

TO CORRELATE THE AGE AND GENDER BETWEEN LIVING FEMALE CHILDREN AND ADULT THROUGH MEASUREMENT OF DIFFERENT SEGMENT OF STERNUM BONE IN NORTH POPULATION OF INDIA

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ABSTRACT

Introduction: The ideal rule of identification of sex and age is a sever need in medico legal cases. Sternum is much more appropriate for detection of sex and age of human beings separately from racial characters.

Method: This study has been conducted on the total 100 subjects, 50 female (0-15 yrs) and 50 female (16-60yrs) of healthy people (living children & adults) from general population of north India as well as in and around the Lucknow of Uttar Pradesh. The technique described by Ashley GT -1956b was used for measurement of sternum.

Discussion: on the basis of observation and result in my present study it was fully supported and agree of the previous researchers, who has done the work in measurement of sternum bone in cadaver and skeletal of human, because they told that the sterna has distinguish in different zone of India.


Result: Comparing the mean length, Student's t test showed significantly different and higher (8.1%) length of manubrium in 16-60 yrs female living adults as compared to 2-15 yrs female living children (44.47 ± 5.79 vs. 48.38 ± 5.71 , $t=3.39$, $p=0.001$).

Conclusion: Different segment of sternum bone significantly different and higher length of manubrium, because the growth of sternum segment was completely develop in adult, but the development in children female is continuous in ratio of adults female.

KEY WORDS: Measurement of Sternum, Gender determination, segment of sternum bone correlation of age.

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INTRODUCTION

The correlation of age and gender between living female children and adults through

measurement of different segment of sternum bone in north population of India are very important for data and report collection in the

field of forensic investigation, which facilitate the identifying of sex and age in living female children and adults through measurement of different segment of sternum bone. Therefore ideal rule of identification of sex and age is a sever need in medico legal cases. Sternum is much more appropriate for detection of sex and age of human beings separately from racial characters. This study with related to sternum bone have been done in female individual at previous in European country and also done in different state of our country as well as India, like Maharashtra, Gujarat, but they not fully fulfilled. Thus on the above collected data and report it is concluded that there is very little research with comparative measurement of different segment of sternum bone in the people of peripheral region of Uttar Pradesh. The sternum is a long, flat bone, forming the middle portion of the front of the chest. The top of the sternum supports the clavicles and its edges join with the costal cartilages of the first seven pairs of ribs. The inner surface of the sternum is also the attachment of the sternopericardial ligaments [1].

The ratio between manubrial and mesosternal lengths differs between the sexes [2] was the first to study the sternum for sexual dimorphism [3] extensively presented that the sternum is an index of age, sex and height of an individual and its measurements have an influence on the sex and age of that individual in European and African population. Dwight T- 1881 [4] Suggested that the male sternum is considerably longer than the female sternum. He also confirmed that the combined length of manubrium and mesosternum, and the total sternal length provide useful guide to the height of an individual. Similarly, Torwalt et al., 2005 [5] studied the sex differentiation in human sternum by studying its various morphometric measurements in various populations.

In India, various researchers have presented their work on the sternum regarding sex determination [6,7].

Identification is recognition of an individual by means of various physical features and biological parameters, which are unique to each individual. Since the bone resists putrefaction and destruction by animals, they can be used

for identification and can lead to a reliable determination of age, sex, race stature of the individual [8].

MATERIALS AND METHODS

This study has been conducted on the total 100 subjects, 50 female (0-15 yrs) and 50 female (16-60yrs) of healthy people (living children & adults) from general population of north India as well as in and around the Lucknow of Uttar Pradesh. After obtaining ethical clearance and informed consent form, the living subjects have been recruited from the healthy staff members of OPD, department of medicine, pediatrics and Obstetrics & gynecology at King George's Medical University, U P, Lucknow. All the living subjects have been well informed about the nature of study. To prevent discrimination, living subjects have recruited for our study fulfilling inclusion criteria (female, age 16 to 60 years, BMI less than 25 and no history of chronic disease, at least 1 year tenure, no use of medication other than analgesics during the month preceding data collection). The living subjects have been explained the procedure of study.

For the morphometry of the sternum, following measurements have been taken in to consideration:

Length of manubrium: It has been measured from the centre of suprasternal notch to the centre of the manubrio-sternal junction in mid sagittal plane.

