International Journal of Enhanced Research in Medicines & Dental Care (IJERMDC),
ISSN: 2349-1590, Vol. 11 Issue 7, July 2024, Impact Factor: 8.325

Stature Estimation in Forensic Nursing Examination

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ABSTRACT

Examining skeletal remains is a difficulty to investigators and medical examiners. Estimating stature or height from various skeletal remains and body parts brought for examination is one of the goals of the medico-legal inquiry. Numerous body components and skeletal remnants have been effectively used to estimate stature since they have a positive and linear connection with stature. This idea is applied to the estimation of stature in various forensic investigations and mass disaster casework in forensic anthropology. For a considerable amount of time, scientists have worked to standardise anthropological data concerning different populations worldwide. This study addresses several crucial methodological difficulties that should be taken into consideration in future studies pertaining to the measurement of stature in forensic exams. It is crucial that forensic nurses understand the theories and methods employed in forensic anthropology since these concerns directly relate to the identification of mixed or unknown remains.

Key Words: Stature, estimation, Forensic Nursing, Examination

INTRODUCTION

Determining the stature from human remains is crucial for comprehending the human osteoarchaeology of historical societies and for facilitating forensic comparisons with recently reported missing individuals. A living person's standing height is their stature. The measurement is taken while the subject is standing straight, with their heels together and their head in the Frankfort Horizontal, from the top of their head (vertex) to the surface of the ground.

Giles and Hutchinson (1991) have reviewed the major sources of extraneous variation in attempting to determine a “true” stature. These include average variations of nearly an inch attributable to the time of day; gravity pulls down on the vertically oriented during the course of a normal day. The measurement technique and variation among measurers introduce inaccuracies from half a centimeter to several centimeters—the greater errors usually attributable to medical, police, or correctional personnel untrained in measurement techniques. Trained measurers using freestanding anthropometers on shoe- less subjects achieve the greatest accuracy and reproducibility in measurements, and even then, small variations persist. Noticeable inaccuracies in recorded heights of the living can result from systematic biases to random errors to simple over-optimism.[1]

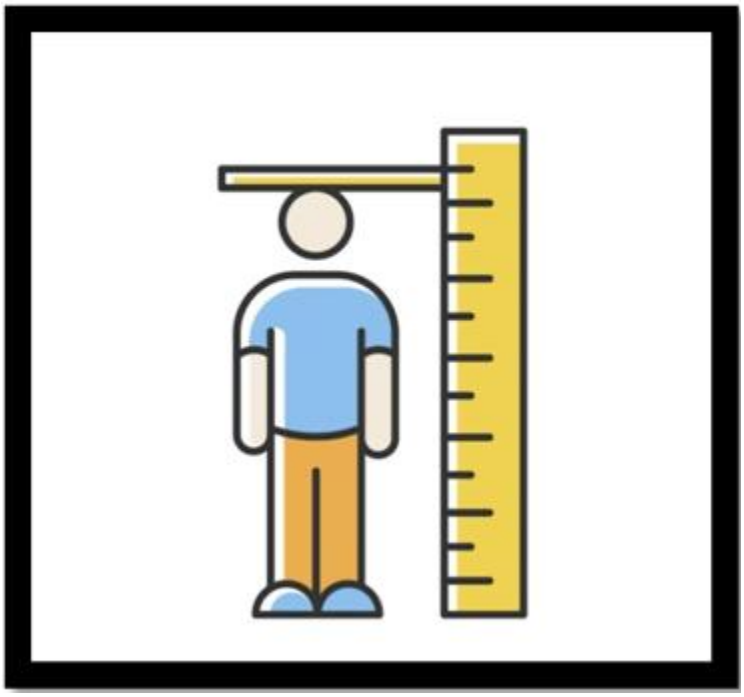

Fig 1: Stadiometer.

A positive linear relationship between stature and the length of various parts of the body, Including long bones, metacarpals, metatarsals, vertebrae, pelvis, scapula, calcaneus, talus, and Skull. Bones associated in the foot may provide little input regarding to information that can be Obtained.[2]

There are several ways to estimate stature. The mathematical method and the anatomical method are the two most popular. The mathematical technique used to determine the living stature, or the height of the person when they were alive, consists of a regression formula and a single bone length. While using every bone that contributes to height, the anatomical method the issue that has been identified is that because demographics in the human population are always changing, formulae for estimating stature is no more in the use. The typical young adult today, for instance, is almost ten centimeters taller than the typical young adult of a century ago. The product strives to minimize errors to the greatest extent possible.[3]

All the bones can help in individual‘s total stature estimation, but the proportionate Contribution can vary greatly. Irrespective of a person’s bodily shape, there are variances in One’s own measures; for example, most calculations for stature are based on the measurement of length Measured from the tip of one hand’s middle finger to the tip of the other hand’s middle finger. The long bones that play a vital role in stature estimation arefemur, humerus, fibula etc. The femur and tibia are the most significant components of height, both individually and together. Complete skeletal structure is not required for the stature estimation, only the long bones is sufficient, certain mathematical formulae helps in estimation of the stature of the individual. Bones associated in the foot may provide little input regarding to information that can be obtained.[4]

