



“MEASUREMENTS OF RIGHT EAR OF MEDICAL STUDENTS IN UDAIPUR”

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Abstract:

Aims and Objectives: This study aimed to determine the normal anthropometric measurements of right external ear in both males and females. **Materials and Methods:** The study was carried out on 100 medical students at department of anatomy, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan, with no evidence of external ear deformities. The cross-sectional analytical study consisted of 50 males and 50 females aged 18-25 years. Digital vernier caliper were used to measure the right external ear. Parameters were total ear length and ear width of right side. **Observation and results:** It were observed that all parameters were significantly higher in males than in females on right external ear. **Conclusion:** This study provides the mean values of right ear length and width in medical students of PIMS, Udaipur. Results according to genders who participated in the study where both dimensions were higher in male as compared to the female subjects.

Keywords: Anthropometry, Right external ear, Total ear length, Ear width, Digital vernier caliper.

Introduction:

The measurement of living human body dimensions for the purpose of understanding human physical variations is known as anthropometry. Importance of this measurement are in plastic surgery, prosthetics and for data collection. Statistical data is useful in the field of forensic and optimize products¹.

In human, ear is the defining feature of the face and its structure shows the signs of age and sex. The human ear is divided into external, middle and internal parts¹. Auricle and external auditory meatus form the external ear which is utilized in forensic sciences for individual identification and authentication. The auricle is one of the five primary features of the human and is particularly influential in determining its appearance². The lateral surface of the auricle is irregularly concave, faces slightly forward and displays many eminences and depressions, which can make contact with

various surfaces and can produce a print like a rubber stamp. Ear prints are found predominantly on surfaces generally at doors or windows³.

Ear biometrics can positively identify an individual using comparative analysis of the human ear and its morphology. The dimensions of the pinna have been found to vary among different ethnic groups. The biometrics of ear is a very interesting issue as during crime scene investigation, ear marks and measurements are often used for identification in the absence of valid fingerprints⁴.

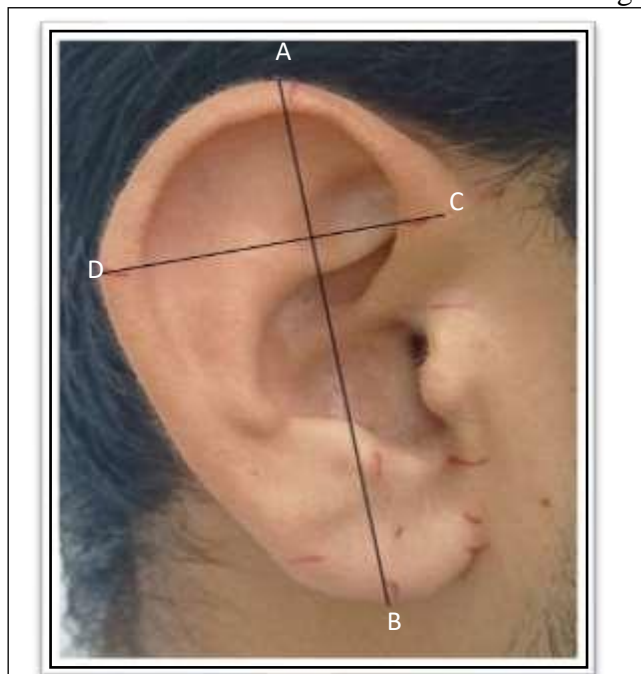


Figure 1: External ear showing total ear length (A-B) and ear width (C-D) marking

The aim of the present study was to determine the normal anthropometric measurements; total length and width of right external ear and compare them in male and female subjects.

Material and methods:

The study design was cross sectional study and conducted in the Department of Anatomy, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan. Total subjects 100 medical students of Pacific Institute of Medical Sciences, Umarda, Udaipur (50 males and 50 females) fulfilling inclusion and exclusion criteria were enrolled for the study. An informed consent was taken from the subject before enrolment. The study was conducted after approval from the Institutional Ethical Committee (IEC).

Inclusion Criteria:

- Age between 18 to 25 years.
- Subjects who were willing to participate.

Exclusion criteria:

- Subjects below 18 and above 25 years.
- Subjects with any congenital ear anomalies.
- Subjects with any previous ear surgeries.

Standardized measurements of the ear auricles were taken according to the landmarked points defined by De Carlo et al. and the methodology was adopted from McKinney et al. and Brucker et al.⁵⁻⁷ The parameters measured were total ear length, ear width for each subject's right ears, when the head was in the Frankfort horizontal plane⁸. The total ear length was measured as the distance from the most

inferior projection of the ear lobule to the most superior projection of the helix. The ear width is measured as the distance between the most anterior and posterior points of the ear.

Additionally, ear index is calculated as:

$$\text{Ear Index} = \frac{\text{Ear width}}{\text{Total ear length}} \times 100$$

These parameters were measured by the specific instrument that is known as digital vernier caliper.

