

## ORIGINAL ARTICLE

**A Study of Prominent Ears Among Undergraduates in Delta State University at Abraka in Nigeria**ANIBOR ESE<sup>1</sup>, ETETAFIA MABEL OKIEMUTE<sup>2</sup>, OMUNU RICHARD OWWIGHO<sup>1</sup>, MARTINS SUSAN ONYEKACHI<sup>1</sup><sup>1</sup>Department of Human Anatomy and Cell Biology, Faculty of Basic Medical Sciences, Delta State University, Abraka, Nigeria.<sup>2</sup>Department of Oral/Maxillofacial Surgery, Delta State University Teaching Hospital, Oghara, Nigeria.Corresponding author: Ese Anibor, E-mail: [eseovo2000@yahoo.com](mailto:eseovo2000@yahoo.com), Cell: +2348131617679 and +2348180404966**ABSTRACT**

The goal of this inquiry is to establish the pervasiveness of prominent ears among undergraduates of Delta State University, Abraka in Nigeria. The outcome can act as a guide during correctional surgical measures in congenital or acquired ear defects. This enquiry adopted an observational cross-sectional study plan. The study sample comprised of both male and female undergraduates of Delta State University, Abraka aged between 16-30 years. Exactly 384 individuals (184 males and 200 females) were sampled and the cluster sampling procedure was practiced. Data was collected with the aid of a sliding vernier caliper, pencil, and a data collection sheet. Every subject's head was kept in Frankfort's horizontal plane and dimensions were taken with a sliding caliper. Ear projection greater than 21mm was defined as ear prominence. Totality of 36 (9.38%) had small right ear while 28 (7.29%) had small left ear. Prominent ear was more prevalent on the right region (n=44, 11.45%) than on the left (n=19, 4.95%). Entirety of 63 (16.4%) had prominent ears with more males affected compared to the females. The gender disparity in the occurrence of prominent ears is not remarkable ( $p>0.05$ ). The relationship between age and the occurrence of prominent ears was remarkable ( $p=.000$ ). Indubitably prominent ear is not widespread among the considered undergraduates.

**INTRODUCTION**

The ear is termed to be prominent if it sticks out and this is agreed by authors to be a projection of more than 21mm<sup>[1][2]</sup>. An ear is prominent if it has projection bigger than 15-20 mm or larger than 21-30<sup>0</sup> from the temporomastoid plane of the skull<sup>[3]</sup>.

The ear (superaurale to subaurale) is 55mm long in boys at 6 years, 60mm at 12 years and 62mm at 18 years. Girls have supraaurale to subaurale dimensions of 54 mm, 58 mm and 58 mm at 6, 12 and 18 years correspondingly. Preaurale to postaurale (earwidth) at 6, 12 and 18 years is 34mm, 35mm and 36mm respectively among boys. The ear width in girls at 6, 12 and 18 years is 33mm, 34mm and 34mm in that order. Standard deviation in ear width is 2.0-2.5mm, and in ear length it is 3.0-3.5mm. An ear that is 2 or additional standard deviations from the average is peculiarly large<sup>[4]</sup>.

Even when dispossessed of instruments and memorized standard dimensions, humans visually recognize when facial structures are imbalanced, and hardly any feature brings out unfavorable reactions as prominent ears<sup>[5]</sup>.

The intention of this endeavor is to establish the pervasiveness of prominent ears among undergraduates of Delta State University in Abraka, Nigeria. The outcomes from this enquiry will guide oral/maxillofacial surgeons, ear, nose and throat surgeons, otolaryngologists and plastic surgeons especially during correctional surgical procedures. Literature appraisal verified rarity of inquiries on the occurrence of prominent ears among undergraduates of Delta State University in Abraka.

**MATERIALS AND METHODS**

This inquisition embraced an observational cross-sectional study design. The study sample comprised of male and female undergraduates of the Delta State University, Abraka aged between 16-30 years. This study was carried out in Delta State University, Abraka in Nigeria. Precisely 384 people (184 males and 200 females) were sampled and the cluster sampling technique was used. Data was collected with the aid of a sliding vernier caliper, pencil, and a data collection sheet. Each subject's head was kept in Frankfort's horizontal plane and ear dimensions were calculated by means of a sliding caliper with a resolution of 0.01mm.

Ear projection greater than 21mm was defined as ear prominence. Measurements gotten were the:

Ear height (right and left): measured as the dimension between the most superior part of the auricle and the most inferior part of the ear lobe.

