



MORPHOLOGICAL STUDY OF ESTIMATED HEIGHT BY USING AVAILABLE FORMULA BASED ON TIBIAL LENGTH IN AN INDIVIDUAL.

Anatomy

Dr. Yusra Magrey* Post Graduate (3rd Year), Department of Anatomy, Govt. Medical College, Jammu.
*Corresponding Author

Dr. Sangeeta Gupta HoD & Professor, Department of Anatomy, Govt. Medical College, Jammu

Dr. Saima Manzoor Post Graduate (3rd Year), Department of Anatomy, Govt. Medical College, Jammu.

ABSTRACT

Introduction: Skeleton is a source of information about a human being. In the anthropometric measurements height is the most important parameter. The identification of individual by estimating the stature is done in mass calamities and helps in medico – legal investigations. Tibial bone is the most important weight bearing bone and situated medially in the lower limb of the body. The tibial length is highly correlated with estimation of stature. **Methods:** This prospective observational study aimed to study the estimated height of tibia and to determine its clinical significance. **Results:** A total of 200 subjects were involved, male female ratio was 1:1 and the mean age of male and female subjects were 19.37 ± 3.58 years and 19.27 ± 2.89 years respectively. The measured mean right tibial length of male and female subjects were 36.29 ± 3.12 cm and 33.89 ± 2.38 cm respectively and mean left tibial length of male and female subjects were 36.22 ± 3.19 cm and 33.87 ± 2.39 cm. **Conclusion:** The present study concluded that the accurate measurement of tibial length is a good possible choice to estimate or determine the height / stature in an individual.

KEYWORDS

Stature, Height, Morphology, Length, Bone & Tibia.

INTRODUCTION

Growth is an important determinant of aging and the physical growth is measured anthropometrically by measuring the height or length of an of an individual. The height of an individual represents the health status (nutrition, metabolic disorders, chronic illnesses, etc.).¹

Skeleton is a source of information about a human being. In the anthropometric measurements height is the most important parameter.² Stature is inherent characteristic which varies among population, gender, etc. and is one of the important marker among various parameters of identification. The identification of individual by estimating the stature is done in mass calamities and helps in medico – legal investigations.³

Forensic anthropology helps in identification of unknown humans, as well as to diagnose the causes and mechanisms of death. The ethnicity, sex, stature, and age are the biological parameters in forensic anthropology which can also identify the possible bone disease or trauma.^{4,5}

The various studies stated that the long bone length is the best indicator or marker of stature and lower limb length estimated the standing height of an individual. The tibia is the most common used long bone for estimation of stature. Tibial bone is the most important weight bearing bone and situated medially in the lower limb of the body.^{6,7}

The tibial length is highly correlated with estimation of stature. In any natural or man-made disaster while there are mass casualties the forensic anthropology helps in identification of individual. As tibia is having a simple structure; it helps in measuring the stature of the individual during medico legal examinations.^{8,9}

Thus, the present study was undertaken to estimate the stature by measuring the tibial length.

AIMS AND OBJECTIVES

1. To study the estimated height of tibia by using available formula.
2. To determine its clinical significance.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Anatomy, Government Medical College, Jammu after obtaining the ethical permission from institution.

A total of 200 adult individuals were involved in the study after taking the informed consent from them. The length of the tibia were measured in centimeters with a caliper and further estimated height of the subjects calculated through linear regression was compared with actual height of the subjects.

Inclusion Criteria

1. Intact tibia.

2. Adult individuals were included.

Exclusion Criteria:

1. Broken tibial bone.
2. Pathological changes.
3. Post operative clients.

The data was collected and recorded into a Microsoft excel sheet. Anthropometric measurement was done in all patients and variables (age, gender) were recorded of all patients. The length of tibia was measured in centimetres in standing position according to the technique stated by Vallois (length of tibia is measured by using sliding caliper, while subjects were in standing position). Each measurement was taken 3 times to avoid any error and mean value was taken to estimate the height of the subjects. The data was analysed with the help of SPSS version 22.

OBSERVATIONS AND RESULTS

In the present study a total of 200 subjects were involved and tibial length was measure to estimate their height. In the present study 100 males and 100 females were involved and mean age of the male subjects were 19.37 ± 3.58 years and the mean age of female subjects were 19.27 ± 2.89 years.

Table 1 Mean tibial height

Variable	Males (Mean $\pm$ SD) CM	Females (Mean $\pm$ SD) CM
Right Tibial length	36.29 ± 3.12	33.89 ± 2.38
Left Tibial length	36.22 ± 3.19	33.87 ± 2.39

Table 1, showed that the mean right tibial length of male and female subjects were 36.29 ± 3.12 cm and 33.89 ± 2.38 cm respectively and mean left tibial length of male and female subjects were 36.22 ± 3.19 cm and 33.87 ± 2.39 cm.

Table 2 Mean estimated stature / height

Variable	Males (Mean $\pm$ SD) CM	Females (Mean $\pm$ SD) CM
Stature / Height	167.36 ± 6.98	163.89 ± 4.81

Table 2, depicted that the mean estimated stature / height of male and female subjects were 167.36 ± 6.98 cm and 163.89 ± 4.81 cm respectively.

Table 3 Mean Actual stature / height

Variable	Males (Mean $\pm$ SD) CM	Females (Mean $\pm$ SD) CM
Stature / Height	167.33 ± 5.78	163.58 ± 4.21

Table 3, depicted that the mean actual stature / height of male and female subjects were 167.33 ± 5.78 cm and 163.58 ± 4.21 cm respectively.

Table 4 Estimated Vs Actual stature/ height

Stature	Males (Mean±SD) CM	Females (Mean±SD) CM
Estimated	167.36±6.98	163.89±4.81
Actual	167.33±6.78	163.58±4.21
Difference	0.3±0.2	0.31±0.6

Table 4, represented the comparison of estimated and actual height / stature. It was observed that there was no statistically difference between mean values of estimated and actual length.

DISCUSSION

In this prospective observational study tibial length was measured to estimate the height of subjects. The data was analysed and discussed with previous literature.

In the present study the male and female ratio was 1:1 and mean age of the male subjects were 19.37±3.58 years and the mean age of female subjects were 19.27±2.89 years. The findings are in accordance with the study conducted by Duyarlzzet, et al. (2003), reported the mean age of the subjects were 20.87±4.01 years and 21.72±2.58 years respectively in experimental and control group.⁶ Similarly a study conducted by Maria DM et al (2021), found the mean age of the study subjects were 60.60±16.38 years and 59.1% subjects were males and 40.9% subjects were females.³

In the present study the mean right tibial length of male and female subjects were 36.29±3.12 cm and 33.89±2.38 cm respectively and mean left tibial length of male and female subjects were 36.22±3.19 cm and 33.87±2.39 cm. The mean estimated stature / height of male and female subjects were 167.36±6.98 cm and 163.89±4.81 cm respectively. Further the mean actual stature / height of male and female subjects were 167.33±5.78 cm and 163.59±4.21 cm respectively.

It was observed that there was no statistically difference between mean values of estimated and actual length. The findings of present study are consistent with the study conducted by Sume BW, (2019), observed that there was strong correlation between tibial length and height of the subjects. No significant difference was reported between actual and estimated height. Similarly Moses Banyeh, et al. (2022), and Dr.Soni RB, et al. (2018), reported that the tibial length was a great predictor of estimating the height of the individuals. And the tibial length is helping in identifying the unknown individuals deceased in calamities.^{9,10,11}

CONCLUSION

The present study concluded that the accurate measurement of tibial length is a good possible choice to estimate or determine the height / stature in an individual.

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