International Journal of Clinical Trials
Raju GM et al. Int J Clin Trials. 2014 May;1(1):18-21
http://www.ijclinicaltrials.com
pISSN 2349-3240 | eISSN 2349-3259
DOI: 10.5455/2349-3259.ijct20140505

Research Article

Estimation of stature from index and ring finger length in Davangere district

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Received: 17 April 2014
Accepted: 27 April 2014

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ABSTRACT

Background: Estimation of stature plays a special role in the field of forensic medicine and forensic anthropology. Present study was designed to investigate the ability of estimating stature from right index and ring finger length.
Methods: The study was carried out by taking the measurement of index and ring finger length of right hand and individual's actual height of 250 medical students (125 males and 125 females) of 18 to 25 years of age. The study was carried out in department of forensic medicine and toxicology at SSIMS & RC Davangere, Karnataka state, India. Obtained data was analysed statistically to establish the relationship between a person's index and ring finger length of right hand and stature.
Results: Regression equation and 'P' values were obtained. A moderate correlation was observed between index and ring finger length of right hand and calculated height of an individual which is statistically highly significant.
Conclusion: The present study would be useful for anthropologists, Investigating Officer (IO) and forensic experts.

Keywords: Forensic anthropology, Stature, Human identification, Finger length

INTRODUCTION

Identification of an individual has assumed importance in almost all spheres of life. In certain situations, such as putrefied, mutilated, or extensively charred body, conventional indicators and routine methods of identification fail to yield results. The situation is worsened when only mutilated and fragmentary remains are available for examination which is not uncommon in today's world due to mass disasters both natural and manmade e.g. earth quakes, cyclones, tsunamis, flood, terror attacks, bomb blasts, accidents, wars and plane crashes etc. Estimating the stature of a person from such fragmented remains forms an important tool of identification in such circumstances.

Kerley[1] states that every body part bears a more or less constant relationship with stature. Simmons et al.[2] derived formulae to calculate stature with good results, even when only parts of the bone are available. Bhatnagar et al.[3] used different hand dimensions to predict the stature of an individual in different populations. It is shown in earlier studies that various hand measurements tend to differ in various ethnic groups.[4] Consequently, the formulae designed to estimate stature from various anatomical dimensions in one population do not apply to another.[5,6] Many studies are done to calculate stature from foot length, limb lengths, long bones, but there are only few studies on hand and finger lengths. Present study, measuring index and ring finger length of right hand to calculate stature of a person. It will be helpful in

conditions in which only hand or part of hand is available for identification of a person.

India is a vast country with varied geographical conditions and stature varies with race, sex, and geographical locations as quoted above. Therefore, present study examines the relationship of the index and ring finger length of right hand with stature in south Indian population. Present study may prove useful in conditions were mutilated body is brought for post-mortem examination.

METHODS

The present study was carried out in the department of forensic medicine and toxicology at SSIMS & RC, Davangere. A total of 250 subjects were included in the study, out of which 125 males and 125 females within age group of 18 to 25 years. The subjects included in study were healthy individuals free from any apparent skeleton deformity. Prior to procedure written informed consent was obtained.

Anthropometric measurements of the index and ring finger length of right hand were taken. Besides the above measurements, actual stature of each subject was recorded. All measurements were taken in well lighted room. The measurements were taken by using standard anthropometric instruments in centimetres to the nearest millimetre in following manner.[7]

Anthropometric measurement

Index and ring finger length of right hand - It is the distance from the tip of index and ring finger to the proximal crease of the index and ring finger respectively. Instruments: Venire calliper.

Technique

The measurement was taken in standing position with stabilization of hand on table. The calliper was horizontally placed along the ventral surface of the right hand. The fixed part of the outer jaw of the calliper was applied to the proximal crease of index finger and the mobile part of the calliper was approximated to the tip of the index finger and measurement was taken. Respectively measurements for ring finger of the right hand were taken.

Statue

It is the vertical distance between the point vertex and the heel touching the floor (ground surface).

Technique

The subject was made to stand in erect posture against the wall with the feet axis parallel or slightly divergent and the head balance on neck and the measurement was taken.

The data was collected, analysed and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) to know the correlation of the stature with the index and ring finger length separately. The reliability of estimation of stature from the length of index and ring finger was determined with the help of 'P' value, SEE, r, r square and regression equations individually.