Ear projection (right and left): measured as the distance from the ear helix to the mastoid process at tragal level.

Face height: measured as the distance from the nasion (the inmost point between the forehead and nose) to the gnathion (in the midline, the lowest spot on the inferior border of the chin).

Ear face index:  $(\text{ear height} / \text{face height}) \times 100$

Individuals who had ear tumours, congenital ear anomalies, history of trauma and ear surgery were excluded from the investigation. Ethical clearance was sought from the Research and Ethics Committee of Human Anatomy Department, Faculty of Basic Medical Sciences, Delta State University, Abraka. Permission was also gotten from the subjects.

A well-structured data collection sheet was used to record the data collected from subjects. The recorded information included the following details: age, sex, faculty of the individual and study level of the individual. Anthropometric parameters documented are: ear height, ear projection, face height and ear face index.

Data obtained was subjected to Statistical Package for the Social Sciences (SPSS version 22). The mean and standard deviations were

calculated and a two tailed t-test at the 95% confidence interval was also used as an inferential statistical tool and p value lesser than 0.05 was deduced to be statistically significant.



Ear height measurement Ear projection measurements

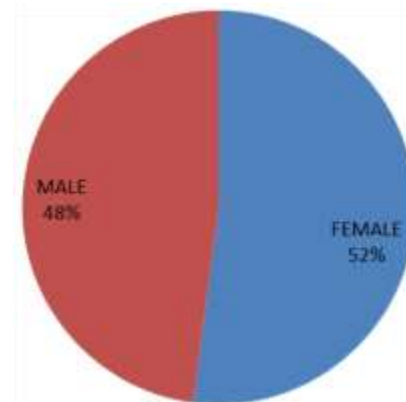
Figure 1: Measurement of the face height (Wlifred and Godfrey, 2015)<sup>[6]</sup>.**RESULTS**

Figure 2: Gender distribution of respondents

There were more female subjects as compared to the males as illustrated in figure 2.

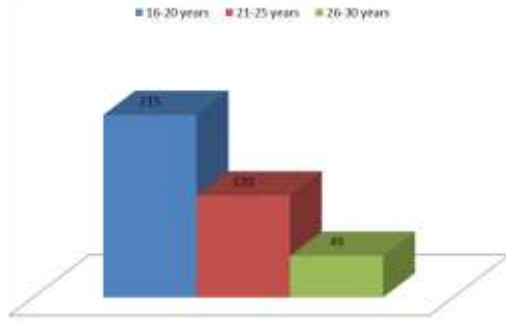


Figure 3: Age distribution of respondents

Majority of the subjects were within the 16-20 years age set as illustrated in figure 3.

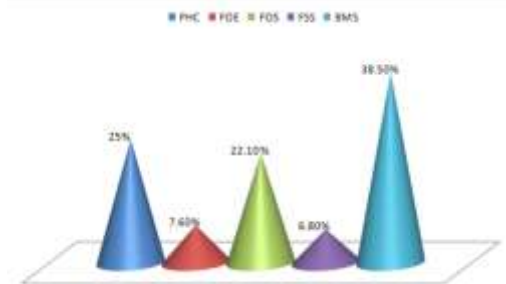


Figure 4: Faculty allocation of sample

Key:

FOE	Faculty of Education
FOS	Faculty of Science
FSS	Faculty of Social Sciences
BMS	Faculty of Basic Medical Sciences

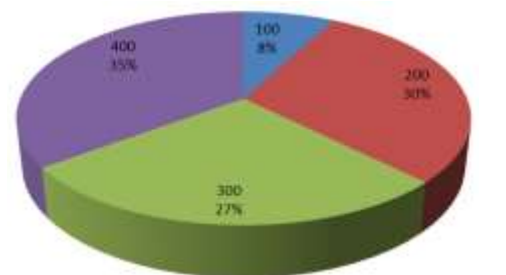


Figure 5: Level division of subjects

Preponderance of respondents were final year students as portrayed in figure 5.

