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Adult Nigerian Population in Lagos: Percutaneous Anthropometric Dimensions of the Upper Arm and Forearm Bones: Determination of Sex and Stature

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Abstract

Background: Like other phenotypic traits, stature is a key indicator for identification and is influenced by a combination of genetic and environmental factors. With the alarming rise in the frequency of road, flood, intentional mutilation and natural disasters, stature or body height is one of the most significant and useful anthropometric parameters that establish a person's physical identity. It is also regarded as one of the important and significant parameters for the establishment of personal identity in forensic medical examination or anthropological studies.

Objectives: To determine stature and gender in an adult Nigerian population by measuring the percutaneous length of the arm and forearm bones.

Methods: The University of Lagos' workers, students and volunteers made up the sample group for this study, which included 222 people (115 men and 107 women) between the ages of 18 and 65. a variety of anthropological tools, including the Stadiometer, an anthropometric tool produced by SECA alpha® in Germany. The measurement was performed using calliper, weighing balance and tape that were calibrated in centimetres.

Results and Conclusion: The intercondylar breadth had the best value for statistical significance in the sex prediction made using logistic regression. The largest link with stature was found for the ulnar measurement, whereas the smallest correlation was found for the intercondylar measurement across all parameters. Both males and females can have their arm and forearm lengths measured percutaneously, which has good reliability for estimating stature and predicting sex. The intercondylar is more strongly correlated with sexual dimorphism. Simple and numerous linear regressions demonstrated that using the foot length is the most accurate technique to predict and estimate stature.

Keywords: Arm and forearm length • Stature • Sex • Correlation coefficient • Simple • Multiple linear regressions

Introduction

Stature In forensic medicine, the distance between a person's vertex and the standing surface is thought to be a crucial characteristic for personal identification. This parameter is influenced by a variety of variables, including genetics, nutrition, environment, gender, age and physical activity. From one race, ethnic origin and geographic area to another, the stature and bone length, as well as the factors affecting stature and bone length, vary greatly. Furthermore, stature has been implicated as a measure of development and growth. It has been used in nutrition and health research in clinical settings. According to studies, stature plays a crucial role in estimating nutrient needs as well as basal energy expenditure, body mass index, basal metabolic rate, body composition and vital capacity. Even among the same subjects, anthropometric measurements have been reported to vary with populations global. Environmental and genetic influences are thought to be responsible for these variances. It is normal practise to utilise anthropometric methods to estimate skeletal length and stature from a subject's skeleton for over a century, anthropologists, physicians and anatomists have studied various body sections one hundred years [1-3].

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Anatomical and mathematical techniques are the two main ways to estimate a person's height from long bones and other body parts. The anatomical method is thought to give the closest estimate of stature, but its fundamental drawback is that it needs the entire skeleton. While the mathematical approach just needs one bone or body part, it is less accurate. Regression analysis is thought to be a superior and more trustworthy mathematical method, nonetheless. In order to rebuild the deceased's biological profile, including age, sex, race and stature, anthropometric measurements are more important than multiplication analysis. Estimating stature is one of these "big four" forensic anthropology's primary criteria for identifying a person during a forensic investigation. The biological basis for determining sex based on the physical and behavioural distinctions between males and females is known as sexual dimorphism. Sexual differences that affect bone size, shape and appearance typically develop during growth as a result of unique genetic markers and a person's response to sex hormones during puberty. In both sexes, bone formation is influenced by a mix of hereditary factors and hormone exposure. There are a number of population-specific genetic and environmental factors that influence the age at which these sex-specific morphological alterations first manifest. Sex estimation standards must be population-specific since the degree of sexual dimorphism and the age at which it manifests in males and females differ between various communities. Since anthropologist has over the years concentrated on how to determine stature from skeletal remains, the current study was unable to find any studies that analyse the determination of stature and gender from percutaneous bones of arm and forearm. However, this study will be conducted on live subjects to estimate stature from the length of the arm and forearm percutaneous bones and the findings will be used to teach anthropologists in this area how to estimate stature from partially skeletonized bodies where the tissues are still required for additional forensic investigation [4-8].

Study design Subjects were informed of the objectives of the study, Stature,

hand anthropometric dimensions, clothing requirements, measurement procedures and freedom to withdraw were let known to the participants who met inclusion and exclusion criteria. A sample size of 230 convenient sample participants (100 males and 130 females) who were all Nigerian medical students (undergraduates and postgraduates), ages between 18 through 36 years were invited to the department of Anatomy, College of medicine, University of Lagos for measurement [9].

Percutaneous anthropometry

The measurement was taken as the maximum vertical distance from the floor to the vertex of the head using Stadiometer for the measurement. Protocol: Each participant was asked to stand barefooted on the flat platform, maintaining an erect position with their heels, buttocks, upper back with the head in contact with the wall. The arms were placed on the sides of the thigh and instructed to inhale and hold their breath. Their heads were held in the Frankfort horizontal plane. This position is achieved when the line joining the orbitale to the tragion is horizontal or at right angles to the long axis of the body. The horizontal sliding bar is then positioned on the contact point of the vertex of the head and stature is recorded in centimeters [10].

Conclusion

The present study will provide a database on an adult Nigerian population for the prediction of stature from hand dimensions. This could lead to the development of a standard for such data on young adult Nigerians. The comparison made with the other studies on different world population could contribute to the understanding of the relative status of Nigerian population in the context of the anthropometric variations around the world. Hence, the regression formulas derived from hand variables, may be of help when reconstructing stature from dismembered body parts, but it is only peculiar to a Nigerian population.

Acknowledgement

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Conflict of Interest

None.

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