.

Fig 1. a) Measurement of height

Fig 1. b) Measurement of weight

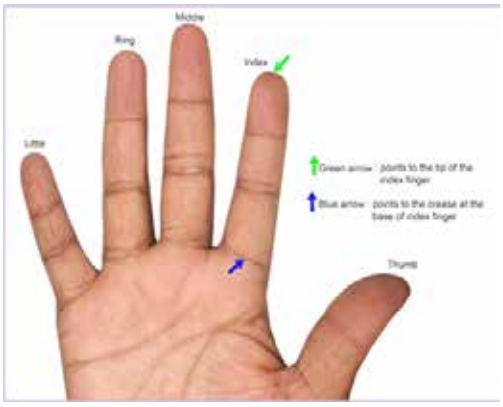

Fig 2. a) Identification of crease and tip of index finger

Fig 2. b) Measurement of the breadth of the crease of the index finger to mark the midpoint of the crease

Fig 2. c) Measurement of length (c-t) of the index finger (2D)

Results

Table I shows the measurements of different variables and Table II and Figures 3−8 show the correlation between index finger length and height, weight and length. In the present study, height positively correlated with the length of right and left index fingers (R2D and L2D) and it was statistically significant ($p<0.01$). But weight and BMI did not show any significant correlation ($p>0.05$).

Table I: Measurement of different variables (N=100)

Variables	Range	Mean ± SD
R2D (cm)	6.359−8.124	7.140 ± 0.367
L2D (cm)	6.319−8.183	7.170 ± 0.379
Height (cm)	154.90−185.42	168.70 ± 5.75
Weight (kg)	46.00−89.00	65.76 ± 9.82
BMI (kg/m²)	16.09−31.55	23.13 ± 3.55

Table II: Correlation between index finger length with height, weight and BMI (N=100)

Variables	Correlation coefficient (r)	p values
Height with R2D	+0.561	<0.01
Height with L2D	+0.579	<0.01
Weight with R2D	+0.102	>0.05
Weight with L2D	+0.134	>0.05
BMI with R2D	−0.148	>0.05
BMI with L2D	−0.112	>0.05

