

Content available at: <https://www.ipinnovative.com/open-access-journals>

Indian Journal of Forensic and Community Medicine

Journal homepage: <https://www.ijfcm.org/>

Original Research Article

Age estimation from sternum of eastern Indian population: Autopsy based study

Manas R Sahu^{1,*}, Prabhas R Tripathy², Manoj K Mohanty¹, Kimi Soumya Padhi¹, Alagarasan Naveen¹¹Dept. of Forensic Medicine & Toxicology, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India²Dept. of Anatomy, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India

ARTICLE INFO

Article history:

Received 02-05-2022

Accepted 17-05-2022

Available online 22-06-2022

Keywords:

Age estimation

Mesosternum

Manubrium

Xiphisternum

Fusion of bones

ABSTRACT

Background: The age determination of an individual is indispensable in various civil and criminal cases. The sternum is one of the key bones for age estimation beyond 25 years. Many studies were done in the past on age determination from the sternum had variable and inconclusive results. Further, the region-specific research on the sternum for age determination is lacking from the eastern Indian population.

Objective: The present study was done to examine the sternum for its fusion status along each segment, mesosternum-xiphisternal (MXJ) junction, and manubrium-sternal (MSJ) joint by direct inspection.

Materials and Methods: This cross-sectional, observational study was conducted in the mortuary of a tertiary health care center in ABC. 102 sterna were collected from known corpses during autopsy which included 73 males and 29 females aged between 6 years to 85 years.

Results: The earliest complete fusion of manubrium with the body was observed to be 17 years in females and 24 years in males. Whereas the maximum number of cases of complete fusion was observed among 51-60 years of age irrespective of the sexes, indicative of a very limited role of the sternum in estimating the age.

Conclusions: The fusion of each segment of mesosternum has utility in determining age beyond 20 years and the xiphisternal joint remains reliable corroborative evidence for the age beyond 40 years.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Age determination of an individual is indispensable in both civil and criminal cases. Medico-Legal experts are frequently entrusted to determine the exact age of the person in various disputes related to age. For this, they usually rely upon physical and dental examination of the individual¹⁻³ which is supplemented by radiographs of various joints for confirmation. In individuals less than 21 years, there are multiple features related to growth & development which help in the estimation of age with a close approximation.⁴

However, beyond this age, the task of age determination relies mostly upon physical appearance, hair color, and various other senile changes, which are quite unreliable. Hence, to determine the age beyond 21 years, closure of skull sutures and fusion of the sternum are taken into account.

Beyond 25 years the radiological examination of the sternum is considered the standard for age estimation by medico-legal experts.⁵⁻⁷ The significance of the age above 25 years includes issues concerning job eligibility criteria, contesting elections, etc. The sternum is also helpful in the determination of age around 60 years which is also important for assessing retirement age, old age pension, government schemes for senior citizens, or any other

* Corresponding author.

E-mail address: fmt_manas@aiimsbhubaneswar.edu.in (M. R. Sahu).

legal implications and benefits. The experts take fusion of xiphisternal joint as a criterion for 40 years and above while manubrio-sternal joint for 60 years and above as mentioned in different Indian standard books.¹⁻⁷ The sternum has been studied by many researchers regarding its utility for age estimation. The studies in this regard have been conducted on the Indian population by various authors⁸⁻²⁰ and by Monum et al²¹ and Bacci N. et al.²² for the Thai and South African populations, respectively. The above studies show variation in the ages of fusion of different joints of the sternum across the various regional levels which does not necessarily applicable to the eastern Indian population. Hence, the present study was carried out to determine the age from the sterna of the deceased and to analyze the reliability of the sternum in the estimation of the age of the deceased belongs to the different parts of eastern India.

2. Material and Methods

This cross-sectional study was conducted in the mortuary of the Department of Forensic Medicine and Toxicology, ABC after due ethical clearance. The sterna from the corpses aged between 6 and 85 years, without any deformity, that are referred to the medicolegal autopsy were included. Sternum from the fetus, unknown bodies, and deformed sterna was excluded from the study. The actual age of the deceased was obtained from the inquest report and verified with associated documents provided by the respective legal heirs and the police. The informed consent was taken from the legal heirs before conducting the autopsy by explaining the purpose of the study and the methodology adopted.

An I-shaped incision between the symphysis menti to the symphysis pubis was given to open the chest cavity. The skin, subcutaneous tissue, and muscles were separated. Ribs were dissected along the costochondral junction, and the intact sternum was removed after disarticulating the sternoclavicular joints. The collected sternum was placed in a solution of freshly prepared calcium hydroxide solution for one week in a properly labeled open jar for chemical maceration. It was then removed from the solution and the attached macerated soft tissue was separated by a scalpel. The sternum was again placed into a freshly prepared solution of calcium hydroxide which was subjected to heating on a moderate flame for 30 minutes to remove the greasy substance and the soft tissue. The sternum was then taken out and the remaining attached soft tissue was removed and placed in hydrogen peroxide solution (bleaching agent) for at least one hour. It was then dried in the open air. The sterna were studied with a naked eye examination and fusion of joints was observed & correlated with the known age. The manubrio-mesosternal joint of each sternum was observed for the following conditions. When all three sides of the joint (posterior, anterior, lateral sides) were found to be fused it was considered complete fusion, whereas samples that showed fusion of one or

more surfaces but did not achieve complete fusion were considered partial fusion. If none of the surfaces is found to be fused it was considered non-fusion. Status of fusion of mesosternum – xiphisternal joint along with joints between individual sternbrae of each sternum also was observed.

