

UNIT OF AXIS JOURNALS

International Peer Reviewed Medical Journal Committed for Excellence

Estimation of stature from head length

Chourasia RS,¹ Bamne A,² Shukla SN,³ Gohiya V,⁴ Pandey R⁵

Assistant Professor,^{1,2,3} Professor,⁴ Professor & Head⁵

¹⁻⁵Department of Anatomy, Index Medical College Hospital and Research Centre, Indore, MP, India

ORIGINAL RESEARCH

ABSTRACT

Aim

In this study an attempt has been made to derive a linear regression equation for estimation of stature from the length of head.

Background

Estimation of stature from head length is considered as an important parameter in medico-legal and forensic examinations. When highly decomposed and mutilated dead bodies with fragmentary remains are brought for postmortem examination, it becomes difficult to identify the deceased.

Material Methods

The present study is conducted on 506 medical students 255 male and 251 female of age group between 18 - 25 years, was conducted at Index medical college hospital and research center Indore. The measurements were taken by using standard anthropometric instruments..

Results

The observed data was subjected to statistical analysis like 't' test for correlation coefficient. The value of 't' was found to be statistically significant. Simple linear regression equation derived has been used for estimation of height..

Conclusion

It is concluded that the head length provides good reliability in estimation of stature in forensic examinations & in medicolegal cases and the correlation between present parameters can be helpful in medico-legal cases for identification of individuals.

Key Words

Anthropometry, Head length, Stature

Received on 06 July 2014

Accepted on 10 Aug 2014

Published on 15 Aug 2014

INTRODUCTION

Human growth is affected by the various factors such as age, race, gender, environment and nutritional status.¹ The stature prediction occupies relatively a central position in the anthropological research and in identification necessitated by medico-legal experts.² Whenever the body is recovered in mutilated or fragmented state, the problem of identification of the person is difficult even by the most experienced forensic experts. The mutilation of dead body is done by a criminal who wants to destroy all the traces of identity and to facilitate the disposal of dead body.³ Height is fundamental to assess growth, nutrition, calculating body surface area and predicting pulmonary function in childhood.^{4,5} The following study was conducted to estimate the stature from head length and to find out the correlation between head length with the stature of the individuals of different sex.

MATERIAL AND METHOD

The present study was conducted on 506 medical students including 255 males and 251 females of age group between 18 - 25 years old, at Index Medical College Hospital & Research Center Indore between August 2012 to July 2013. The subjects were selected irrespective of their caste, religion, dietary habits and socio-economic status. The subjects were apparently healthy and without any craniofacial deformity

Height

The height of the individual was measured between vertex and the floor, when the person is standing erect, in anatomical position and the head in the Frankfort plane, using a Standing flexible steel tape. (Figure 1)

Height was measured to the nearest 0.1 cm. Height is a vertical distance from the vertex of subject to the floor of standing surface. Vertex is the highest point of the head in Anatomical position which is obtained by joining the infra orbital margin to the upper margin of the external auditory meatus (Frankfurt's plane).



Figure 1 Showing Flexible measuring steel tap

Measurement was taken by making the subject stand erect on a horizontal resting plane, bare footed with shoulder and buttocks touching the wall. Hands were turned inwards & fingers horizontally pointing downward. The one end of standard flexible steel tape was held at vertex & another touching the ground and the height is noted in centimeters. (Figure 2)

Head Length

The head length is measured from glabella to inion, when subject is sitting on the chair with head in the Frankfurt's plane. The instruments was used Spreading Caliper (0-300mm). (Figure 3 & 4)



Figure 3 Showing Spreading Caliper (0-300mm)



Figure 2 Showing Measuring of Height

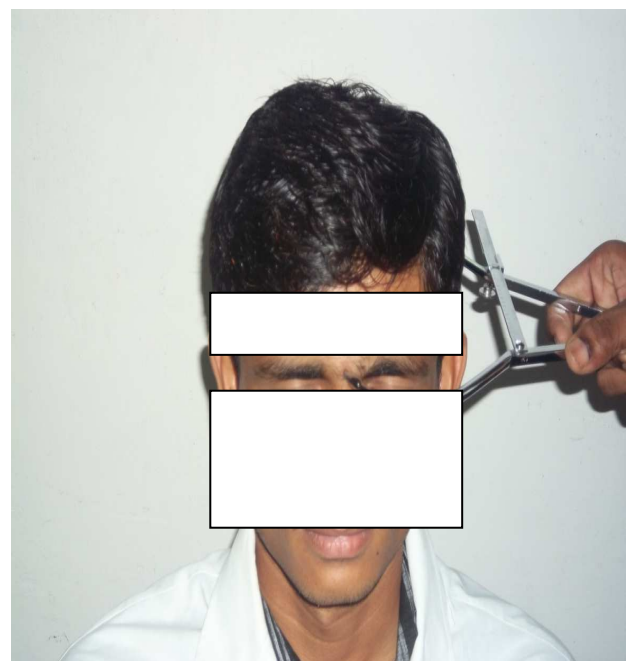


Figure 4 Showing Measuring of Head length

Calculation formula

The calculations was done with following formula.

- **Regression equation formula in male –**

$$\text{Height (y)} = \text{Constant (a)} + \text{slope (b)} \times \text{head length}$$

$$y = 1478 + (1.2525 \times \text{head length})$$

- **Regression equation formula in female -**

$$\text{Height (y)} = \text{Constant (a)} + \text{slope (b)} \times \text{head length}$$

$$y = 1265.5 + (1.7173 \times \text{head length})$$

RESULT

Total 506 medical students including 255 males and 251 females of age group between 18 - 25 years old were included in this study. The total height (Mean \pm SD) is 1709.05 \pm 113.39 and head length (Mean \pm SD) is 184.20 \pm 12.72.

