ESTIMATION OF STATURE OF PHYSIOGNOMIC EAR LENGTH AND BREADTH

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Abstract: **The aim of this study is to estimate height of a person from the data of physiognomic ear length and breadth. In forensic crime investigations, it is important to be able to identify different parts of the body during autopsy in order to find information about the concerned individual and the suspected criminals. It is important to estimate the basic details of a person, such as; age, sex, weight and height. For this concept to be accepted usually a regression equation is formulated to show there is a correlation between the two variable and can be used to estimate the height of the person. These regression equations are very specific to certain group of populations and cannot be used for other populations.**

Keywords: **physiognomic ear breadth, physiognomic ear length, stature estimation.**

Introduction

The use of forensic science in most countries is often hampered by unprepared and ill-equipped institutions. Only a limited number of countries have the correct infrastructure, knowledge and expertise to properly investigate and prosecute crimes. During legal investigations, especially in crimes resulting in fatalities or when unknown human remains are recovered by investigating agencies, the forensic pathologist is often required to give an opinion regarding personal identification of the deceased.

Features pertaining to the human ear that may be used for identification include piercings, tattoos, abnormalities and trauma.

The anatomical structure of the external ear is used for personal identification of living subjects in relation to criminal activity. Ear length, ear length above tragus, ear length below tragus, tragus length, ear breadth, concha length, concha breadth, lobule height and lobule width of the external ear can be measured for identification.

The human ear is the most defining feature of the face. Several studies have been attempted for individual identification from morphological features of ears. Studies on various landmarks like have been identified with high accuracy.

Method and Materials

A total sample of 100 healthy individuals were taken from Chennai. It consisted of 25 males and 75 females. The height of each individual was measured using a standard height measuring frame.

- Measuring Physiognomic ear length

It is measured from the superior aspect (supra-aurale) to inferior aspect (sub-aurale) of the external ear by using sliding calliper.

- Measuring Physiognomic ear breadth

It is the maximum breadth, measured from the anterior aspect (pre-aurale) to the posterior aspect (post-aurale) of the external ear by using sliding calliper.

Ear length

Ear breadth

Results

Table 1
Descriptive statistics for height, physiognomic ear breath and ear length.
(Male: 25, Female : 75)

Measurements	Gender	Mean	Std. Deviation	Minimum	Maximum
Height	Male	168.48	10.373	146	192
	Female	160.08	8.406	142	185
Ear length	Male	4.76220	0.778319	1.798	3.665
	Female	4.90640	0.841879	3.460	6.754
Ear breath	Male	3.17368	0.459577	1.798	3.665
	Female	2.89552	0.603142	1.990	4.521

The results show that both the values, ear length and ear breadth have low standard deviation, with values close to the mean. Standard errors are very high, with values, more than 1. The difference between the values of males and females was small, so it was not considered to be significant.

Discussion

Studies were conducted with human remains and categorising them with upper and lower extremities[6]. Studies on upper extremity are; a study by Ahmed[9] using Sudanese adults investigated the relationship between stature and upper limb dimensions[5]. Another case by Agnihotri et al. Studied the stature from the forearm length[6], hand length and hand breath in Indo-Mauritian population to work out the regression equations[7]. A study conducted in Nigeria using Igbo population, showed that external biocular breadth and inter-ocular breadth had a higher significance correlating with stature estimation. And the values were higher in males than females [16].

Studies on the lower extremity are; Ahmed calculated the tibial length and for length to be considered as on of the best predictors of stature in Sudanese Arabs. Since foot is protected by footwear, it is well preserved. In another study by Agnihotri et al. In a group of Indo-Mauritian population they used the per cutaneous of tibia to find that the tibia length has a strong relation with stature[10]. He also showed that the principal criterion in measuring the stature for individuals is the foot length[10]. At the same time, Krishnan et Al.[11] That measuring foot length gives a greater accuracy than measuring foot breath to estimate the stature. Ozaslan et al.[12] The relationships between dimensions of lower extremity and height in adult Turks living in Istanbul and confirmed that correlation is present between the lower extremity and height of a person. And to reinforce this result, Han et al. Lower leg length gives a good prediction of height.

To extend this study, studies have been done on other parts of the body to determine the stature. In a Study done by Menezes et al[13]. To formulate a linear regression equation using length of sternum. He concluded that the a reliable predictor for stature in adult South Indian females is using length of sternum. In case of Cambaccos et al.[14] For a forensic practise a sample of scapula is reliably used for the estimation of stature in absence of long limb bones. Nagesh et al.[15] Used different parts of vertebral column and estimated the stature in South Indian population.

In a study conducted by Krishna and Kumar with 252 males, suggested that a better value is given with horizontal head circumference, maximum head length and maximum head breadth. Another study observed that estimating stature in Turkish population using per cutaneous dimensions is not a good predictor[3][4].

In another study conducted in Delhi on male and female Jatavs have shown that there is a significant difference in stature estimation between males and females in ear length and Nasal breadth. It shows females have greater dimensions when the results were programmed in the T-test [17]. Another study there showed a correlation between ear morphology and height estimation. This study was done in Nigeria using 219 students from Bayero university, their result was used to formulate a linear equation for ear dimensions and height. So ear dimensions was concluded as an additional tool to estimate height [18].

In this study, the ear length and breath have a low standard deviation (close to 0) which suggests that there is very little variation and the values are close to the mean. These results can be considered significant [1]. On the other hand the standard errors are quite high with a value of more than 1, but the values for ear length and breath are close to each other in the respective categories. Since the values are high, it may not be considered significant. For accurate estimation of stature from remains of body to determine the height of the person is very important in forensic investigation[2]. Regression analysis is the best and most reliable tool for this experiment. The measurements for both males and females did not show any significant difference, since the mean values are in close proximity. The reason to use the formula is to calculate the estimation of the growth of the skull which genetically grown due to the growth of brain. So there should be a correlation between the stature and the measurements of ear. As per the results both the ear length and ear breath does not have a significant influence on estimating the height of a person, since both give a R^2 value of zero. Therefore there is no need for the use of the formula.

Conclusion

One of the main aspects of criminal justice is forensic investigation. Scientifically studying and collecting data from evidence can be of great help in case of no witnesses or if the main remains of the body are gone. We can use cephalo-facial measurements to predict the height of the person. In this study, as the mean difference between male and female ear length and ear breadth had less significance, and the R^2 value turned out to be zero, linear regression formula was not programmed. As far as we know from the results, ear length and breath does not give a reliable measurement to estimate the height of a person.

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