

## ANATOMICAL VARIATIONS OF THE HELIX AND EARLOBE OF THE HUMAN EAR IN YOUNG POPULATION

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**Abstract: Background:** Human external ear is a morphologically complex structure and plays a vital role in the collection of sound. The present study would provide the information regarding the shape and size of the various morphological structures of the ear in normal individuals which may help the plastic surgeons to reconstruct the anatomy of the deformed ear and the physical and forensic anthropologists to study variations and establishing its use as a biometrics. The aim of the study was the morphological examination of the ear and its features to investigate the biological variations, sex differences, bilateral variations and further attempt to provide a database of external ears

**Methodology:** The sample for the present study comprises of 80 males and 77 females aged of the 19 years. Thickness, and attachment of the earlobe and shape of the helix were examinations.

**Results:** The earlobe showed different characteristics in different individuals. In nearly half of the cases in both males and females, the earlobe was found to be attached to the face; in many cases, it was free and in some partially attached. The size and shape of the earlobe also showed variations with respect to sides as well as sexes.

The shape of the helix is highly variable in the individuals showing certain characteristics such as normally rolled helix, concave, flat, and wide covering scapha helix.

The other types of the helix such as concave, flat, and wide covering scapha helix were present among rest of the subjects.

**Conclusion:** The database may be useful in the reconstruction of the deformed ears and in the anthropological and forensic research for comparison purposes.

**Keywords:** Forensic science, Forensic anthropology, Personal identification, Human ear, Morphological variations .

### 1. INTRODUCTION

The human ear is organ of the body which is unique to an individual. Like fingerprints and other characteristics of the human body, the ear retains certain individualistic characteristics which are unique due to variations in the anatomical structure of the external ear . In certain situations, where the dead body is recovered in dismembered or mutilated conditions, the shape, size, and individualistic features of his ears may be useful in identifying the deceased along with other identification characteristics of the human body. Many studies have been conducted worldwide to show variations in human ears morphologically and morphometrically. Some recent studies (Rubio et al. 2017; Purkait 2016; Verma et al. 2016) have shown that every part of the external ear is morphologically unique and shows reasonable variations in individuals and population groups.

### 2. MATERIALS AND METHODS

The study was conducted in department of anatomy in Faculty of Medical Sciences, University "Goce Delcev" - Stip. The sample for the present study comprises of 80 males and 77 females aged of the 19 years. Thickness, and attachment of the earlobe and shape of the helix were examinations. The photographs of the ears were taken with the help of Dig. Camera Sony DSC-W810 Cyber-Shot at the same distance in all the subjects.

*Table 1 Shape of the ear helix in males (N = 90) and females (N = 87) bilaterally*

Shape of the helix	Male		Female	
	Right (N, %)	Left (N, %)	Right (N, %)	Left (N, %)
Concave margina	35, 38.9%	37, 41.1%	25, 28.7%	24, 47.6%
Normally rolled	45, 50.0%	46, 51.1%	39, 44.8%	42, 48.3%
Flat	6, 6.7%	3, 3.3%	5, 5.8%	4, 4.6%
Wide covering scapha	4, 4.4%	4, 4.5%	18, 20.7%	17, 19.5%
Total	90, 100%	90, 100%	87, 100%	87, 100%

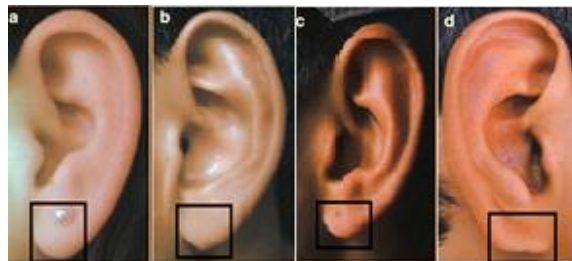


**Fig. 1** Photographs showing the different forms of the helix. *a* Normally rolled. *b* Wide covering scapha. *c* Flat. *d* Concave marginal

Table 1 details the frequency distribution of the shape of the helix (Fig. 1) among the subjects. The shape of the helix is highly variable in the individuals showing certain characteristics such as normally rolled helix, concave, flat, and wide covering scapha helix. Normally rolled helix was common (51.1% males and 48.3% females for the left ear; 50% males and 44.8% females for the right ear) among both sexes in the studied population. The other types of the helix such as concave, flat, and wide covering scapha helix were present among rest of the subjects.

