Research Article

Study of Correlation between Stature and Length of Fingers

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Abstract: Identification of person is one of the significant aspects of Forensic investigation. Recently studies were conducted to estimate stature ; however, few studies were conducted using finger lengths from estimation of stature. The purpose of present study was to evaluate utility of finger lengths in estimation of stature and to predict the accuracy of regression models derived from such parameters. The study was carried out 200 subjects(100 males,100 females) There was significant difference (P < 0.001) between stature of male and female subjects. Similarly significant difference (P < 0.001) exists between male and female finger length. A significant correlation was observed between finger length and stature. Pearson correlation between finger length and stature was higher among males than fe males. The findings of present study indicate that finger lengths can be used successfully to predict living stature of an individual.
Keywords: Fingers length, Stature, Phalanges length, Forensic, Identification

INTRODUCTION

Stature is one of the numerous data for identification. The stature prediction occupies relatively a central position in the identification necessitated by the medicolegal experts or medical jurisprudence and also in the anthropological research. When a complete dead body is found, stature determination is rather an easy task; but in cases where only some parts of the body are available, the determination of stature of the individual is difficult [3].

Estimation of stature of an individual from the skeletal material or from the mutilated or from amputated limbs or from parts of limbs has obvious significance in the personal identification in the events of the murders, accidents or natural disasters mainly concerned with the forensic identification analysis. Many factors like racial, ethnic and nutritional factors play an important in human development and growth; therefore different nomograms become necessary for different population [11].

Till date, most of the workers on stature estimation have used the length of bones such as femur, tibia, humerus, radius, etc. Very little data is available on previous work done for calculation of height from finger length. Hence this study intends to fill this lacuna. This study looks into the possibility of estimation of stature from the length of finger

Very few anatomists are involved in this type of study . So we wanted to share our knowledge anatomist.

Aims and Objectives

- To study the correlation between stature and lengths of the fingers in an individual.
- To find out which finger is best to estimate the stature of an individual.

MATERIALS AND METHODS

The study comprised of 200 subjects (100 males &100 females) students & staff of Kamineni Institute of Medical Sciences Narketpally. The present study is aimed at measuring the stature from length of fingers of both right and left hands

Inclusion criteria

Subjects between the ages of 18-60years of Indian origin.

Exclusion criteria

Cases having any significant diseases, congenitally malformed limbs, metabolic disorders and developmental exclude.

Fig. 1: Materials used

Method of collection of data
Informed written consent was taken from the subject.

Measurement of Stature Using Stadiometer
It was measured as vertical distance from the vertex to the foot. Measurement was taken by making the subject to stand erect on a horizontal resting plane, on the stadiometer bare footed. Palms of hand turned inwards and fingers horizontally pointing downwards and head oriented in eye-ear-eye plane (Frankfurt Plane). The movable rod of the stadiometer was brought in contact with vertex in the mid sagittal plane.

Fig. 2: Measurement of Stature Using Stadiometer

Measurement of Finger Length with Vernier Callipers
It was measured straight distance from the midpoint of the proximal finger crease to the tip of the finger. Vernier calliper was used to measure the finger length, hand placed on the plane surface, palm of the hand is facing upwards.

Fig. 3: Vernier Callipers for measuring figure length

Statistical Analysis
The data was tabulated, analyzed and subjected to statistical analysis using SPSS software windows(statistical package for social science version 11.0)

RESULTS
1. LI= Left Index Finger length
2. LM= Left Middle Finger length
3. LR= Left Ring Finger length
4. LL= Left Little Finger length
5. LT= Left Thumb length
6. RI= Right Index Finger length
7. RM = Right Middle Finger length
8. RR = Right Ring Finger length
9. RL = Right Little Finger length
10. RT = Right Thumb length

