



Anatomy

ANATOMICAL VARIATIONS IN LOBULUS AURICULAE, TRAGUS AND DARWIN'S TUBERCLE OF EXTERNAL EAR- A POPULATION STUDY

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**ABSTRACT** External ear is unique in its morphology. It is developed from the fusion of six auricular hillocks. Variations occur during the development which differ not only among populations but also within the population group. The present study was done on the people of north coastal Andhra Pradesh, to determine the variations in the shape, thickness and attachment of ear lobes, morphology of tragus and Darwin's tubercle. The photographs of 284 ears of 142 students (78 girls, 64 boys) were analyzed and compared. The most common shape of the tragus was found to be nodular in both males (right-76.8%; left-77.3%) and females (right-85.2, left- 86.7%), followed by elongated and the least common shape was triangular. Lobulus auriculae had arched shape as the commonest in both males (right-68.2%; left- 66.3%) and females (right-70.3%; left- 69.6%) followed by tongue shape and square shape. The least common was triangular. Most common form of Darwin's tubercle from the study was "elongated" in both males (right-68.4%; left-69.3%) and females (62.3%; 61.4%). These variations were bilateral showing variations in both right and left ears.

**KEYWORDS :** Lobulus Auriculae, Tragus, Darwin's Tubercle, External Ear.

**INTRODUCTION**

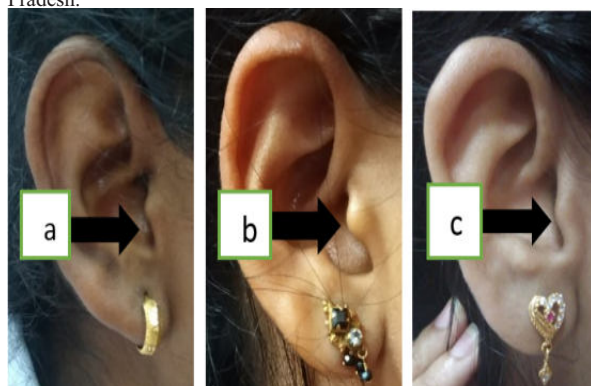
External ear is a unique structure which is considered as an acoustic antenna. It is a highly variable structure with different morphological and individualistic features in different individuals and population groups, thus marking the source of identity. Krishnan et al<sup>(1)</sup> described about the uniqueness and importance of the ear prints in identifying the criminals. Every part of the external ear like the Darwin's tubercle, tragus, helix, ear lobe etc. show variations. Ahmed et al<sup>(2)</sup> studied on the morphometric measurements of the ear to determine the sex. Guyomarc'h et al<sup>(3)</sup> has shown that size and shape of the ear can be used for facial reconstruction. A study by Purkait & Singh<sup>(4)</sup> tried to formulate the population and community characteristics basing on the morphometry of external ear. Sforza<sup>(5)</sup> et al determined the age and sex related changes in the external ear. Though many studies have been done, the external ear is unique forming the hallmark of identification. The present study reports the anatomical variations of external ear from the people of north coastal Andhra Pradesh. A comparison has also been made to correlate the values.

**MATERIALS & METHODS**

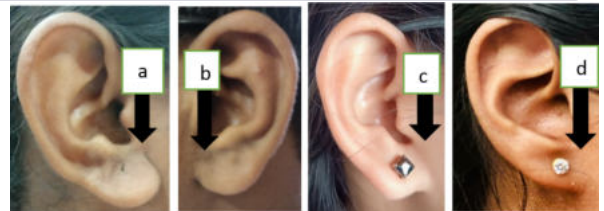
142 students- 78 girls and 64 boys with age ranging 17-23 years have participated in the study after taking an informed consent. They were asked to capture the photographs of both ears with their heads in anatomical position. The pictures of 284 ears were analysed for the variations of tragus, lobulus auriculae and Darwin's tubercle. The results were tabulated and compared.

**RESULTS**

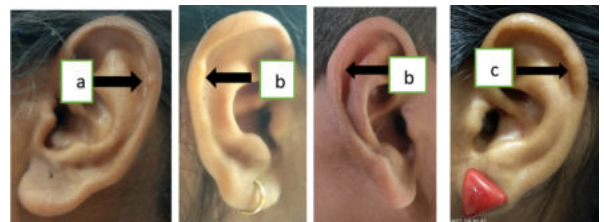
The following pictures show variations of tragus, lobulus auriculae and Darwin's tubercle from the people of north coastal Andhra Pradesh.