RESULTS

The present study focused on estimation of stature from the length of the index and ring finger of right hand both in males and females.

The 'P' value is 0.001 for index and ring finger, individuals both in males and females, which indicate that stature estimation from index and ring finger length, could be calculated with high significance values.

Table 1: Showing correlation coefficient and standard error of estimation of right index and ring finger in both males and females.

Parameter	Males			Females		
	SEE	R	R square	SEE	R	R square
RIFL	6.1	0.34	0.11	4.6	0.54	0.29
RRFL	4.4	0.57	0.32	5.9	0.43	0.19

Table 2: Depicting regression equation in both males and females from right index and ring finger.

Parameter	Males	Females
	Regression equation	Regression equation
RIFL	Height = 129.84+5.81 (RIFL)	Height = 111.32+7.10 (RIFL)
RRFL	Height = 96.44+10.14 (RRFL)	Height = 120.59+5.53 (RRFL)

Regression equation:

Stature = value of constant (a) + regression coefficient (b) x index finger length.

Males:
Y_1 = 129.84+5.81 (RIFL) Y_2 = 96.44+10.14 (RRFL)

Females:
X_1 = 111.32+7.10 (RIFL) X_2 = 120.59+5.53 (RRFL)

Regression equation with range of height

Males:
Y_4 = 129.84+5.81 (RIFL) ± 12.2
Y_5 = 96.44+10.14 (RRFL) ± 8.8

Females:
X_4 = 111.32+7.10 (RIFL) ± 9.2
X_5 = 120.59+5.53 (RRFL) ± 11.8

Where,

Y_1 & Y_2 = Height in males.
Y_4 & Y_5 = Average height in males.
X_1 & X_2 = Height in females.
X_4 & X_5 = Average height in females.
RIFL = Right index finger length.
RRFL = Right ring finger length.

DISCUSSION

The identification of commingled mutilated remain is a challenge to forensic experts and hence, a need of studies on estimation of stature from various body parts in different population groups. Such studies can help in narrowing down the pool of possible victim matches in cases of identification from dismembered remains.

The present study show that estimation of stature from the index and ring finger are highly significant (P <0.001) in both males and females so it can be used for estimation of stature of a person. The values of 'r' square in males and females with r square = 0.11 of RIF in males being the lowest all over 0.32 for RRF in males being the heights, r square = 0.29 for RIF in females being the highest, 0.19 for RRF being the lowest in case of females, from these values it can be depicts that estimation of height from the RIF in females is more significant while as in case of males it is RRF which show greater value of significance. Standard error of estimation SEE = 6.1 for RIF being the highest and 4.4 for RRF being the lowest in case of males SEE = 5.9 for RRF being the highest value and 4.6 for RIF being the lowest value in case of females. This indicates RIF in case of females is better predictor of height as compared to RRF while as in case of males it is RRF which gives better prediction of stature estimation than the RIF. Comparing the over-all results stature estimation in males can better predicted from the length of fingers as compared to females.

A study was done by Krishan K[8] et al. on stature from Index Finger Length (IFL) and Ring Finger Length (RFL) which shows larger significance in males than females, with higher significance for IFL than RFL which is contradictory to our study showing higher significance in males but it is RFL which gives better prediction of stature estimation.

A study done by Rastogi[9] et al. on 500 subjects from Manipal North and South Indian population, showed higher significance in males as compared to females, which is contrary to our study showing higher significance in males.

CONCLUSION

Estimation of stature forms an important parameter to reach to the partial identification of an unidentified body and dismembered remains. The results of the present study indicate that the index and ring finger length can be efficiently used for estimation of stature. Most authors have underlined the need for population-specific stature estimation formulae. Present study we derived a separate regression equation to estimate stature from right index and ring finger length for south Indian population.

Present study revealed that the RFL can be used with high significant values for estimation of stature in South Indian population even if only an amputated hand is found and other body parts are unavailable. The results of present study are however, applicable only when an intact finger is examined. Such studies can help in narrowing down the pool of possible victim matches in cases of identification from dismembered remains.

ACKNOWLEDGEMENTS

Authors would like to thank Department of Forensic Medicine, SSIMS & RC, Davangere.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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DOI: 10.5455/2349-3259.ijct20140505
Cite this article as: Raju GM, Shahina, Dubey S, Vijayanath V. Estimation of stature from index and ring finger length in Davangere district. Int J Clin Trials 2014;1:18-21.