Table 1: Female n=100 cases

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
1	28	152.4	6.4	9	10.2	9.5	7.5	6.1	8.7	9.7	9.5	7.6
2	24	152.4	6.7	9.6	10.6	10.3	8.4	7	9.5	10.4	10.2	8.5
3	23	152.4	6.4	9.5	10.5	10.1	8.4	6.6	9.5	10.4	10.2	8.2
4	22	152.4	6.1	9.1	10.1	9.8	7.5	6.2	9.2	10.2	9.7	7.6
5	22	157.4	6.3	9	10.3	9.6	7.6	6.4	9	10.3	9.6	7.5
6	24	157.4	6.6	9.8	11.2	10.4	8.1	6.5	9.7	11.1	10.3	8.2
7	26	157.4	6.5	9.4	10.8	10	7.9	7.6	9.4	10.5	10	7.9
8	23	160	7.1	9.4	10.6	10	7.7	7.1	9.7	10.6	10.1	7.8
9	23	160	6.5	10	11.3	10.5	8.6	6.6	10.1	11.4	10.6	8.6
10	24	160	6.7	9.7	10.6	10	7.9	6.5	9.5	10.5	9.8	8
11	23	160	6.8	9.6	11	10.7	8.5	7	10	11	10.5	8.6
12	23	160	7.1	9.9	11.2	10.5	8.2	7.1	9.8	11.2	10.4	8.3
13	24	160	6.3	9	10.3	9.6	8.1	6.5	9.2	10.3	9.6	7.5
14	21	162.5	6.9	10	11	10.5	8.3	7	9.8	10.8	10.5	8.5
15	21	162.5	7	10.4	11.6	10.7	8.9	7.3	10.2	11.4	10.8	8.8

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
16	23	162.5	6.5	9.2	10.3	9.8	8.3	6.7	9.1	10.4	10.2	8.3
17	24	165.1	7.1	9.6	11	10.3	8.5	7.1	9.7	11	10.4	8.7
18	30	165.1	6.7	10	10.8	10.4	8.5	6.8	9.8	10.8	10.2	8.5
19	25	165.1	7.6	10.2	11.7	11.1	9.3	7.7	10.6	12.1	11.4	9.3
20	27	165.1	6.5	9.4	10.4	9.7	7.7	6.7	9.4	10.3	10	8.2
21	25	165.1	6.5	8.9	10.1	9.6	7.6	6.4	8.7	10	9.5	7.6
22	24	165.1	7	9.5	11.1	10.4	8.4	7.4	10	11	10.5	8.523
23	25	165.1	7	9.9	10.8	10.3	8.1	7.1	9.5	10.6	10	8.13
24	25	165.1	6.8	9.5	11	10	8.4	7	9.6	11	10.3	8.5
25	24	165.1	7	10.3	11.5	10.9	8.9	7.2	10.2	11.6	10.7	8.8
26	23	165.1	7.2	10.1	11	10.6	8.5	7.1	10	11	10.5	8.3
27	23	165.1	6.5	9.7	10.2	9.8	8	6.3	9.6	10.3	9.8	8
28	24	165.1	7.2	10	11	10.5	8.6	7.4	10	11.1	10.5	8.5
29	24	165.1	7	10	11	10.8	8.6	7.1	10	11	10.4	9.1
30	24	166	7	9.8	11	10.3	8.3	7	9.6	10.8	10	8.1

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
31	25	167.6	7.3	10	11.5	11.3	9	7.1	9.9	11.4	11.2	9.2
32	25	167.6	6.5	9.4	10.5	10.3	8.1	6.3	9.1	10.6	10.1	8.1
33	24	167.6	6.8	9.9	11	10	8.5	7	9.5	10.9	10.4	8.9
34	28	167.6	7.1	10.2	11	10.4	8.7	7.1	10.1	11	10.6	8.8
35	24	167.6	7	9.5	11	10.4	9	7	9.6	11.1	10.4	8.6
36	25	167.6	6.5	9.5	11.2	10.5	8.5	6.6	9.9	11	10.4	8.2
37	23	167.6	6.9	10	11.2	10.1	8	7	10	11.2	10.3	8.2
38	24	167.6	6.5	9.8	11	10.8	8.5	6.6	9.6	10.8	10.2	8.391
39	24	165.1	6.8	9.5	11	10	8.4	7	9.6	11	10.3	8.5
40	23	165.1	7	10.3	11.5	10.9	8.9	7.2	10.2	11.6	10.7	8.8
41	23	167.6	6.5	9.5	11.2	10.5	8.5	6.6	9.9	11	10.4	8.2
42	22	167.6	6.9	10	11.2	10.1	8	7	10	11.2	10.3	8.2
43	23	167.6	6.5	9.8	11	10.8	8.5	6.6	9.6	10.8	10.2	8.1
44	23	167.6	7.5	10.1	11.8	11.2	8.8	7.5	10.2	11.5	10.9	9
45	23	169	7.3	10.5	11.6	11	8.6	7.4	10.3	11.5	11	8.8