**Table 2** Shape of the earlobe in males ( $N = 90$ ) and females ( $N = 87$ ) bilaterally

Shape of the earlobe	Male		Female	
	Right (N, %)	Left (N, %)	Right (N, %)	Left (N, %)
Arched	67, 74.4%	61, 67.8%	63, 72.4%	59, 67.8%
Tongue	14, 15.6%	18, 20%	13, 15%	14, 16.1%
Square	4, 4.4%	3, 3.3%	6, 6.9%	5, 5.7%
Triangular	5, 5.6%	8, 8.9%	5, 5.7%	9, 10.4%
Total	90, 100%	90, 100%	87, 100%	87, 100%

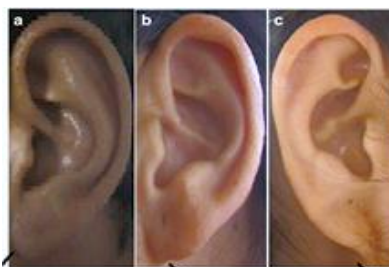


**Fig. 2** Photographs showing the different shapes of the earlobe. *a* Tongue. *b* Triangular. *c* Arched. *d* Square

Table 2 shows the frequency distribution of the shape of the left and right earlobe (Fig. 2) among the studied sample. The shape of the earlobe may be of various kinds such as arched, tongue shaped, square, and triangular. Arched earlobe was found to be common (67.8% males and 67.8% females for the left ear; 74.4% males and 72.4% females for the right ear) among both sexes in the studied population. The square type (3.3% males and 5.5% females for the left ear; 4.4% males and 6.9% females for the right ear) and triangular types (8.9% males and 10.3% females for the left ear; 5.6% males and 5.5% females for the right ear) of the earlobes were the rare variants reported in the study.

**Table 3** Attachment of the earlobe in males ( $N = 90$ ) and females ( $N = 87$ ) bilaterally

Attachment of the earlobe	Male		Female	
	Right (N, %)	Left (N, %)	Right (N, %)	Left (N, %)
Attached	48, 53.3%	45, 50%	51, 58.6%	49, 56.3%
Free	9, 10%	37, 41.1%	8, 9.2%	29, 33.3%
Partially	33, 36.7%	8, 8.9%	28, 32.2%	9, 10.4%
Total	90, 100%	90, 100%	87, 100%	87, 100%

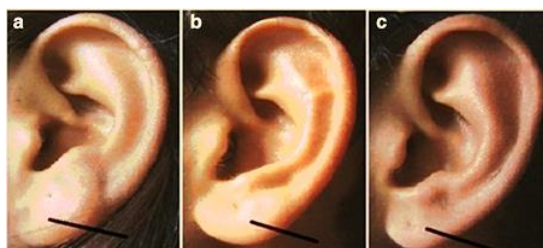


**Fig.3 Photographs showing the different forms of the earlobe attachment. a Free. b Partially attached. c Attached**

Table 3 indicates the frequency distribution of the attachment of the left and right earlobes (Fig. 3) that whether the earlobes are attached to the skin of the face, free (not attached to the skin of the face but hanging freely), and partially attached. The attached earlobe was common (50.0% males and 56.3% females for the left ear; 53.3% males and 58.6% females for the right ear) among both sexes in the studied population. Partially attached earlobe was rare among the males and females on the left side; however, the free earlobe was found to be rare among the both sexes on the right side.

**Table 4 Thickness of the earlobe in males (N = 90) and females (N = 87) bilaterally**

Thickness of the earlobe	Male		Female	
	Right (N, %)	Left (N, %)	Right (N, %)	Left (N, %)
Medium	60, 66.7%	58, 64.4%	59, 67.8%	59, 67.8%
Thick	21, 23.3%	23, 25.6%	14, 16.1%	14, 16.1%
Thin	9, 10%	9, 10%	14, 16.1%	14, 16.1%
Total	90, 100%	90, 100%	87, 100%	87, 100%



**Fig. 4 Photographs showing the thickness of the earlobe. a Thick. b Medium. c Thin**

Table 4 indicates the frequency distribution of the thickness of the left and right earlobes (Fig. 4). The thickness of the earlobe is an important character which may be considered an individualistic feature of the person. The medium thickness of the earlobe was common (64.4% males and 67.8% females for the left ear; 66.7% males and 67.8% females for the right ear) among the subjects in both sexes. The thick-type earlobes (25.6% males and 16.1% females for the left ear; 23.3% males and 16.1% females for the right ear) and thin-type earlobes (10% males and 16.1% females for the left and right ears) were also reported in the study.

### 3. DISCUSSION

Many studies have been conducted worldwide to show variations in human ears. These studies have described, various forms of the helix and forms of the earlobes. Many studies have been conducted worldwide to show variations in human ears morphologically and morphometrically. Some recent studies (Rubio et al. 2017; Purkait2016; Verma et al. 2016) have shown that every part of the external ear is morphologically unique and shows reasonable variations in individuals and population groups.

### 4. CONCLUSION

The study concludes that the earlobe showed different characteristics in different individuals. In nearly half of the cases in both males and females, the earlobe was found to be attached to the face; in many cases, it was free and in some partially attached. As regards the individualization/uniqueness of the ear, the study confirms that every human ear is unique and consequently its impression also because of the sufficient variability encountered in the external structure of the ear.

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