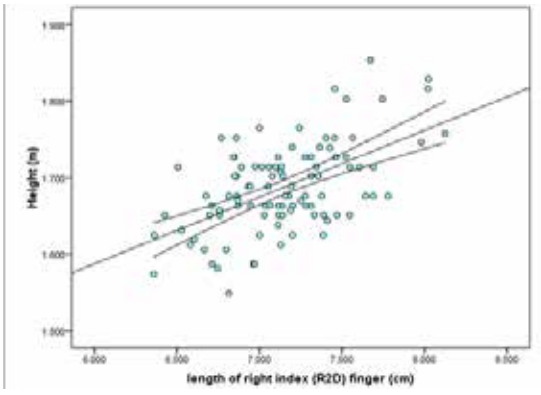

Fig 3. Correlation of length of right index finger (R2D) with height

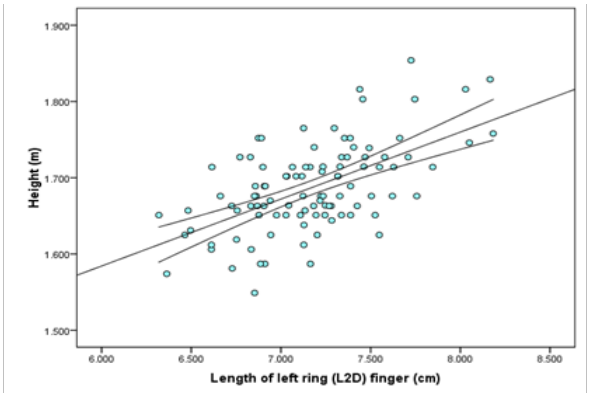

Fig 4. Correlation of length of left index finger with height

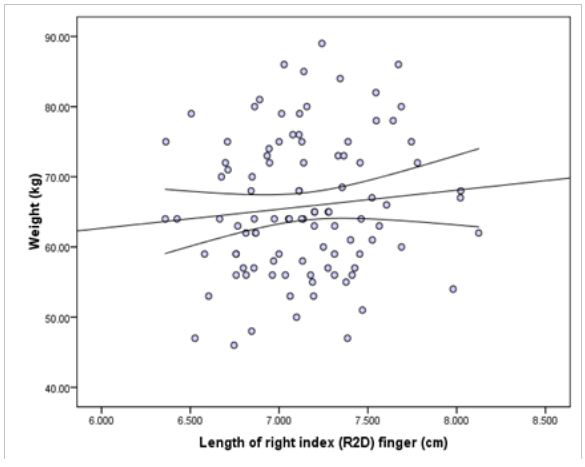

Fig 5. Correlation of length of right index finger (R2D) with weight

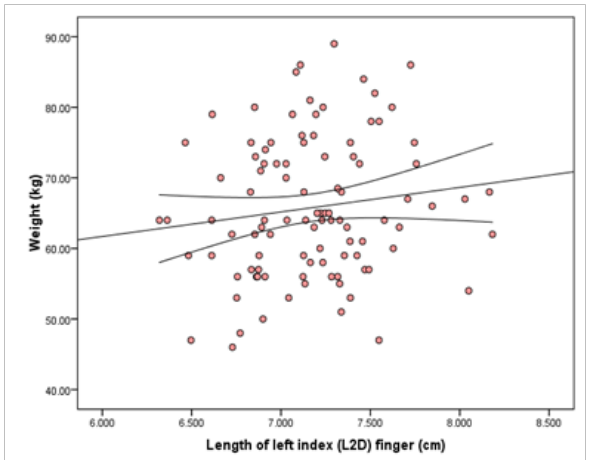

Fig 6. Correlation of length of left index finger (R2D) with weight

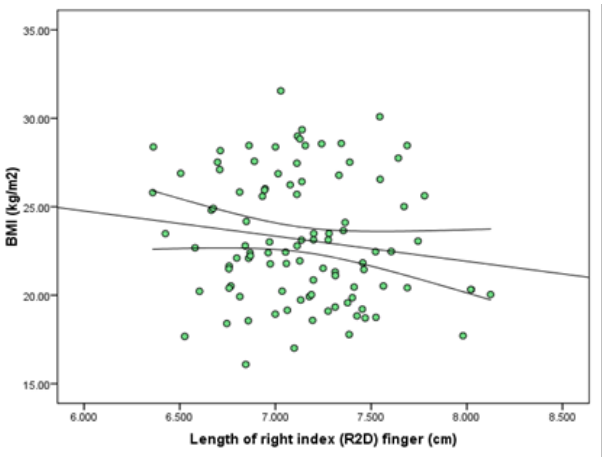

Fig 7. Correlation of length of right index finger (R2D) with BMI

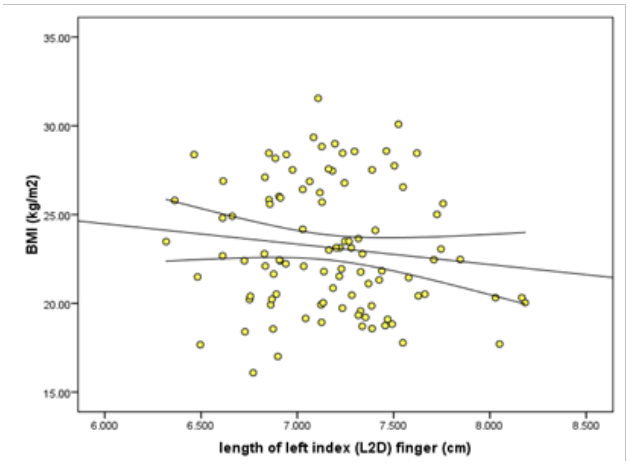

Fig 8. Correlation of length of left index finger with BMI

Discussion

In the present study, height positively correlated with the length of right and left index fingers (R2D and L2D) and it was statistically significant ($p<0.01$). But weight and BMI did not show any significant correlation ($p>0.05$). Similar studies have been done by Fink et al[13] in the University of Vienna (Austria) and in the Northumbria University (United Kingdom), Dongen[14] in the Antwerp University, Belgium, Danborno et al[15] in Ahmadu Bello University, Zaria, Nigeria and Ibegbu et al[16] in Ebira ethnic extraction of local government area in Nigeria. Findings of all these studies are consistent with that of the present study.

The length of index finger varies in both hands and also shows sexual dimorphism. So, it has a great medicolegal importance to determine age, sex and race of an individual. In this study, index finger length in both hands of Bangladeshi male showed variations where left index finger length is a little longer than right one. Length of both index fingers was compared with height, weight and BMI. Height showed positive correlation with index finger lengths of both hands, but weight and BMI did not show any correlation with index finger length. However, further studies on human hands are recommended, which may reveal significant findings that will help in evolutionary biology, forensic science and other branches of medical science.

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