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
46	25	170.1	7.3	10.5	11.7	11.3	9.2	7.5	10.2	11.8	11.5	9.2
47	25	170.1	7	9.8	11	10.7	8.2	7	9.7	11	10.4	8.4
48	25	170.1	7.7	11	11.8	11.1	9.4	8	11	12	11.1	9.5
49	26	170.1	6.7	10.1	11	10.7	8.7	7.4	10.7	11.3	10.7	8.7
50	25	170.1	6.4	9.9	11.2	10.5	8.6	6.2	9.7	11.2	10.7	8.8
51	25	170.1	7	9.4	10.5	10.2	8.4	7.5	9.7	10.6	10.2	8.4
52	27	170.1	7.4	10.3	11.7	11	9	7.3	10.4	11.5	11.1	8.9
53	26	170.1	7	10.7	11.6	10.9	8.6	7.2	10.1	11.3	10.6	8.3
54	26	170.1	7.3	10.7	11.6	10.7	8.4	7.3	10.6	11.5	10.7	8.5
55	25	170.1	7	10	10.9	10.3	8	6.9	9.9	11	10.2	8
56	24	170.1	7.2	10.3	11.2	10.5	8.6	7.2	10.3	11.3	10.4	8.7
57	24	170.1	7.2	10.5	11.4	10.8	8.4	7.1	10.4	11.6	10.9	8.5
58	23	170.1	7.7	11	11.8	11.1	9.4	8	11	12	11.1	9.5
59	24	170.1	7.4	10.4	12	11.6	8.9	7.5	10.4	11.7	11.1	9.1
60	23	172.7	7.4	10.8	11.9	11.5	9.3	7.7	10.7	11.8	11.2	9

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
61	25	172.7	7.5	10.4	11.6	10.8	9	7.3	10.2	11.5	11.2	8.8
62	22	172.7	7.1	10.5	11.6	10.6	8.4	7.1	9.5	11	10.5	8.3
63	27	172.7	7.3	10.2	11.7	10.9	8.9	7.2	10.4	11.5	10.8	8.8
64	25	172.7	7.2	10.2	11.2	10.6	8.5	7.3	10.1	11.1	10.9	8.5
65	22	172.7	6.6	9.9	11	10.4	8.4	6.8	9.9	10.7	10.5	8.1
66	24	172.7	7.2	10.3	10.7	10.9	8.6	7.5	10.4	11.8	11	8.7
67	25	172.7	7.1	10	10.6	9.7	8.7	7.1	10	10.6	10	8.3
68	25	172.7	6.9	9.9	10.8	10.3	8.5	7.2	10	10.9	10.5	8.6
69	24	172.7	7.1	10	11.4	11	8.9	7	10.4	11.7	11.2	9
70	25	172.7	7.2	10	11	10.3	8.4	7.1	8.7	11	10.5	7.4
71	23	172.7	7.3	10.5	11.8	10.7	8.9	7.2	10.5	11.6	10.9	8.8
72	24	172.7	7.3	10.5	11.4	11.1	9.1	7.1	10.5	11.3	11	9
72	24	172.7	6.8	10.6	11.5	11	8.8	10.2	10.3	11.5	11.1	9.2
73	24	175.2	6.6	9.8	11	10.5	8.5	6.8	10.1	11.2	10.8	8.6
74	24	175.2	7.1	9.9	11.2	10.6	8.9	7.2	10	11.2	10.6	8.7
75	23	175.2	7.4	10.2	11.6	11.1	8.9	7.4	10.2	11.5	11	8.9