Table 1: Gender comparison of parameters

Parameters	Gender		P value
	Male	Female	
Right ear height (mm)	55.23±4.89	54.77±5.27	0.375
Left ear height (mm)	55.82±4.72	55.72±4.97	1.000
Right ear projection(mm)	18.70±2.99	18.84±3.04	0.642
Left ear projection (mm)	19.12±3.17	19.57±3.54	0.191
Face height (mm)	141.99±14.68	137.01±13.26	0.001
Right ear face index	39.28±5.15	40.28±5.04	0.056
Left ear face index	39.67±5.42	40.98±5.01	0.014

Table 1 depicted that the ear height is longer in the males than in the females and this variation is not considerable ( $p > 0.05$ )

Table 2: Combined ear measurements

Parameters	Gender		P value
	Male (mm)	Female (mm)	
Ear height	55.47±4.49	55.24±4.83	0.629
Ear projection	18.91±2.84	19.21±3.03	0.323
Ear face index	39.47±5.13	40.63±4.86	0.024

Table 2 divulged that the ear projection was further in females than it was in the males and this disparity is not exceptional ( $p > 0.05$ )

Table 3: Comparison of right and left ear dimensions for females

Parameters	Right (mm)	Left (mm)	P value
Ear height	54.77±5.27	55.72±4.97	0.000
Ear projection	18.84±3.04	19.57±3.54	0.000
Ear face index	40.28±5.04	40.98±5.01	0.000

The ear sizes had striking ( $p = 0.000$ ) side distinction among the females as specified in table 3.

Table 4: Comparison of right and left ear measurements for males

Parameters	Right (mm)	Left (mm)	P value
Ear height	55.23±4.89	55.72±4.72	0.000
Ear projection	18.70±2.99	19.12±3.17	0.000
Ear face index	39.28±5.15	39.67±5.42	0.000

The ear proportions had remarkable ( $p = 0.000$ ) side disparity among the males as stated in table 4.

Table 5: Age comparison of parameters

Parameters	Age groups		
	16-20 years	21-25 years	26-30 years
Ear height	54.90±4.47	55.54±4.64	55.56±4.83
Ear projection	19.84±3.55	19.08±2.17	18.46±2.83
Ear face index	39.59±4.85	40.44±5.01	40.15±5.16

The ear height increased with age as stipulated in table 5.

Table 6: Distribution showing the ear projection

	Right – frequency (%)	Left – frequency (%)
Small	36 (9.38)	28 (7.29)
Normal	304 (79.17)	337 (87.76)
Prominent	44 (11.45)	19 (4.95)

Table 6 noted ear projection such that small is  $< 15$ mm, normal is 15-21 mm and prominent is  $> 21$  mm.

Table 7: Right ear projection comparison by gender

	Male – frequency (%)	Female – frequency (%)
Small	16 (8.70)	19 (9.5)
Normal	138 (75)	167 (83.5)
Prominent	30 (16.30)	14 (7)

Table 7 depicted that the males had more prominent right ears than the females. Tagging is such that a small ear is  $< 15$ mm, normal is 15-21 mm and prominent ear is  $> 21$  mm.

Table 8: Left ear projection comparison by gender

	Male – frequency (%)	Female – frequency (%)
Small	14 (7.6)	13 (6.5)
Normal	147 (79.9)	163 (81.5)
Prominent	23 (12.5)	24 (12)

Table 8 jotted that the females had more normal left ears than the males. Labeling is such that a small ear is  $< 15$ mm, normal is 15-21 mm and prominent ear is  $> 21$  mm.

Table 9: Gender peculiarity in the occurrence of prominent ears

Gender	Mean±Standard deviation	T	df	P value	95% confidence interval	
					Lower	Upper
Female	19.21±3.033	0.990	382	0.323	Lower	Upper
Male	18.91±2.84				-0.293	0.887

Gender disparity in the occurrence of prominent ears is not remarkable ( $p > 0.05$ ) as recorded in table 9.

Table 10: Association between age and the occurrence of prominent ears

Age (years)	Mean±Standard deviation	df	P value	95% confidence interval	
				Lower	Upper
16-20	19.84±3.50	114	0.000	19.1833	20.4933
21-25	19.08±2.17	119		18.6889	19.4752
26-30	18.46±2.83	148		18.0038	18.9203

There is a considerable age variation in the incidence of prominent ears as affirmed in table 10.

## DISCUSSION

This study scrutinized 384 subjects out of which 184 (47.9%) are males and 200 (52.1%) are females. It was shown in this current study that age group 16-20 years had the highest frequency ( $n = 215$ , 55.99%), and the Faculty of Basic Medical Sciences had the highest frequency of respondents ( $n = 148$ , 38.5%).

