Original Research Article

Assessment of Anthropometric Measurements of External Ear Among Known Population: An Institutional Based Study

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Abstract

Background: The size, shape, position, and projection of the ear all influence the appearance of the individual. The present study was conducted to assess anthropometric measurements of external ear among known population.**Materials & Methods:** 112 subjects of both genders were recruited, and measurement of ear was done. Data such as name, age, gender etc. was recorded. Pictures with camera were obtained on white paper. Various landmarks of the auricle were identified. **Results:** Out of 112 subjects, males were 60 and females were 52. The mean length was 64.5 mm in males and 63.1 mm in females. Width was 32.8 mm and 30.5 mm in males and females, length above tragus was 29.4 mm and 28.3 mm in males and females respectively, length below tragus was 21.0 mm and 20.4 mm, tragus length was 14.9 mm and 14.3 mm, concha length was 23.5 mm and 22.9 mm, concha width was 17.2 mm and 17.0 mm in males and females, lobule height was 12.4 mm and 11.5 mm, lobule width was 20.3 mm and 19.4 mm respectively.**Conclusion:** Assessment of parameters of ear is helpful in detecting various ear abnormalities.

Keywords: Ear, Lobule, Width.

Introduction

An important organ contributing to the esthetics of the human face is the ear. The size, shape, position and projection of the ear all influence the appearance of the individual[1]. The external ear consists of the external auditory meatus and the auricle or pinna[2]. The latter is most commonly associated with congenital abnormalities such as microtia, macrotia, malposed ear, accessory auricle, lop ear and protruding ear, which may be associated with Down's syndrome, Potter's syndrome and Turner syndrome. Acquired defects result from traumatic injuries and pathologic conditions, especially cancer[3].Five to eight percent of all skin cancers are located on the auricle as its projection and exposure make it more prone to actinic damage. Rectifying these abnormalities requires information about normal auricular dimensions, the auricle's bilateral position on the face and general conformation. Some studies of the ear involving syndromes and anomalies have been published, but few studies have investigated the ear in the normal population[4].
The measurement of human individual is known as Anthropometry (anthrops-human and metron-measure)[5].
Anthropometric measurements have uses in epidemiology and medical anthropology, in helping to determine the relationship between various body measurements such as the height, weight, percentage, body fat and medical outcomes.

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Anthropometry involves the systematic measurement of the physical properties of the human body, primarily dimensional descriptors of body size and shape[6].The present study was conducted to assess anthropometric measurements of external ear among known population.

Material and Methods

The present study was conducted among 112 subjects of both genders at Department of Anatomy, All India Institute of Medical Sciences (AIIMS), Rajkot, Gujarat, India. All were informed regarding the study and their written consent was obtained. Data such as name, age, gender etc. was recorded. Pictures with camera were obtained on white paper. Various landmarks of the auricle were identified. A straight line was drawn marking the attachment of the auricle to the skin of the face. A perpendicular was drawn to this first line such that it was tangential to the highest point on the helix. Another perpendicular was drawn to the first line such that it was tangential to the lowest point on the lobule. Another line is drawn parallel to the first line and tangential to the outermost point on the helix of the auricle. A rectangle was thus drawn tangential to the four borders of the auricle. This rectangle defined the boundaries of the auricle. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1 shows that out of 112 subjects, males were 60 and females were 52. Table 2,Fig 1 shows that mean length was 64.5 mm in males and 63.1 mm in females. Width was 32.8 mm and 30.5 mm in males and females, length above tragus was 29.4 mm and 28.3 mm in males and females respectively, length below tragus was 21.0 mm and 20.4 mm, tragus length was 14.9 mm and 14.3 mm, concha

length was 23.5 mm and 22.9 mm, concha width was 17.2mm and 17.0 mm in males and females, lobule height was 12.4 mm and 11.5 mm, lobule width was 20.3 mm and 19.4 mm respectively.

Table 1: Distribution of subjects

Total- 112		
Gender	**Males**	**Females**
Number	60	52

Table 2: Assessment of ear measurements

Parameters (mm)	Male	Female	P value
Length	64.5	63.1	0.1
Width	32.8	30.5	0.9
Length above tragus	29.4	28.3	0.13
Length below tragus	21.0	20.4	0.65
Tragus length	14.9	14.3	0.16
Concha length	23.5	22.9	0.09
Concha width	17.2	17.0	0.12
Lobule height	12.4	11.5	0.45
Lobule width	20.3	19.4	0.51