Every bone can contribute to an individual 's total stature, but estimation of stature from length of long bones is often an important contribution to the identification of unknown human remains. The stature estimation from the long bones is possible because the bones serve as muscle attachment points which directly can reveal some information about body composition. Identification of a person is the important part of investigation and estimation of stature is important part for identification for medico-legal expert.[5]

Forensic anthropologists do not certify cause of death but provide data to assist in determination of probable cause. This is a branch of the field of physical anthropology and qualified individuals Are certified by the American Board of Forensic Anthropology. [6]

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In forensic anthropology, the stages of bone growth and tooth development provide information that will help determine whether the remains belong to a kid or an adult. Characteristics like pelvic bone form. If there are any anomalies in the size, shape, or density of the bones, they may be a sign of disease or damage. The cause of death can be determined by perimortem injuries that are visible on the bones, such As unhealed fractures, bullet holes, or slashes. Skeletal hints about ancestry will be easy for a Knowledgeable anthropologist to spot. Bones and teeth can be used as indicators of lifestyle, diet and activities. [8]

Forensic anthropology is the application of anthropological principles to medico legal issues. The term medico legal refers to capability of medical science to shed light on legal matters, such as identity of the deceased and circumstances of death. Whereas Anthropometry is the science of obtaining systematic measurements of the human body. Anthropometry helps in study of human variations and evolution in both living and dead populations.[9]

The conducted study is related to forensic anthropology as it will help in estimation of stature of human beings in particular south Asian, specifically of Indian origins. The estimation of stature is a useful study of the identification of human body through the means of measurements. Interest in stature estimation from long bones is not new but the number of actual investigations on the subject is relatively few. [10]

Stature estimations aid identification of more recently deceased unknown individuals in contemporary forensic contexts. As the stature is the fixed trait over a period of time. Stature increases during childhood and through puberty, there is cessation of growth of all the bones after an individual reach adulthood. The growth during the period of puberty is variable and there is noticeable and prominent growth spurt is seen in an individual. Forensic anthropology uses skeletal stature estimation as part of a biological profile including sex, age, and ancestry. [11]

ESTIMATION OF LIVING STATURE FROM SKELETAL REMAINS

Stewart (1979) reviewed the historical highlights of stature estimation from postmortem Remains. Several efforts were proffered in the nineteenth century, but North American studies are A feature of the twentieth century, a time when European methods and European population Applications expanded, and numerous estimation equations for various Asian Populations appeared in the literature (Krogman and I˙s¸can, 1986). Regression formulae for Circumscribed European or Asianpopulations can certainly be the method of choice in Circumstances where the corresponding ethnicity of the deceased is known and appropriate to The chosen formula. However, here we will focus discussion on those methods most applicable to Thegeneral North American adult population. One of these methods was devised in Europe.[12]

THE FULLY METHOD

In 1956 Georges Fully, a French physician, published a method for estimating stature from Skeletal remains that improved upon the European methods of the day (Stewart, 1979b). Fully's"anatomical" method incorporated measurements of skeletal elements from head vertex to Heel (Fully, 1956). The method is based on data from a very large sample of skeletons exhumed From a German concentration camp after World War II and forwhom identity and measured height at arrival could be determined. The original article is rather hard to come by, but the method and Measurements are described in Lundy (1988) and Stewart (1979a). In brief, height ¼ basion bregma height þ maximum heights of vertebral bodies C2 through S1 þ Lengths of femur (bicondylar) and tibia (maximum omitting spines) þ articulated height of talus And calcaneus þ soft tissue factor.[13]

The correction factor for soft tissue was assigned by three categories:
If calculated stature is 153:5cm (60:5 inches) or less, add 10cm (4 inches) If 153:6-165:4cm (60:5 to 65:1 inches), add 10:5cm (4:1 inches).

If 165cm (or 65 inches) or greater, add 11:5cm (4:5 inches)

STATURE ESTIMATION FROM LONG BONE LENGTH

Even casual observation reveals that limb length and stature are positively associated, as are Limb bone length and stature. Plots of known statures vs lengths of a long bone show that Association tobe linear. As a consequence, stature can be predicted from long bone lengths by Simple first-order regression equations. The regression equations are derived from a database of Measured long bones taken from cadavers of measured or "known" (seeabove) stature. Because The magnitude of the contribution of limbs and particular limb segments to stature varies Somewhat predictably on the bases of sex and ancestry, separate regression equations for sex And ancestry are needed. Since large databases on which to base regression

equations for many Populations do not exist, one does the best one can with what is available. In many forensic Situations sex is known with a higher degree of assurance than ethnicity is known, so an extensive Menu of closely defined subtle ethnic choices may be less utilitarian than is often supposed. Nevertheless, it is important to pick the equation(s) that best fit the demographic description of The deceased and to have a large database sample size.[14]