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
76	23	175.2	6.5	9.8	10.7	10.4	8.1	7	9.5	10.6	10.4	8.7
77	24	175.2	7	9.5	11.4	10.7	8.3	6.7	9.7	11.2	10.5	8.2
78	24	175.2	7.7	9.9	11	9.7	8.1	6.8	9.8	11	10	8.2
79	28	175.2	7.7	10.1	11.6	11	8.5	7.5	10	11.5	11.1	8.6
80	24	177.8	7.1	10	11.1	10.4	8.5	7.2	9.5	11	10.2	8.3
81	24	177.8	6.9	10.4	11.7	11	8.4	6.9	10.3	11.6	11	8.3
82	24	177.8	7.5	10.6	12.3	11.6	9.3	7.5	10.6	12.4	11.7	9.3
83	22	177.8	7.7	10.8	12.3	11.7	9	7.9	11.3	12	11.5	9
84	23	177.8	7.3	10.6	11.6	11	8.6	7.5	10.7	11.6	10.9	8.7
85	24	177.8	7.1	10.1	11	10.8	9	7.4	10.2	11	10.5	9
86	23	177.8	8	11.5	12.5	11.6	9.2	8	11.5	12.4	11.8	9.4
87	24	177.8	7.2	10.7	11.6	11	8.7	7.5	10.5	11.6	11	8.7
88	25	180.3	8	10.5	12	11.7	9	7.7	10.4	12	11.5	9
89	24	180.3	7.9	10.8	12	11.6	9	7.7	10.7	12	11.4	9
90	24	180.3	7.2	10.4	11.7	11.2	8.7	7.2	10.2	11.7	11.2	8.6
S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
91	24	180.3	7.1	10.8	11.6	10.9	8.6	7.3	10.4	11.6	10.7	8.5
92	21	180.3	7.5	10.7	11.9	11.5	9.2	7.5	10.4	12.1	11.6	9.4
93	24	180.3	7.2	10.2	11.5	11	9	7.4	10.4	11.7	11.1	9.3
94	23	180.3	7	10.1	11.7	11.2	8.6	7.2	10.4	11.6	11.5	8.7
95	24	180.3	6.9	9.6	10.8	10.2	8.3	6.8	9.9	10.5	10.1	8.2
96	23	180.3	6.5	9.1	11.3	10.3	8.8	6.7	9.9	11.3	10.7	8.6
97	23	182.8	7.5	11.2	12.7	11.9	9.3	7.6	11.1	12.5	11.7	9.1
98	24	182.8	7	9.9	11.3	10.6	8.5	7.1	9.9	11.1	10.8	8.5
99	23	187.8	7.5	10.5	11.7	10.8	8.6	7.4	10.4	11.7	11	8.7
100	26	177.8	7.1	10	11.1	10.4	8.5	7.2	9.5	11	10.2	8.3

Table 2: Male n=100 Cases

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
1	28	147.3	6.1	8.8	9.6	9.1	7.5	6	8.7	9.5	9.2	7.4
2	24	147.3	5.8	8.3	9.1	8.7	7	5.7	8.2	9.1	8.8	7.1
3	25	150	6.3	9.5	10.2	9.9	8	6.3	9.1	10.2	9.7	7.6
4	25	150	6.7	9	9.7	9.1	7.3	6.8	8.9	9.7	9.3	7.4
5	22	150	6.3	8.6	9.5	9	7.3	6.2	8.6	9.4	9	7.2
6	25	150	6.2	8.6	10	9.5	7.5	6	8.6	9.8	9.4	7.5
7	24	150	6.2	9.2	10.5	9.8	8.1	6.4	9.4	10.5	10.4	8
8	23	152.4	6.7	9.5	9.9	9.3	8	6.7	9.2	9.9	9.2	7.9
9	25	152.4	6.3	9.2	10	9	7.5	6.4	9.2	10	8.9	7.6
10	25	152.4	6.2	8.8	9.8	9.3	7.5	6.1	8.8	9.8	9.2	7.5
11	26	152.4	6.5	9.2	10.7	10.1	8	6.6	9.4	10.3	10.1	7.6
12	26	152.4	6.3	9	10	9.4	7.8	6.3	8.9	9.8	9.3	7.9
13	26	152.4	6.3	9.5	11	10	8.1	6.4	9.6	10.8	9.6	8
14	21	152.4	6.3	8.1	9.8	9.2	8	6.1	8.4	9.5	9.1	7.5
15	23	152.4	6	8.5	9.4	8.7	7	6.2	8.2	9.1	8.4	7

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
16	24	154.9	6.3	9	10.1	9.8	8	6.3	9.1	10.3	9.7	7.8
17	25	154.9	6	9	9.9	9.3	7.3	6.1	8.5	9.4	9.3	7.4
18	24	154.9	6.5	9.8	10.2	9.7	8.4	6.9	9.5	10.3	9.8	8.1
19	23	154.9	6.3	9.2	9.9	9.5	7.1	6.6	9.5	10.1	9.8	7.3
20	24	154.9	6.2	9.2	10.6	10	8	6.2	9.4	10.3	10	7.4
21	24	154.9	6.4	9	10.1	9.5	7.5	6.4	8.7	9.8	9.2	7.5
22	25	154.9	6.1	9.2	10.1	9.4	7.7	6.1	9	10.1	9.7	7.6
23	25	154.9	6.3	9	10.1	9.8	8	6.3	9.1	10.3	9.7	7.9
24	24	154.9	6.8	9.5	10.8	10.3	8.1	6.5	9.6	10.9	10.2	8.1
25	25	154.9	6.1	9	9.8	9.3	7.1	6	8.8	9.6	9.2	7.2
26	30	154.9	6.7	9.3	10.2	9.7	7.2	6.6	9.2	10.2	9.6	7.4
27	24	154.9	6.6	9.4	10.2	9.7	7.6	6.7	9.3	10.3	9.7	7.6
28	24	154.9	6.6	9.4	10.3	10	8	6.6	9.4	10.1	9.7	7.7
29	24	154.9	5.7	8.3	9.2	8.8	7	5.9	8.1	9.1	9.9	6.5
30	23	154.9	5.7	8.5	9.5	9.1	7.2	5.8	8.5	9.4	9.2	7.2