Length of mesosternum: It has been measured from the centre of manubrio-sternal junction to the centre of sterno-xiphoid junction in the mid sagittal plane.

Total length of sternum: It has been measured from the centre of jugular notch to xiphoid process in the mid sagittal plane. The above mentioned measurements have been further use to calculate various sternal size and indices according to the technique described by Ashley. Each linear measurement has been taken thrice on the anatomical position of the sternum using Mitutoyo-digital vernier calipers to the nearest millimeter with precision of 0.01 mm, according to definitions presented in and their average was recorded [9].

Statistical analysis: Data were summarized as Mean \pm SD (standard deviation), range (min to max) and median. Groups were compared by independent Student's t test. Pearson correlation was done to assess association between variables. A two-tailed ($\alpha=2$) $p<0.05$ was considered statistically significant. Analyses were performed on SPSS software (windows version 21.0). The statistical analysis has been done by Dr M.P. Negi, from Central Drug Research Institute (CDRI) Lucknow.

RESULTS

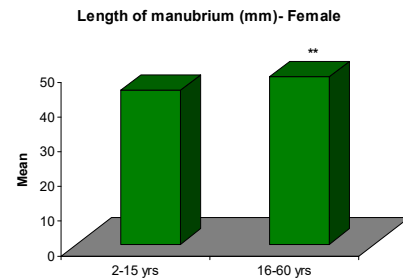
Basic characteristics: The primary outcome measures of the study were in millimeter (mm). Besides that actual age (yrs), height (cm), weight (kg), chest circumference (cm), waist circumference and hip circumference (cm) were also noted.

Correlation between Living Female Children - 2 To 15 Yrs vs. Living Female Adult 16 To 60 Yrs:

The comparison of mean length of manubrium, mesosternum and sternum between 2 to 15 yrs and 16- 60 yrs females is summarized in Table 3 and also depicted in Fig. 1 to 3 respectively. Comparing the mean length, Student's t test showed significantly different and higher (8.1%) length of manubrium in 16-60 yrs female living adults as compared to 2-15 yrs female living children (44.47 ± 5.79 vs. 48.38 ± 5.71 , $t=3.39$, $p=0.001$). In contrast, mean length of mesosternum lower (4.6%) significantly in 16-60 yrs female living adults as compared to 2-15 yrs female living children (93.90 ± 7.92 vs. 89.55 ± 10.81 , $t=2.30$, $p=0.024$). However, mean length

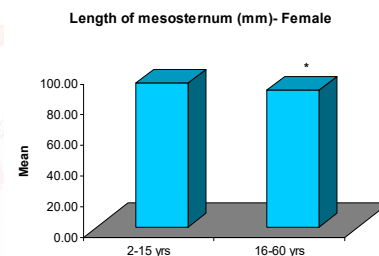
of sternum not differ between the two groups living female children and living female adult (138.38 ± 6.93 vs. 137.93 ± 8.70 , $t=0.29$, $p=0.775$) though it lower 0.3% in 16-60 yrs as compared to 2-15 yrs.

Fig. 1: Correlation with length of manubrium.



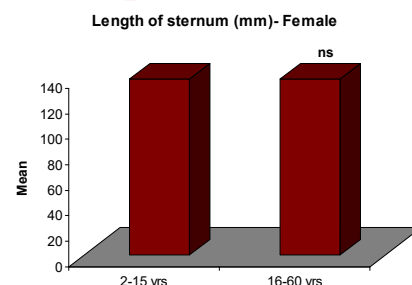
** $p<0.01$ - as compared to 2-15 yrs

Fig. 2: Correlation with length of mesosternum.



* $p<0.05$ - as compared to 2-15 yrs

Fig. 3: Correlation with length of sternum between 2 to 15 yrs and 16 to 60 yrs females.



^{ns} $p>0.05$ - as compared to 2-15 yrs

Table 1: Basic Characteristics of 2-15 Yrs Females.