Trotter and Gleser (1952, 1958, 1977; Trotter, 1970) produced a series of regression equations based on measured cadaver height and long bone length from the Terry Collection and measured long bone length from identified World War II and Korean War casualties with known living stature. For the Terry males living stature was derived from cadaveral height by subtracting 2.5 cm. Their female sample for American blacks and whites came exclusively from the Terry Collection. For American black and white males Trotter (1970) recommended equations from World War II data.[15]

STATURE ESTIMATION IN FORENSIC NURSING

- Stature estimation is obtained from measurements of long bones; namely the humerus, femur, and tibia. If these bones are unavailable, the ulna, radius, and fibula can also provide a good range for the expected height of an individual.
- It helps to the Forensic Nurse to preserve the skeleton completely. In this case an anatomical method should be used.
- It helps to understand the population origin of the unknown person, whose stature is estimated, is known (or can be assumed with high reliability), but the skeleton is not completely preserved. In this case, if any least squares regression equations for this population have been published, these can be used to estimate the stature.
- It helps for the Nurse to use different methods of stature estimation, when the skeleton is incomplete and the population origin is unknown (or cannot be estimated with sufficient reliability), only the methods based on direct proportionality may be performed. However, estimates based on direct proportionality are unprecise, so this method should be either used with great caution or completely avoided.

CONCLUSION

- Stature estimation is a key factor in estimating the length of the living person.
- Estimating stature from human remains is important for understanding the human osteoarchaeology of past populations as well as providing information for forensic comparisons with recent missing persons.
- Variations in stature can be observed when estimating the stature of persons from multiple places.
- Giving a stature estimation "range" that is derived from a regression formula. The difference between a variable's least and greatest observed values is known as its range in statistics. "Interval" is a better word to use.
- According to Forensic Labs in India and the DFS Biology Manual, the multiplication factor for humerus bone is 5.2. This multiplication factor was then used to get the error rate.
- The measurement of the overall height and middle finger tip from one hand to the other determines the error percentage. The inaccuracy % is computed using the difference between the total length and total breadth.
- A series of measurements has to be collected until the required amount of data reached satisfactory to calculate error percentage.

BIBLIOGRAPHY

[1]. Giles and Hutchinson https://www.researchgate.net/profile/Mamdouh_Zaki2/post/Im_looking_ for_step by_ step_work book_ that_introduces_students_ to_all_procedures_ of_the_f orensic_ anthropology_ protocol_Could_ anyone_recommend_one/ attachment /59d61d9979197b80779786e2/ AS%3 A271760551809025% 40144180417327 8/download/0471210064.pdf
[2]. Adult Stature Estimation from Radiographic Metatarsal Length in a Contemporary Korean Population https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8508081.
[3]. Stature estimation from the skeleton https://www.researchgate.net/ publication/ 285692773_ Stature_estimation_fr om_the_skeleton
[4]. The estimation of stature on the basis of measurements of the femur https://www. researchgate.net/publication/8159131_The_estimation_of_stature_on_the_basis_of_measurements_ of_the_femur
[5]. Estimation of stature from measurements of long bones, hand and foot dimensions.https://www.researchgate.net/publication/277036272_Estimation_of_stature_from_ measurements _ of_ long_bones_ hand_and_foot_dimensions
[6]. Forensic Anthropology MeSH Descriptor Data https://meshb.nlm.nih.gov/record/ui?ui= D018732
[7]. Adult Stature Estimation from Radiographic Metatarsal Length https:// www. ncbi.nlm.nih.gov/ pmc/articles/PMC8508081/

[8]. Forensic anthropology Smithsonian National museum of natural history https://naturalhistory.si.edu/education/teaching-resources/social- studies/ forensic-anthropology
[9]. Positiv linea relationship https://ebooks.inflibnet.ac.in/ antp07/chapter/ definition-aim-and-scope-of- forensic-anthropology/
[10]. Estimation of stature from dimensions of hands and feet in a South Indian Population https://www.researchgate.net/publication/341409765_Estimation_of_stature_from_dimensions_ of_hands_and_feet_in_a_South_Indian_Population
[11]. Significance of Head Length in Estimation of Stature in Healthy Individuals of Central India https://www.researchgate.net/publication/273012650_Significance_of_Head_Length_in_Estimation_of_Stature_in_ Healthy_Individuals_of_Central_India
[12]. History of Human Stature Estimation Based on Skeletal Remains https://www.researchgate.net/publication/265543193_History_of_Human_Stature_Estimation_Based_on_Skeletal_ Remains
[13]. Revision of the Fully technique for estimating statures https://pubmed.ncbi.nlm. nih.gov/16425177/
[14]. Prediction of stature from long bones versus hand and foot measurements: A comparative study of the Kolhapur population https://nmji.in/prediction-of-stature-from-long-bones-versus-hand-and-foot- measurements-a-comparative-study-of-the-kolhapur-population/
[15]. Trotter and Gleser's (1958) equations outperform Trotter and Gleser's (1952) equations in stature estimation of the US White males https://www.researchgate.net/ publication/369486699_Trotter_and_Gleser's_ 1958_ equations_ out perform_Trotter_ and_Gleser's_1952_equations_in_statur e_estimation_ of_the_US_white_ males