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
31	25	154.9	6	9.1	10.1	9.2	7.7	6.2	9.1	10	9.2	7.8
32	25	154.9	6.6	9.4	10.2	10	7.6	6.6	9.2	10.1	9.7	7.6
33	24	154.9	6.4	9.4	10.4	9.8	7.9	6.5	9.2	10.3	9.9	7.9
34	23	154.9	6.5	9.3	10.4	9.5	7.7	6.5	9.3	10.4	9.6	7.6
35	24	154.9	6.5	9.4	10.5	9.8	8	6.3	9.5	10.3	9.9	8
36	24	154.9	6.4	9	9.7	9.4	7.5	6.2	8.5	9.7	9	7.4
37	23	157.4	6	8.6	9.6	9.4	7.7	6.2	8.5	9.5	9.4	7.6
38	24	157.4	6.5	9.8	11	10.4	7.9	6.8	9.5	10.6	10.2	8.2
39	28	157.4	6.6	8.8	9.6	9.1	7	6.6	9.5	9.2	6.9	6.8
40	24	147.3	6.1	8.8	9.6	9.1	7.5	6	8.7	9.5	9.2	7.4
41	23	157.4	6.5	9.8	11	10.4	7.9	6.8	9.5	10.6	10.2	8.2
42	24	157.4	6.6	8.8	9.6	9.1	7	6.6	9.5	9.2	6.9	6.8
43	24	157.4	7.1	9.6	10.6	10.2	8.1	7	9.9	10.6	10.3	8.1
44	24	157.4	6.2	9.3	10.5	9.9	7.8	6.4	9.2	10.4	10	8
45	23	157.4	6.3	9	10.1	9.5	7.2	6.4	9.3	10.1	9.2	7.1

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
46	23	157.4	6.1	9	9.8	9.3	7.5	6.1	8.5	9.5	9	7.4
47	28	157.4	6.7	9.4	11.1	10.6	8.5	6.6	9.7	11	10.4	8.1
48	24	157.4	6.6	8.9	9.9	9.2	7.5	6.5	8.9	9.5	9.2	7.2
59	26	157.4	6	9	10.2	9.4	7.5	6.5	9	10	9.3	7.5
50	24	157.4	6.3	9.4	10.2	9.7	7.6	6.6	9	10.3	9.4	7.7
51	24	157.4	6.7	9.4	10	9.5	7.2	7.3	9.1	10	9.4	7.5
52	25	157.4	6.6	9.2	10.2	9.9	8.2	6.9	9.3	10.5	9.9	8.2
53	24	157.4	6.3	9.3	10.4	10.1	8.2	6.7	9.2	10.4	10	8.1
54	26	157.4	6.8	9.6	10.5	10.3	8.5	7	9.9	10.8	10.5	8.5
55	24	157.4	6.8	9.5	10.7	10.1	8.2	6.7	9.5	10.9	10	8
56	25	157.4	6	8.8	9.8	9.1	7.7	6	8.8	9.7	9.1	7.2
57	23	157.4	6.4	9.6	10.7	9.6	8.1	6.6	9.2	10.7	9.5	7.9
58	23	157.4	6.5	9.4	10.5	9.8	8.2	6.6	9.6	10.4	9.7	8
59	23	160	6.5	9.1	10	9.6	7.6	6.6	8.9	10	9.8	7.6
60	23	160	6.9	9.7	11	10.2	8	6.8	9.6	11	10.2	8