This current study showed that the right and left ear height, both ear projections, face height, and face index in males were 55.23±4.89mm, 55.82±4.72mm, 18.70±2.99mm, 19.12±3.17 mm, 141.99±14.68mm, 39.28±5.15mm, and 39.67±5.42mm respectively. The right and left ear height, right and left ear projection, face height, and right and left face index in females were 54.77±5.27mm, 55.72±4.97mm, 18.84±3.04mm, 19.57±3.54mm, 137.01±13.26 mm, 40.28±5.04mm, and 40.98±5.01mm respectively. Females had elevated mean for the right and left ear face index, and the right and left ear projection while males had larger dimensions for right and left ear height, as well as facial height.

The findings of the right and left ear height being greater in males than in females is similar to the findings of Sidhra and Vrushali, (2015) who reported that the left ear heights in males was 6.19±0.44cm and 6.14±0.45cm in females.<sup>[7]</sup> Perez-Macias (2008) recorded that the ear height in males was 62mm while ear height in females was 58mm.<sup>[4]</sup>

It was also shown in this current study that there were no significant gender differences in the right and left ear heights, the right and left ear projections and the right ear face index ( $p=0.375, 1.000, 0.642, 0.191$  and  $0.056$  respectively). There were however significant gender differences in the facial height and left ear face index ( $p=0.001$  and  $0.014$  respectively). These findings were supported by the findings of Sidhra and Vrushali, (2015) who saw no considerable gender disparity in the right and left ear heights ( $p=0.37$  and  $0.53$  respectively)<sup>[7]</sup>.

As seen in this present study, the ear height, ear projection and ear face index in males was  $55.47\pm 4.49$ mm,  $18.91\pm 2.84$ mm, and  $39.47\pm 5.13$  respectively. The ear height, ear projection and ear face index in females was  $55.24\pm 4.83$ mm,  $19.21\pm 3.03$ mm, and  $40.63\pm 4.86$  respectively. The value for the height of the ear recorded in this study was lower than the value recorded by Sidhra and Vrushali, (2015) who reported that the ear height in males was  $6.42\pm 0.61$ cm and  $6.34\pm 0.39$ cm in females.<sup>[7]</sup> Wilfred and Godfrey, (2015) recorded that the mean right ear height was  $56.95$ mm, whilst the mean left ear height was  $56.86$ mm<sup>[6]</sup> and Eboh, (2013) recorded that the ear height was  $56.79\pm 4.25$ mm<sup>[8]</sup>.

This current study also showed that there was a remarkable gender difference in the ear face index ( $p=0.024$ ). However, the ear height and the ear projection were without significant gender disparity ( $p=0.629$  and  $0.323$  respectively). Sidhra and Vrushali, (2015) supported the result of this scrutiny without significant gender dissimilarity in the ear height of their subjects ( $P=0.371$ )<sup>[7]</sup>. Wilfred and Godfrey, (2015) also recorded that the gender differences in ear height and the ear projection were not statistically significant.<sup>[6]</sup> However, this study was not supported by Vinita and Punnya, (2013) who recorded a significant gender difference in ear height ( $p<0.001$ )<sup>[9]</sup>.

The right ear height, ear projection, and ear face index as presented in this current study were  $54.77\pm 5.27$ mm,  $18.84\pm 3.04$ mm, and  $40.28\pm 5.04$  respectively. The left ear height, ear projection, and ear face index as presented in this current study were  $55.72\pm 4.97$  mm,  $19.57\pm 3.54$ mm, and  $40.98\pm 5.01$  respectively. The right and left ear heights recorded in this study were lower than values recorded by Sidhra and Vrushali, (2015) ( $6.34\pm 0.39$ cm and  $6.14\pm 0.45$ cm respectively).<sup>[7]</sup> Wilfred and Godfrey, (2015) documented that the right ear height, ear projection, and ear face index were  $55.93\pm 4.91$ mm,  $19.20\pm 2.16$ mm, and  $45.97\pm 3.92$  respectively and the left ear height, ear projection, and ear face index were  $55.81\pm 4.84$ mm,  $19.20\pm 2.14$ mm and  $45.88\pm 3.94$  respectively.<sup>[6]</sup>