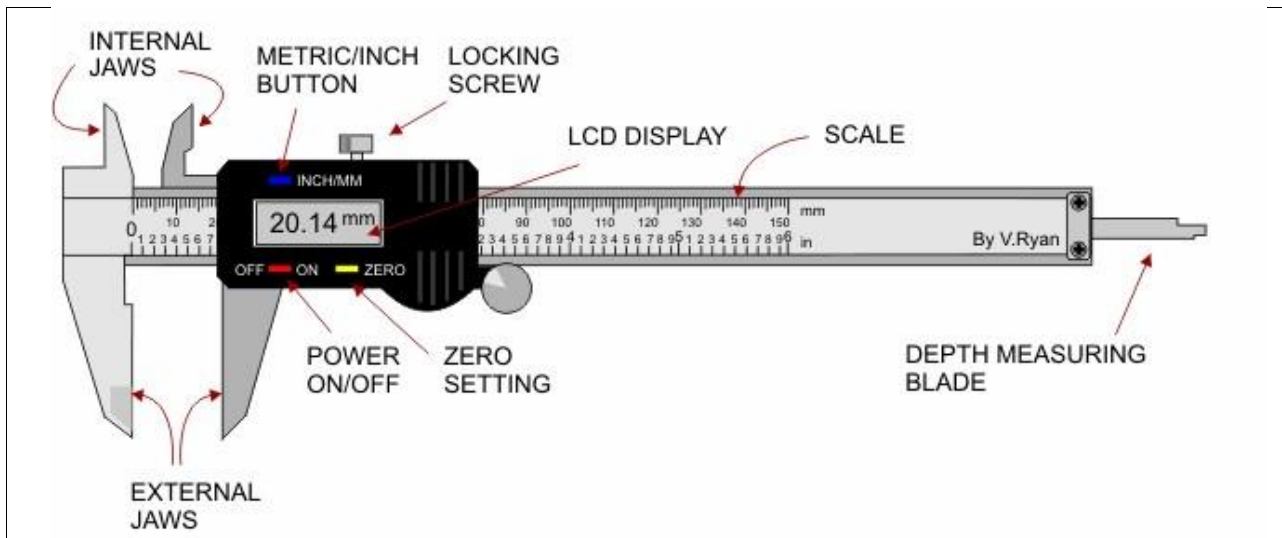


Figure 2: Vernier Caliper



(A)

(B)

Figure 3: Showing measurement of (A) Ear width (B) Total length of external ear.

All the measurements were carried out by the same investigator in order to minimize bias and error of identification of the parts of the ear pinna involved in the measurements. These measurements were carried out twice to ascertain accuracy and then recorded on the proforma.

The numerical data were analyzed using a Statistical Package for Social Sciences Version (SPSS) 26.0. Comparisons of the measurements according to gender were performed using an independent samples t-test. P-values of less than 0.05 were considered to be statistically significant.

Observations:

Total ear length, ear width and ear index of right ear comparison between male and female subjects were showing in following table 1 and table 2.

Table 1: Comparison of total ear length and ear width of right ear between males and females.

Variables	Male (Mean ± SD)	Female (Mean ± SD)	t value	p value
Right Ear length (mm)	62.15 ± 3.06	58.23 ± 3.00	6.4673	<0.0001
Right Ear width (mm)	32.18 ± 3.63	29.89 ± 1.83	3.9787	0.0001

Table 2: Comparison of Ear Index of right ear between males and females.

Variable	Male (Mean ± SD)	Female (Mean ± SD)	t value	p value
Right Ear Index	51.77 ± 4.50	51.41 ± 3.61	0.4408	0.6603

Results and discussion:

The following results found from the study were:

The mean value for right ear length and width in female subjects were found 58.23 ± 3.00 mm and 29.89 ± 1.83 mm respectively. However, in males right ear length and width were found 62.15 ± 3.06 mm and 32.18 ± 3.63 mm respectively. Comparison of ear length and width were performed by independent t-test. Total ear length was significantly higher in male than female (p value <0.0001). Ear width was also significantly higher in male than female (p=0.0001).

The total ear length and width is important in the evaluation of congenital anomalies (down syndrome etc.) The auricle reaches its mature height at 13 years in male while 12 years in female. Existence of sexual dimorphism in external ear dimension were documented. It was shown that sexual dimorphism exists in ear length and width between male and female with higher value in male. It is similar to the findings of Shireen S et al.⁹ and Deopa D et al.¹ who observed significant difference.

The mean value for right ear index in male subjects 51.77 ± 4.50 and in female subjects 51.41 ± 3.61 were observed in this study. It was found nonsignificant (p is >0.05). Similar findings were observed by Prasad RJ et al.⁸ while Ferrario VF et al.¹⁰ found significantly higher ear index in males than females.

Conclusion:

This study provides the mean values of right ear length and width in medical students of Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan. Results according to genders who participated in the study where both dimensions (total ear length and ear width) were higher in male

as compared to the female subjects. Although there was no significant difference in ear index of male and female subjects.

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