Original article

Association between index finger length (2D) with height, weight and BMI in adult female population of Bangladesh

Karim Rezwan Hasan[1], Shamim Ara[2], Rubaba Tajreen[3]

Abstract:

Objective : Digital lengths of human hand 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 the same in different sexes or even both hands. 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 as well as shown positive correlations with other morphological traits like height, weight and BMI. In this study, this variation of the index finger (2D) length has been analyzed and compared with height, weight and BMI of adult male Bangladeshis.

Materials & Methods : A Cross sectional analytical study was conducted in the department of Anatomy, Dhaka Medical College, Dhaka, from July 2012 to June 2013. The study was performed on 100 female MBBS students (20-25 years of age) of Dhaka Medical College, Dhaka. With the help of digital vernier caliper measurements of index finger length (2D) was recorded. Height and weight was 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 correlations between index finger length with height, weight and BMI.

Results : Significant correlation has been found between the lengths of index finger (2D) with height and weight ($P<0.01$) but there was no significant correlation with index finger length with BMI ($P>0.05$ ns)

Conclusion : Study over the variations of digital lengths and their correlations with other body morphological traits have great medicolegal importance to determine age, sex and race of an individual.

Keywords : Right finger length (R2D), Left index finger length (L2D), BMI (Body Mass Index)

Introduction

On the basis of Anatomy, any measurements of body parts can change with the alterations in size of the organs involved or general body size and this concept was defined concisely by Levinton[1].Throughout the following decades, one such study has been a marked increase in interest, that is measurements of digital length and its sexual variations. The index finger located between thumb and middle finger is the second digit (2D) which is usually the most dexterous and sensitive fingers of a human hand[2]. Researchers claimed that the relativelengths 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[4], it is seen that smaller index fingers in women have been associated with higher levels of physical aggression throughout their life[5]. Women 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 length (2D) in both sexes which were statistically proven. For example, females with longer 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, female 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, Hepatitis-B related hepatocellular carcinoma, urolithiasis and rheumatoid arthritis but female having longer index finger often has

1. Assistant Professor, Department of Anatomy, Ad-din Women's Medical College, Dhaka.
2. Professor and Head, Department of Anatomy, Dhaka Medical College, Dhaka.
3. Lecturer, Department of Community Medicine, Ad-din Women's Medical College, Dhaka.

Correspondence : Dr. Karim Rezwan Hasan
E-mail : dr.rezwan21@gmail.com

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 produces a typical male body shape (android) and female body (gynoid) respectively. So, 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 (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 adult.

Materials & Methods:

The study was performed on one hundred (100) female medical students of Dhaka Medical College, Dhaka age ranging from 20-25 years. With the help of a digital vernier caliper the index (2D) lengths were recorded in millimeters.

Table-1 : Measurements of different variables

Variables	Female (n=100)	
	Range	mean ± SD
R2D (cm)	5.952 - 7.813	6.710 ± 0.369
L2D (cm)	5.765 - 7.912	6.720 ± 0.362
Height (cm)	147.30-167.00	155.45 ± 4.40
Weight (kg)	41.00 - 75.00	54.59 ± 7.80
BMI (kg/m^2)	17.08 - 30.73	22.48 ± 2.89

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) finger9. Measurements were taken three times independently and the maximum length was taken for analysis. Height of the subject was taken by stadiometer. According to the standard procedure the subject was stand bare footed. The subject was standing in erect posture so that weight would be 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 lies 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 stand on the scale facing forward with both feet placed on the scale and weight evenly distributed between the feet[12]. Body mass index was calculated by dividing the body weight in kg by the square of the height in meters. (Fig-1: a, b, c, d, e)

Results : Results are shown in Tables and Figures.

Table-2 : Correlations of hand variables with height weight and BMI in female

Variables	Correlation coefficient (r)	Significance of correlation (P –value)
Height with R2D	+0.540	P < 0.01**
Height with L2D	+0.513	P < 0.01**
Weight with R2D	+0.366	P < 0.01**
Weight with L2D	+0.314	P < 0.01**
BMI with R2D	+0.148	P > 0.05 ns
BMI with L2D	+0.096	P > 0.05 ns

Pearson's correlation-coefficient (r) test ns = not significant, ** = significant at P<0.01

Discussion:

In present study, height and weight positively correlated with the length of right index (R2D) finger and left index (L2D) finger that significant (P< 0.01) but BMI didn't show any significant correlation with neither of the index finger lengths (P > 0.05 ns). Similar kind of study has been done by Fink B., Neave N. and Manning J.T. (2006, pp.711-14) in the University of Vienna (Austria) and in the Northumbria University (United Kingdom)[13]; Dongen S.V (2009, Vol.3, pp.01-06) in the Antwerp University, Belgium[14]; B. Danborno, S.S. Adebisi, A.B. Adelaiye and S.A. Ojo (2009, Vol.3, No.3) in Ahmadu Bello University, Zaria, Nigeria[15] and Ibegbu A.O. et al. (2012, pp.79-84) in Ebira ethnic extraction of local Govt. area in Nigeria[16]. All of these studies revealed similar kind of result where finger length was strongly correlated with height but not with body weight or BMI.