The right ear height, ear projection, and ear face index as shown in this current study were  $55.23\pm 4.89$ mm,  $18.70\pm 2.99$ mm, and  $39.28\pm 5.15$  respectively. The left right ear height, ear projection, and ear face index as presented in this current study were  $55.72\pm 4.72$  mm,  $19.12\pm 3.17$  mm, and  $39.67\pm 5.42$  correspondingly. The right and left ear heights established in this scrutiny were lower than values ( $6.42\pm 0.61$ cm and  $6.19\pm 0.44$ cm respectively) recorded by Sidhra and Vrushali, (2015) <sup>[7]</sup>. Wilfred and Godfrey, (2015) stated that the right ear height, ear projection, and ear face index were  $58.10\pm 4.87$ mm,  $19.76\pm 1.91$ mm and  $46.50\pm 4.01$  respectively and the left ear height, ear projection, and ear face index were  $58.08\pm 4.78$  mm,  $19.90\pm 1.79$  mm and  $46.72\pm 3.83$  respectively.<sup>[6]</sup>

This current study showed that majority of the respondents had normal right and left ear projections ( $n=304$  and  $n=337$  respectively). Totality of 36 (9.38%) of the respondents had small right ears while 28 (7.29%) of the respondents had small left ears. Prominent ears were more rampant on the right ( $n=44, 11.45\%$ ) than on the left ( $n=19, 4.95\%$ ). These findings were not similar to that of Wilfred and Godfrey, (2015) who noted that a total of 6.89% of all the subjects had prominent ears. Those researchers noted that 90.49% of the subjects had ear projections within the normal range. Overall, 6.89% had prominent right auricle whilst 6.56% had prominent left auricle.<sup>[6]</sup> Kalcioğlu et al., (2003) noted the dominance of ear protrusion to be about 10%<sup>[10]</sup>.

As seen in this present study, the right ear of females were smaller than that of males ( $n=19, 9.5\%$  and  $n=16, 8.7\%$  respectively). Majority of those with normal right ears were females ( $n=167, 83.5\%$  and  $n=138, 75\%$  respectively). However, the right ear was more noticeable in males than in females ( $n=30, 16.3\%$  and  $n=14, 7\%$  respectively). Wilfred and Godfrey, (2015) findings contradicted the findings of this current study. They recorded that among male subjects, 7.69% had prominent ears and 6.89% of female

subjects had prominent ears. There were more females with small ears ( $<15$  mm) compared to males (4.43% and 0.7% respectively)<sup>[6]</sup>.

The left ear projections of both genders in this current study similarly displayed prominence ( $n=24, 12\%$  and  $n=23, 12.5\%$  respectively). This scrutiny deduced that the proportion of males with prominent right ears were more than those with prominent left ears whilst among the female subjects frequency of prominence of the left ear was more than that of the right. Wilfred and Godfrey, (2015) recorded findings that are not in harmony with the findings of this current study. They reported that prominence of the left ear was more common among male subjects as compared to female subjects (7.69% and 6.56% respectively). They also reported that the percentages of males with prominent right and left ears were equal whilst among the female subjects frequency of prominence of the right ear was more than that of the left<sup>[6]</sup>.

This present study showed that the ear height, ear projection and ear face index in age group 16-20 years was  $54.90\pm 4.47$ mm,  $19.84\pm 3.55$ mm and  $39.59\pm 4.85$  respectively. The ear height, ear projection and ear face index in age group 21-25 years was  $55.54\pm 4.64$ mm,  $19.08\pm 2.17$  mm and  $40.44\pm 5.01$  respectively. The ear height, ear projection and ear face index in age group 26-30 years was  $55.56\pm 4.83$  mm,  $18.46\pm 2.83$  mm and  $40.15\pm 5.16$  respectively. These findings did not concur with that of Ekanem et al., (2010) who observed a gradual increase in the total ear height from a mean of  $5.89\pm 0.41$ cm among those aged 15-20 years to a mean of  $5.89\pm 0.82$  cm in age group 51-55 years<sup>[11]</sup>. This current study disclosed a significant age difference in the occurrence of prominent ears ( $p<0.05$ ). The finding of this current work was similar to the findings of Deopa et al., (2013) who saw a significant age variation in the manifestation of prominent ears ( $p<0.05$ )<sup>[12]</sup>.

These differences and similarities seen between this current study and other studies could have been as a result of differences in the methodologies, aims, scopes of inquiries and the study populations. This is of much significance to the surgical specialities during surgeries to correct congenital and acquired ear anomalies.

## CONCLUSION

Certainly prominent ears are not widespread among the considered undergraduates. Gender disparity in the occurrence of prominent ears is not considerable.

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