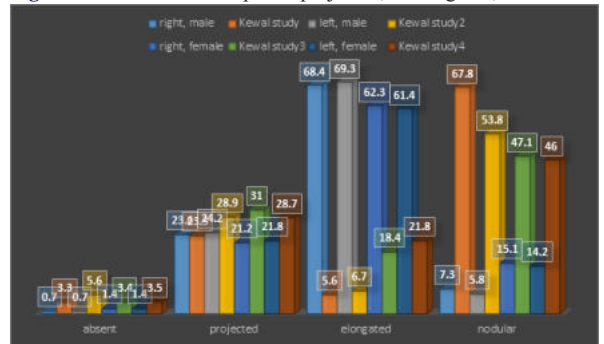
**Fig1:** Tragus shapes- a: triangular, b: nodular, c- elongated



**Fig 2:** Lobulus auriculae- (i) Shape:- a-tongue; b-arch; c-traingular; d-square (ii) Attachment:- a-free; b,c- partial; d-attached (iii) Thickness:- a-thick; b,c-intermediate; d-thin



**Fig 3:** Darwin's tubercle shapes- a: projected; b: elongated; c: nodular



**Graph 1:** Anatomical variation of Darwin's tubercle and comparison

**Table 1: Anatomical Variations Of Tragus And Lobulus Auriculae**

TRAGUS shape	Females		Males	
	Right(%)	Left(%)	Right(%)	Left(%)
Triangular	4.4	2.9	6.4	7.1
Nodular	85.2	86.7	76.8	77.3
Elongated	10.2	10.2	16.8	15.6
EAR LOBE shape				

Arched	70.3	69.6	68.2	66.3
Tongue	21.8	21.8	22.6	22.8
Square	5.6	5.8	5.3	6.4
Traingular	2.3	2.8	4.2	4.8

## DISCUSSION

The morphology and morphometry of the external ear is highly variable among population and also individuals. Thus it can be used as a source of identity in forensic medico legal issues or for the ear reconstructions by the oto rhino laryngologists. A study by Verma P et al<sup>(6)</sup> concluded that their study results could be used in anthropological and forensic sciences for the inclusion and exclusion of persons for identification on the basis of ear variations. Gray's anatomy<sup>(7)</sup> states that the shape of the ear is fixed at birth and never changes till death. Few studies- Kumar et al<sup>(8)</sup>; Chattopadhyay et al<sup>(9)</sup> reported the dimensions of the external ear vary in populations and different ethnic groups. The present study has been done to analyse the anatomical variations of the tragus, lobulus auriculæ and Darwin's tubercle of the external ear of the people of the north coastal Andhra Pradesh. The most common shape of the tragus was found to be nodular in both males (right-76.8%; left-77.3%) and females (right-85.2, left- 86.7%), followed by elongated and the least common shape was triangular. Lobulus auriculæ has been studied extensively in the form of shape, thickness and attachment. When the shape of the ear lobe was analysed, arched shape was most common in both males(right-68.2%; left- 66.3%) and females (right-70.3% ;left-69.6%) followed by tongue shape and square shape. The least common was triangular. Darwin's tubercle has been evaluated and compared with study done by Kewal Krishnan et al<sup>(10)</sup>. Most common form of Darwin's tubercle from the study was "elongated" in both males(right-68.4%; left-69.3%) and females( 62.3%; 61.4%). This result showed a gross variation with the reports made by Kewal Krishnan et al in males( right-5.6%; left-6.7%) and females (right-18.4%; left- 21.8). Bilateral variation occurred in tragus, Darwin's tubercle and lobulus auriculæ.

## CONCLUSION

External ear anatomical variations of tragus, Darwin's tubercle and lobulus auriculæ in the form of shape, attachment and thickness has been evaluated from the people of north coastal Andhra Pradesh. Most common shape of tragus was nodular, Darwin's tubercle was elongated in majority of ears and lobulus auriculæ occurred in arched form.

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