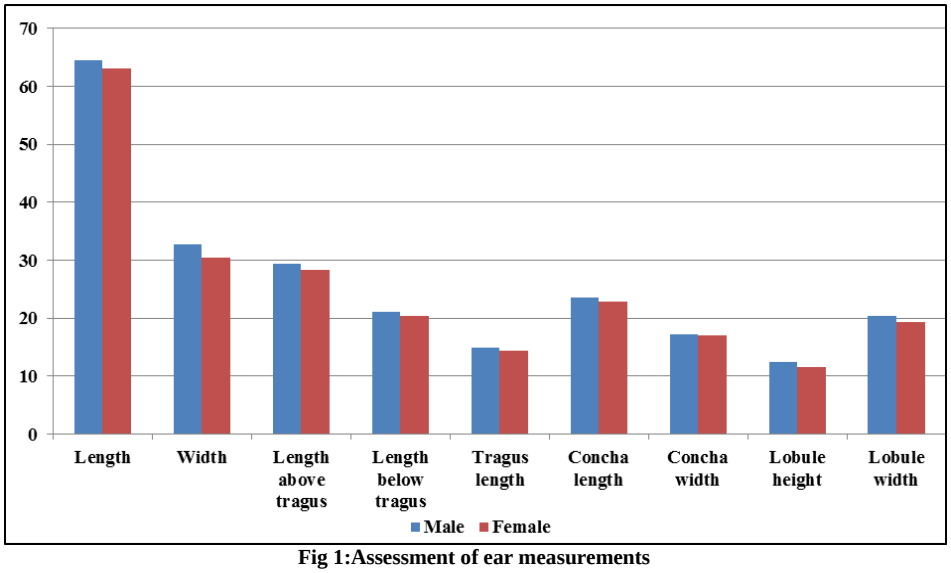

Fig 1:Assessment of ear measurements

Discussion

The ear is an important and under-recognized defining feature of the face whose shape and size conveys information about age and sex[7]. Although the primary function of the pinna is to collect sound waves that are transmitted to ear drum through the external auditory meatus, the ear is also recognized as a cosmetic organ and its importance is more related to the aesthetics and physiognomy of the face[8]. People having abnormal set of ears through congenital malformations or loss of the auricle through trauma usually feel depressed and uncomfortable. Any auricular defect in form of inappropriate size, abnormal elongation of the auricular lobe, or missing part is corrected by surgery[9].For rectifying such abnormalities plastic surgeons require information about normal auricular dimension, the auricles bilateral position on the face, the general conformations, and its variation. But these auricular data vary in different ethnic groups[10]. Recent anthropometric studies of the external ear from different parts of the world prove that much variability exists depending on the age, sex and ethnic group, and even in the same person between the right and left ears. In spite of this, the available literature suggests that males have larger ears than females, the length and width of the ear keep on increasing with age, and the general size of the ear varies in populations of different ethnicities[11].The present study was conducted to assess anthropometric measurements of external ear among known population. In present study, out of 112 subjects, males were 60 and females were 52. Japati et al[12] found that evaluation of 156 participants, 49 males and 107 females (mean age = 24.72 years), was done. It was observed that males had slightly larger dimensions for left ear length, right ear length, left ear breadth, right ear breadth, left ear length above tragus, right ear length above tragus, left ear length below tragus, right ear length below tragus, left ear concha length, right ear concha length, left ear concha breadth, right ear concha breadth, left ear lobule height, right ear lobule height, left ear lobule width and right ear lobule width as compared to females. On the other hand, females had slightly higher values for left ear tragus length and right ear tragus length as compared to the males. The *P* values for left ear length, right ear length, left ear breadth, right ear breadth, left ear length above tragus, right ear length above tragus and left ear lobule width were <0.05 and hence statistically significant. All other variables of the ear between males and females in this age group had a *P* >0.05 and hence were not significant. The Spearman's correlation coefficient (*r*) was calculated, and the highest strength of correlation was seen for left ear length–right ear length (r^2 = 85.9%), while the least was observed for left ear breadth–right

ear breadth (r^2 = 69.7%). The *P* value for all the correlations was found to be <0.05.We found that mean length was 64.5 mm in males and 63.1 mm in females. Width was 32.8 mm and 30.5 mm in males and females, length above tragus was 29.4 mm and 28.3 mm in males and females respectively, length below tragus was 21.0 mm and 20.4 mm, tragus length was 14.9 mm and 14.3 mm, concha length was 23.5 mm and 22.9 mm, concha width was 17.2mm and 17.0 mm in males and females, lobule height was 12.4 mm and 11.5 mm, lobule width was 20.3 mm and 19.4 mm respectively. The shortcoming of the study is small sample size.

Conclusion

Authors found that assessment of parameters of ear is helpful in detecting various ear abnormalities.

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