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
61	23	160	6.3	9	10.5	10	7.6	6.5	9	10.4	9.8	7.5
62	25	160	6.7	9.7	10.2	9.6	7.6	6.5	9.5	10	9.3	7.7
63	24	160	6.1	9.1	10	9.5	7.8	6.3	9.1	10	9.4	7.7
64	23	160	6.5	9.5	10.5	10	7.7	6.6	9.3	10.3	9.5	7.6
65	22	160	6.2	9.1	10.4	10.1	7.6	6.4	8.9	10.8	10.2	8.1
66	21	160	7	9.6	10.7	9.8	8	6.6	9.9	10.5	10	7.5
67	24	160	6	9	9.4	9	8	6.1	9	9.5	8.8	7.6
68	24	160	6	9	10	9.5	7.5	6.2	8.7	10	9.3	7.6
69	24	160	6.6	8	8.7	8.5	7.6	6.6	8.1	8.6	8.5	7.6
70	27	160	6.7	9.8	11.1	10.4	8.3	6.7	9.8	11	10.5	8.4
71	23	160	6.4	9	10.2	9.5	7.6	6.5	9.2	10.2	9.5	7.9
72	23	162.5	6.7	9.4	10.6	11.1	8.2	6.6	9.6	11.1	10.9	8.3
73	22	162.5	7	9.9	9.3	10.7	8.6	6.6	10	11	10.5	8.2
74	28	162.5	7	9.4	10.3	9.9	8.3	7	9.4	10.3	9.9	8
75	23	162.5	7	9.4	10.3	9.9	8.3	7	9.4	10.2	9.9	8

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
76	23	162.5	6.3	9.2	10.5	10	8	6.5	9	9.4	9.8	8
77	24	162.5	6.5	10	10.7	10.1	8.3	6.7	9.9	10.6	10	8
78	25	162.5	6.5	9.2	10	9.6	8	6.5	9.2	10	9.7	7.8
79	24	162.5	6.5	9.7	10.7	10.4	8.2	7.1	9.6	11	10.5	8.3
80	23	162.5	6.3	9.2	10.4	9.6	7.1	6.6	9.5	10.6	9.5	7.2
81	24	162.5	6.4	10	10.6	10.2	8.3	6.5	9.8	10.5	10.1	8
82	23	162.5	5.8	8.8	9.8	9	6.7	6	8.6	9.5	9.1	6.6
83	22	162.5	6.1	8.7	9.9	9.5	8	6.2	8.5	9.9	9.5	7.9
84	23	162.5	6.9	9.6	10.4	10	8.2	7	9.4	10.4	10	8
85	22	162.5	7	10.4	11.2	10.9	8.8	7	10.1	11.5	11	8.4
86	21	162.5	6.9	9.2	10.3	9.9	7.9	6.7	9.3	10.4	9.9	7.9
87	22	162.5	6.4	9.2	10.4	9.8	7.6	6.5	9.3	10.3	9.8	7.6
88	24	162.5	7.3	10.2	10.7	10.3	6.5	7.2	10	10.7	10.2	8.2
89	23	162.5	7.2	10.2	11.3	10.4	8.6	7.2	10.1	11.2	10.5	8.6
90	24	165.1	7.1	9.6	10.8	10	8.2	7.1	9.7	10.6	9.6	8

S. No.	AGE (yrs)	HEIGHT (cm)	RIGHT HAND(cm)					LEFT HAND(cm)				
			RT	RI	RM	RR	RL	LT	LI	LM	LR	LL
91	24	165.1	6.3	8.8	10.1	9.4	7.3	6.1	8.7	10	9.4	7.3
92	24	165.1	6.9	9.2	10.1	9.6	7.5	6.8	9.2	10	9.3	7.5
93	23	165.1	6.5	9.3	10.6	9.9	7.9	6.6	9	10.5	9.9	8
94	24	165.1	6.6	9.5	10.5	10.3	7.8	6.8	9.3	10.7	10.5	7.6
95	24	165.1	6.6	9.2	10.5	9.5	7.7	6.5	9.5	10.5	9.8	7.8
96	24	165.1	6.8	10	11	10.3	8.6	7	10	11.1	10.4	8.5
97	24	165.1	6.4	9	10.4	9.7	7.1	6.2	8.8	10.1	9.4	7.4
98	23	165.1	6.8	9.4	10.4	10	8	7	9.6	10.4	10	8
99	30	165.1	6.5	8.9	9.9	9.5	7.6	6.6	8.9	9.4	9.4	7.5
100	28	165.1	6.7	10	10.8	10.3	8.5	7	9.5	10.5	10.1	8.5

Table 3: Pearson Correlation coefficient of finger measurements with stature and p-value in females