Variable	n	Min	Max	Mean	SD	SE	Median
Age (yrs)	50	3	15	9.14	3.08	0.44	9
Height (cm)	50	70.56	136.89	112.48	16.76	2.37	111.85
Weight (cm)	50	12.39	41.29	25.36	9.26	1.31	24.19
BMI (kg/m ²)	50	8.14	31.87	20.02	5.91	0.84	19.89
Chest circumference (cm)	50	34.18	70.42	53.8	6.87	0.97	54.94
Waist circumference (cm)	50	37.52	66.58	50.92	5.84	0.83	51.5
Hip circumference (cm)	50	35.89	75.41	56.61	7.36	1.04	57.09
Length of manubrium (mm)	50	34.65	58.9	44.47	5.79	0.82	43.17
Length of mesosternum (mm)	50	70.37	108.56	93.9	7.92	1.12	95.38
Length of sternum (mm)	50	110.24	148.29	138.38	6.93	0.98	138.55

Table 2: Basic Characteristics of 16-60 Yrs Females.

Variable	n	Min	Max	Mean	SD	SE	Median
Age (yrs)	50	17	55	35.7	8.32	1.18	36.5
Height (cm)	50	142.39	165.49	154.24	5.72	0.81	154.56
Weight (cm)	50	35.46	85.19	61.46	10.63	1.5	62.54
BMI (kg/m ²)	50	14.96	32.2	25.81	4.11	0.58	26.14
Chest circumference (cm)	50	75.29	116.16	96.21	9.03	1.28	96.83
Waist circumference (cm)	50	58.18	118.28	96.16	12.59	1.78	98.36
Hip circumference (cm)	50	80.19	117.87	100.89	8.41	1.19	100.41
Length of manubrium (mm)	50	23.79	60.35	48.38	5.71	0.81	48.77
Length of mesosternum (mm)	50	68.33	122.42	89.55	10.81	1.53	90.11
Length of sternum (mm)	50	116.36	148.92	137.93	8.7	1.23	139.47

Table 3: Correlation of length of manubrium, mesosternum and sternum (Mean \pm SD, n=50) between 2 to 15 yrs and 16 to 60 yrs females.

Variable	2-15 yrs	16-60 yrs	t value	p value
Length of manubrium (mm)	44.47 \pm 5.79	48.38 \pm 5.71	3.39	0.001
Length of mesosternum (mm)	93.90 \pm 7.92	89.55 \pm 10.81	2.3	0.024
Length of sternum (mm)	138.38 \pm 6.93	137.93 \pm 8.70	0.29	0.775

DISCUSSION

The study was conducted on 100 subjects (female living children and adults). Anthropometric and morphometric parameters were measured for forensic purposes in all subjects and correlated age, sex with their different part of sternum. Results from our study revealed that body weight, BMI, and abdominal circumference were in normal range. The findings suggest that osteometric evaluation of the sternum can be an effective method for identification of sex and age in the Lucknow population. Comparing the mean length, Student's t test showed significantly different and higher (8.1%) length of manubrium in 16-60 yrs female living adults as compared to 2-15 yrs female living children (44.47 \pm 5.79 vs. 48.38 \pm 5.71, t=3.39, p=0.001). On the basis of observation and result in my present study it was fully supported and agree of the previous researchers, who has done the work in measurement of sternum bone in cadaver and skeletal of human, because they told that the sterna has distinguish in different zone of India, as well as it is shorter than European country. The length of manubrium in adult were higher than children because the growth of sternum segment was completely develop in adult, but the development in children female is continuous in ratio of adults female. It indicates that ratio between the children and adult

female was fully supported to the previous research rule.

However, mean length of sternum not differ between the two groups living female children and living female adult (138.38 \pm 6.93 vs. 137.93 \pm 8.70, t=0.29, p=0.775) though it lower 0.3% in 16-60 yrs as compared to 2-15 yrs. This result and observation show that there was no eject explanation about segment of sternum and age, sex of female living adult vs children respectively. According to observation and result we can discus that [9]. Ashley GT -1956b got 52.2 mm for males and 47.9 mm for females [10]. Queiroz A et al., 2004 obtained 51.73 mm for males and 48.42 mm for females, which agreed with our findings of manubrium was in 16-60 yrs female living adults as compared to 2-15 yrs female living children (48.38 \pm 5.71 vs. 44.47 \pm 5.79 t=3.39, p=0.001) respectively. Therefore further need for future study related to female sternum.

CONCLUSION

The correlation of age and gender between living female children and adult through measurement of different segment of sternum bone significantly different and higher length of manubrium, because the growth of sternum segment was completely develop in adult, but the development in children female is continuous

in ratio of adults female. It indicates that ratio between the children and adult female was fully supported to the previous research rule. But Therefore further need for future study related to female sternum.

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Conflicts of Interests: None

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