



ORIGINAL RESEARCH PAPER

Medical Science

CORRELATION OF SKULL SIZE AND BRAIN VOLUME WITH AGE, WEIGHT, HEIGHT AND BODY MASS INDEX OF MEDICAL STUDENTS

KEY WORDS: Cranial Capacity, Body Mass Index, Anthropometry.

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ABSTRACT

Physical anthropology involves measurement of various physical parameters referred to as anthropometric parameters. Anthropometric methods can show changes in craniofacial composition that diversify human phenotypes and particular features that differentiate individuals and ethnic groups. These standard data are accurately assessed which can be found useful in plastic surgery, tooth deformities, in legal medicine for identification of an individual or in medical genetics for the diagnosis of dimorphism or craniofacial abnormalities.

MATERIAL AND METHOD-The study was carried out on Medical students in Ajmer. Study was carried on 350 students age group of 17-26 years. The head length, head width and auricular height was measured and correlated with age, body weight, body height and body mass index.

CONCLUSION- Body measurements are used for calculation of BMI and also head measurements such as length, width and height can be used to calculate the skull volume. Cranial Capacity is one of the indicators to estimate brain volume. An increase of cranial capacity resulted in increase of the body height, body weight and BMI.

INTRODUCTION

"Identification is an individual's birth right." Personal identification means determination of individuality of persons. It is a fact that no two persons are ever alike in all their measurable characters. Every person tends to undergo change in varying degrees from birth to death, in health and disease. Age, sex and stature are the primary characteristics of identification. A variety of factors such as age, race, gender and nutritional status affect the human growth and development.

It is well known that there is a definite relationship between the height of the person and various parts of the body like head, trunk and length of the upper and lower limbs. Assessing the height of an individual from measurements of different parts has always been of immense interest to the anatomists, anthropologists and forensic medicine experts. Various ongoing researches in anthropology reveal that accurate and fast technique of identification is still required especially in cases of human remains where intact, burned, fragmented parts or badly decomposed bodies are found. Determination of cephalic parameters is of great importance for identification. Cephalic features depend on many factors like age, gender, race, climate, socioeconomic, nutritional and genetic factors.

Craniofacial anthropometry which is used in the determination of the morphological characteristics of the head and face is an important part of anthropology and medicine.

MATERIAL AND METHOD

The study was performed on students of medical college of Ajmer. A total of 350 students of age group of 17-26 years were undertaken. No skeletal or pathological changes were taken into considerations.

The particular age group was taken as the ratio between height and limbs will not change after the age.

The Parameters taken were-

1. Stature – Maximum distance from vertex to floor
2. Measurement of Head Length- Head length measures the straight distance between glabella and inion when head is in frankfurt's plane.
3. Measurement of Head Width- Head width measures between parietal eminences (right and left) which are the maximum breadth of cranium at right angle to the mid sagittal plane.
4. Measurement of Head Height- Head height measures the projective distance between porion and vertex.

Porion- It is the point where the perpendicular drawn in the middle of external acoustic meatus meets its upper margin.

Vertex- The Vertex is the highest point on the skull and it usually occupies a position in the middle third of the sagittal suture.

Brain volume (cranial capacity) was calculated using the following formula given by Lee Pearson.

In males: $0.000337(\text{Head Length}-11) \times (\text{Head Breadth}-11) \times (\text{Auricular Height}-11) + 406.01$

In females: $0.0004(\text{Head Length}-11) \times (\text{Head Breadth}-11) \times (\text{Auricular Height}-11) + 206.6$

RESULT

Correlation between study parameters and brain volume

Parameters	Pearson's Correlation coefficient (r)
Age	0.194
Weight	0.284
Height	0.329
BMI	0.044

DISCUSSION

The evaluation and measurement of human body dimensions and diameters may be achieved by physical anthropometry. Anthropometric measurements are also important for the assessment of health status. An important part of anthropometry is represented by craniofacial measurements for the determination of head and face shapes. Estimated cranial volume can be obtained either from the cadaver or human. Several methods were reported in previous literatures, including by imaging i.e. magnetic resonance imaging (MRI), computed tomography (CT) scan and by craniometry. Craniometry is a branch of anthropometry through which cranial dimensions can be estimated. Cranial capacity is a measure of the volume of the interior of the cranium (skull) of those vertebrates who have both a cranium and a brain. The cranial capacity is used as a rough indicator of the brain size and this in turn is used as a rough indicator of the potential intelligence of the organism.

The present study explore the correlation of cranial capacity with cranial length, cranial width, cranial height, body weight, body height and BMI.

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