Right hand	Correlation coefficient	p- value	Left hand	Correlation coefficient	p- value
Thumb	0.463	<0.001*	Thumb	0.497	<0.001*
Index finger	0.390	<0.001*	Index finger	0.347	<0.001*
Middle finger	0.359	<0.001*	Middle finger	0.360	<0.001*
Ring finger	0.385	<0.001*	Ring finger	0.318	<0.001*
Little finger	0.239	<0.001*	Little finger	0.335	<0.001*

*p is < is 0.005 is significant

Table 4: Regression equations for estimation of stature in males

	Right hand (in cm)	Left hand (in cm)
Thumb	Height= 104.226+ 9.432 (RT)	Height=129.753 +5.707 (LT)
Index finger	Height=95.434+7.473 (RI)	Height=98.995+7.138 (LI)
Middle finger	Height=80.762 + 7.994 (RM)	Height=84.902+7.646 (LM)
Ring finger	Height= 94.150+7.189 (RR)	Height=86.380+7.919 (LR)
Little finger	Height=100.716 +8.164 (RL)	Height=113.586+6.661 (LL)

Table 6: Regression coefficient for estimation of stature in females

Fingers	Constant (in cm)	Regression coefficient (in cm)
Thumb (RT)	116.71	6.42
Index (RI)	119.53	4.19
Middle (RM)	122.02	3.54
Ring (RR)	121.76	3.76
Little (RL)	138.99	2.47
Thumb (LT)	112.61	7.00
Index (LI)	125.96	3.51
Middle (LM)	126.19	3.15
Ring (LR)	132.87	2.63
Little (LL)	128.02	3.91

Table 7: Regression coefficient for estimation of stature in males

Fingers	Constant (in cm)	Regression coefficient (in cm)
Thumb (RI)	104.22	9.43
Index (RI)	95.43	7.47
Middle (RM)	80.76	7.99
Ring (RR)	94.15	7.18
Little (RL)	100.71	8.16
Thumb (LI)	129.75	5.70
Index (LI)	98.99	7.13
Middle (LM)	84.90	7.64
Ring (LR)	86.38	7.91
Little (LL)	113.58	6.66

Significance

Regression formula for estimating the stature from fragmentary remains of fingers can be made when ever such a thing is recoved.

Linear regression equation derived from finger lengths for estimation of stature showed a statistically significant ($p < 0.001$) relationship in both the genders.

DISCUSSION
For right thumb in female
$y = B_0 + B_1 x$
$B_0 = 116.719$
$B_1 = 6.426$
$x = 7$
$y = 116.79 + 44.98 = 161.7$
Measured height=162.5cm
Measured height=162.5cm

For right index in female
$y = B_0 + B_1 x$
$B_0 = 119.536$
$B_1 = 4.192$
$X = 10.4$

$Y = 119.536 + 43.6 = 163.1$
Measured height=162.5cm
Calculated height=163.1cm

For right middle
$y = B_0 + B_1 x$
$B_0 = 122.023$
$B_1 = 3.544$
$x = 11.2$
$y = 122.023 + 39.6928 = 16.7158$
Measured height=162.5cm
Calculated height=161.72c

For right ring finger in female
$y = B_0 + B_1 x$
$B_0 = 121.768$
$B_1 = 3.760$
$x = 10.9$
$Y = 121.768 + 40.98 = 162.748$
Measured height=162.5cm
Calculated height=162.7

For right little finger in female
$y = B_0 + B_1 x$

$B_0 = 138.99$
$B_1 = 2.479$
$X = 8.8$
$y = 139.99 + 21.8 = 160.8$
Measured height = 162.5cm
Calculated height = 160.8cm

From the above calculations of all the fingers ring finger is the best to calculate height of the individual. Estimation of stature from bones especially longer ones is preferable practice because of higher correlation coefficient and small error of estimate. However, practical difficulty arises in a situation where only dismembered body part is available for medical examination. Therefore in search of new parameters, the Forensic investigators are exploring different body parts to estimate stature such as head, face, hand, foot, phalanges, finger length etc [1-16].

Tyagi et al studied the subjects from Delhi and found positive correlation between stature and finger lengths and have suggested that index finger was best for the prediction of stature in both males and females. [9] *Jasuja et* al had studied the hand and four phalange lengths in 60 subjects belonging to Jat Sikhs community. The researchers had observed correlation coefficient that ranged from 0.215 to 0.681 and concluded that stature could be estimated from studied parameters [1-6].

According to Rajesh Vaijnathrao Bardale [23] while comparing the parameters amongst sexes, it was found that female have higher correlation than males. From the regression models derived in the present study the standard error of estimate in the predicted stature was more in males than the females. In other words the accuracy of stature estimation in females is more than males.