Fig-1 : (a) measurement of height, (b) Measurement of weight (c) Identification of crease and tip of index figure. (d) Measurement of the breath of the crease of the index finger to mark the midpoint of the crease and (e) measurement of length (c-t) of the index figure (2D)

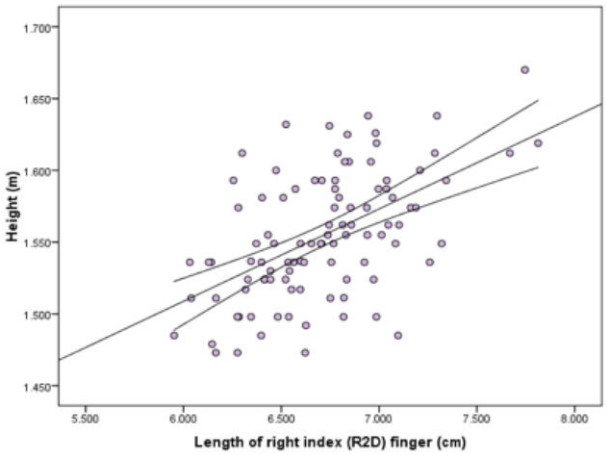

Fig-2 : Correlation of right index finger (R2D) with height in female

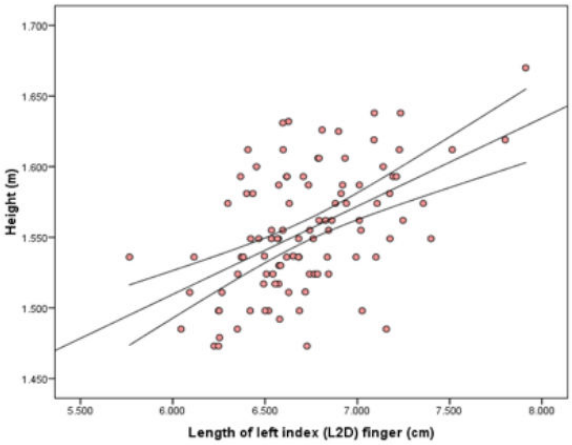

Fig-3 : Correlation of left index finger (L2D) with height in female

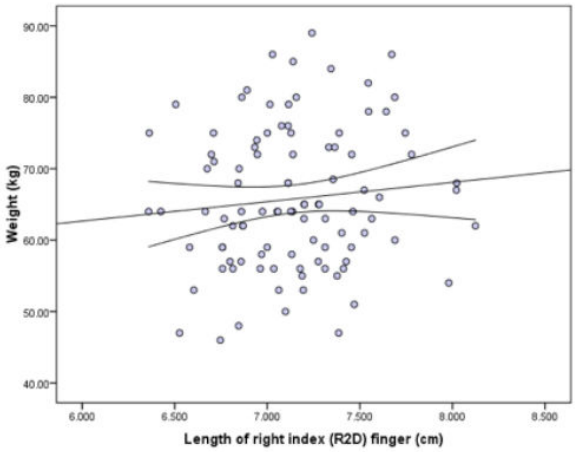

Fig-4 : Correlation of right index finger (R2D) with weight in female

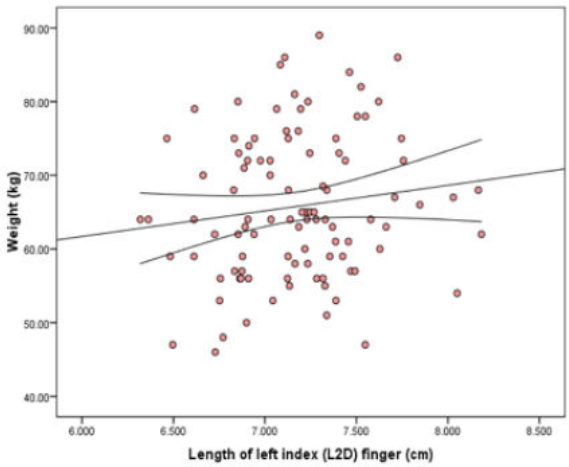

Fig-5 : Correlation of left index finger (L2D) with weight in female

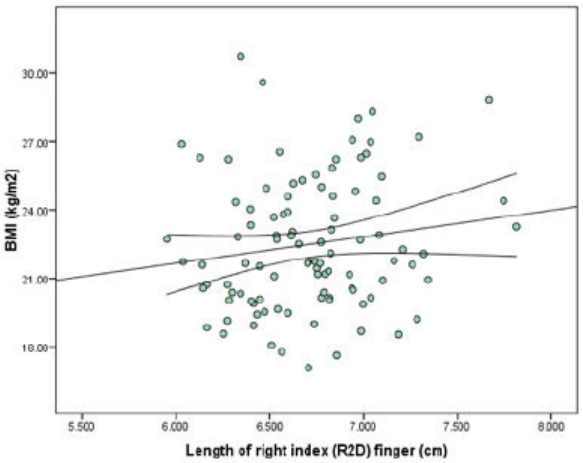

Fig-6 : Correlation of right index finger (R2D) with BMI in female

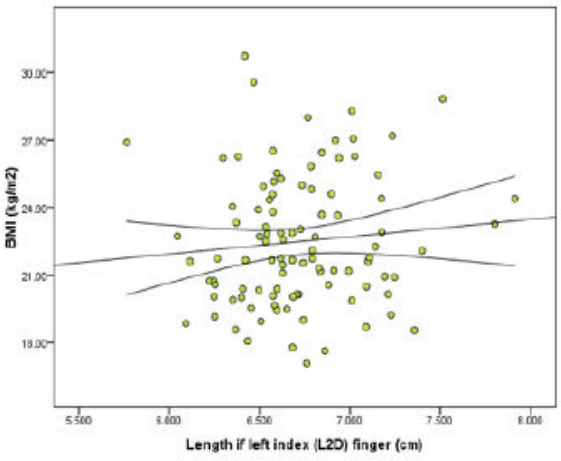

Fig-7 : Correlation of leftt index finger (L2D) with BMI in female

Conclusion:

Study over the variations of digital lengths have great medicolegal importance to determine age, sex and race of an individual. Doing studies on digital lengths and their correlations with other physiological traits can reveal so many mysterious characters of human hand and body morphometry that indicates general sexual characters and hormonal status of adult population of Bangladesh.

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