The various observations and results are arranged in tables and presented graphically as follows:-

Table 1

Total height and head length of male and female population

S. NO.	Parameter (mm)	Mean \pm SD	
		Male	Female
1.	Total height	1709.05 \pm 113.39	1533.74 \pm 205.44
2.	Head length	184.20 \pm 12.72	172.60 \pm 5.97

Table 2

Regression analysis of various parameters in male and female.

Parameter	S. No.	Coefficient	SE Coefficient	t	p
Constant	Male	508.4	158.3	3.21	0.001
	Female	726.01	95.48	7.60	0.000
Head length (mm)	Male	0.4129	0.5162	0.80	0.425
	Female	0.3858	0.5019	0.77	0.443

Table 3

Regression analysis of total height (mm) versus head length (mm) in male.

Parameter	Sex	Coefficient	SE Coefficient	t	p
Constant	Male	1478.3	102.5	14.43	0.000
	Female	1265.5	107.3	11.79	0.000
Head length (mm)	Male	1.2525	0.5550	2.26	0.025
	Female	1.7173	0.6214	2.76	0.006

Table 4

Correlation of total height in relation to other parameter in male and female.

Sex	Parameter	Pearson correlation	p value
Male	Head length and total height	0.241	0.000
Female	Head length and total height	0.173	0.006

Table 5

Total Results (male and female) Regression analysis of total height versus other parameters in combined gender males and females.

Parameter	Coefficient	SE Coefficient	t	p	Significance	
Constant	252.40	43.33	5.83	0.000	P < .001	Highly significance
Head length (mm)	1.5749	0.2931	5.37	0.000	P < .001	Highly significance

DISCUSSION

In present study we have used only head length to estimate the stature of individual. The parameters used in present study were compared with the study of other researchers. We have compare our findings with the Krishan K⁶, Jadav H R⁷, Seema and Mahajan's⁸.

Table 6

Comparison of head length (cm) in male.

S.N.	Research worker	Sample size	Mean	SD
1.	Kewal Krishan ⁶	996	17.83	0.89
2.	Jadav H R ⁷	468	17.65	0.97
3.	Seema and Mahajan ⁸	210	17.81	0.96
4.	Present study	255	18.42	1.27

The above table shows that in the present study the mean value of the head length is 18.42 \pm 1.27 and our finding slightly higher from Kewal Krishan⁶, Jadav H R⁷, Seema and Mahajan's⁸ study in males. ((Table 6)

Table 7

Comparison of head length (cm) in female.

S. N.	Research worker	Sample size	Mean	SD
1.	Zakia Akhter ⁹	100	17.49	0.58
2.	Jadav H R ⁶	259	17.65	0.97
3.	Seema and Mahajan ⁷	190	17.81	0.96
4.	Present Study	251	17.26	0.59

The above table shows that in the present study the mean value of the head length is 17.26 ± 0.59 and our finding correlates with study of Zakia Akhter,⁹ Jadav H.R.,⁶ Seema and Mahajan 's⁸ in females. (Table 7)

The correlation coefficients of the previous workers and the present study has been found comparable and statistically significant correlation found in these parameters.

CONCLUSION

It is concluded that the head length provides good reliability in estimation of stature in forensic examinations & in medicolegal cases and the correlation between present parameters can be helpful in medico-legal cases for identification of individuals. This study is helpful to provide database for biometrics.

REFERENCES

1. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE. Gray's Anatomy: The anatomical basis of medicine and surgery. 38th Ed. New York, Churchill Livingstone, 2000.
2. Jasuja OP and Singh G. Estimation of stature from hand and phalanges. JIAFM 2004; 26(3): 100-106.
3. Rani M, Tyagi AK, Ranga VK, Rani Y, Murari A. Stature estimates from foot dimensions. J Punjab Acad Forensic Med Toxi-cology 2011; 11(1): 26-30.
4. Gauld LM, Kappers J, Carlin JB, Robertson CF. Height prediction from ulna length. Dev Med Child Neurol 2004; 46(7): 475-80.
5. Ilayperuma I, Nanayakkara G, Palahepitiya N. Prediction of personal stature based on the hand length. Galle Medical Journal 2009; 14(1): 15-18.
6. Krishan K. Estimation of stature from cephalo-facial anthropometry in North Indian population, Forensic Science International 2008; 181: e1-e5.
7. Jadav HR, Shah GV. Determination of personal height from the length of head in Gujarat region,

Journal Anatomical Society of India 2004; 53(1): 20-21.

8. Seema, Mahajan A. Estimation of personal height from the length of hand in Punjab zone, International Journal of Plant, Animal and Environmental Sciences, 2011; 1: 205-208.
9. Akhter Z, Begum JZ, Banu LA, Alam M, Hossain S, Amin NF, et al. Stature estimation using head measurement in Bangladeshi Garo adult females. Bangladesh Journal of Anatomy volume 2009; 7(2): 101-104.

CORRESPONDENCE ADDRESS

Dr Rajveer Singh Chaurasia,

Department of Anatomy, Index Medical College Hospital and Research Center, Index city N H – 59 Nemawar Road near Khudel Dist. Indore (M. P.) pin code – 452016
Email: rajveer.chourasia79@ gmail.com

Please cite this paper as: Chaurasia RS, Bamne A, Shukla SN, Gohiya V, Pandey R. Estimation of Stature from head length. Inter J Medical Sci Res Prac 2014; 1 (2): 40-43.

ACKNOWLEDGEMENTS

Nil

PEER REVIEW

Double Blinded externally peer reviewed.

CONFLICTS OF INTEREST

Nil

FUNDING

Nil