According to our study height and length of the hand were significantly more in males compared to females. There was no bilateral variation of right and left fingers.

CONCLUSION
Though height and length of the fingers of the hand were significantly more in males compared to females , a direct relationship was observed in both sexes.

The difference in right and left side measurements are minimal and statistically insignificance in derivation of regression equation.

The regression euation for reconstruction of stature from length of the fingers is
$y = B_0 + B_1 x$
B_0 = Measuring height, $B_1 x$ = Calculated height

Among the five fingers middle finger will give the exact height of the individual.

Calculated statures from these equations are close to the actual height, only ± 5 cm difference in most of the cases.

REFERENCES
1. Tyagi AK, Kohli A, Verma SK, Aggarwal BB; Correlation between stature and finger Length. International Journal of Medical Toxicology and Legal Medicine, 1999; 1: 20-22
2. Rastogi P, Kanchan T, Menezes RG, Yoganarasimha; Middle finger length- a predictor of stature in the Indian population. Med Sci Law, 2009; 49 (2): 123-126.
3. Athwale MC; Estimation of height from length of forearm bones. A study on 100 Maharashtrian male adults of age 25-30. American Journal of Physical Anthropology, 1963; 21: 105-112.
4. Begum E; Estimation of Stature from Hand Measurements in Assamese Muslims. Bulletin of Department of Anthropology, University of Guwahati, Assam, 1999.
5. Bhatnagar DP, Thapar SP, Batish MK; Identification of personal height from somatometery of hands in the Punjabi males
6. Rani M, Tyagi AK, Ranga VK, Rani Y, Murari A; stature estimates from foot dimensions. JPAFMAT; 2011:11(1)
7. Jasuja OP, Singh G; Estimation of stature from hand and phalange length. JIAFM, 2004; 26(3).
8. Giles E, Vallandigham PH; Height Estimation from Foot and Shoe print length. Journal of Forensic Sciences, 1991; 36(4): 1134-1151.
9. Jasuja OP; Calculation of stature from foot and shoe impressions. PhD Thesis, Punjabi University, Patiala. (unpublished) 1987.
10. Jasuja OP, Singh J, Jain M. Estimation of stature from foot and shoe measurements by multiplication factors: A reviewed attempt. Forensic Science International, 1991; 50: 203-215.
11. Jasuja OP, Manjula; Estimation of stature from footstep length. Forensic Science International 1993; 61:1-5.
12. Jasuja OP, Harbhajan S, Anupama K; Estimation of stature from stride length while walking fast. Forensic Science International, 1997; 86: 181-186.
13. Kalte PM, Bansal PC; Determination of regression formulae for reconstruction of stature from long bones of upper limbs in

Maharashtrians and Marathwara region. Journal of Anatomical Society (India), 1974; 23: 6-11.

14. Kapoor AK; Estimation of stature from hand length as obtained through palm prints among the Lodhas of district Midnapur, West Bengal. Indian Journal of Physical Anthropology, 1987; 13: 139.

15. Lal CS, Lala JK; Estimation of stature from tibial and ulnar lengths in North Bihar. Journal of Medical Association, 1972; 58: 120-121.

16. Patel MP, Joshi NB, Dongre AV; Regression equation of height on tibial length. Indian Journal of Medical Research, 1964; 52: 531-534.

17. Pearson K.; Mathematical contributions to the theory of evolution V: On the reconstruction of stature of pre historic races. Philosophical Transection of Royal Society; London; 1899; 192: 169-224.

18. Saxena SK; Study of correlations and estimation of stature from hand length, hand breadth and sole length. Anthropol Anz., 1984; 42(4): 271-276.

19. Sharma PK, Kapoor AK; Estimation of stature from finger tip length and finger print tip length among criminals, Recent advances in forensic biology (edited), Kamla-Raj Publishers, 2001: 117-127.

20. Shintaku K, Furuya Y. Estimation of stature based on the proximal phalangeal length of Japanese women's hands. JUEOH, 1990; 12(2): 215-219.

21. Thakur SD, Rai KS; Determination of Stature from hand measurement, Medicine Science and Law, 1987; 78: 25-28.

22. Trotter M, Glesser GC; Estimation of stature from long bones of American White and Negroes, American Journal of Physical Anthropology, 1952; 10: 463.

23. Baul S; Anatomical Clinical Study of Human foot. M.S. Thesis, Punjabi University, Patiala 1974.