3. Results

In the present study, 102 sterna, from 6 to 85 years of age, with a sex distribution of 73 males (8 to 85 years) and 29 females (6 to 80 years) were examined to observe the fusion status. The fusion between S4-S3 and S3-S2 starts at 6 years in females & 8 years in males and is completed at or above 11 years of age in both the sexes. For S2 and S1, the earliest complete fusion observed was in a male of 8 years while partial fusion was observed till 15 years of age in females and 19 years in males; whereas the complete fusion was observed at 20 years or above in both the sexes. (Table 1)

Manubrium was found to be as bony in all cases with or without fusion with the body in varying degrees ranging from non-fusion, and partial fusion to complete fusion. The fusion process was observed to be from posterior to anterior followed by lateral surface in sequence. The complete fusion was observed earliest at 17 years in females and 24 years in males. Though the complete fusion was observed from as early as 17 years of age a maximum number of cases of complete fusion was observed around 51-60 years of age, it continues in the all the age ranges irrespective of the sexes. (Table 2) The earliest partial fusion was observed at 17 years in females and 19 years in males. The partial fusion is seen in varying frequencies in all age groups. Even beyond 60 years, the fusion process continues and partial fusion was observed up to 80 years of age in females and 78 years in males, with 42% (5/12) remain non - fused.

The xiphoid process was found to be cartilaginous or bony with or without fusing with the body of the sternum. The earliest formation of bone is seen by 25 years in females and fuses with the body within 32 to 40 years of age, whereas in males the formation of bone is seen by 23 years and fuses with the body within 25 to 40 years of age in male. (Table 2) The xiphisternum remains cartilaginous in 33% (15/45) of cases between 20 to 40 years of age and 14% (6/42) above 40 years of age and is observed till the age of 85 years.

4. Discussion

The mesenchymal mass known as presternal mass gives rise to the cartilaginous primordia of manubrium at the 6th week of intrauterine life (IUL) which starts to ossify at the 5th month of IUL, becomes recognizable appearance by the 6th month postpartum. The lateral sternal plate, a pair of mesenchymal masses appearing at the 6th week of IUL embedded in the anterior chest wall starts fusing and chondrifying at the 9th week of IUL in the craniocaudal

Table 1: Fusion of body of sternbrae in the various age group

Age (In Years)	Number of cases	Body								
		Not fused (%)	1-2 Partially fused (%)	Complete fusion (%)	Not fused (%)	2-3 Partially fused (%)	Complete fusion (%)	Not fused (%)	3-4 Partially fused (%)	Complete fusion (%)
<10	4	3	0	1	2	0	2	2	0	2
11-20	11	0	3	8	0	0	11	0	0	11
21-30	20	0	0	20	0	0	20	0	0	20
31-40	25	0	0	25	0	0	25	0	0	25
41-50	14	0	0	14	0	0	14	0	0	14
51-60	16	0	0	16	0	0	16	0	0	16
>61	12	0	0	12	0	0	12	0	0	12

Table 2: Fusion of manubrium and mesosternum in various age groups

Age (In Years)	Number of cases	Manubrium - Body				Body - xiphoid		
		Not fused (%)	Partial Fused (%)	Complete fused (%)	Absent (%)	Not fused (%)	Complete fused (%)	
<10	4	4	0	0	4	0	0	
11-20	11	8	1	2(18%)	11	0	0	
21-30	20	15	2	3(15%)	11	7	2 (10%)	
31-40	25	9	5	11(44%)	4	5	16 (64%)	
41-50	14	5	3	6(43%)	2	0	12 (86%)	
51-60	16	4	1	11(69%)	2	0	14 (88%)	
>61	12	5	2	5(42%)	2	0	10 (83%)	

direction, thus giving rise to cartilaginous primordia of all four sternbrae at varying numbers; mostly the upper two from a single center and lower two from two or more centers, shaping the sternum into Ashley's Type-I, II and III patterns.²³ The ossification centers of sternbrae appear in the sequence 5th to 6th-month IUL for 1st sternbrae, 7th to 8th Month IUL for 2nd & 3rd sternbrae, and at 1 year age for 4th sternbrae. The ossification for xiphoid starts at 3-6 years of age, or remains cartilaginous even into advanced age.²⁴ However, the fusion between different components of the sternum is highly variable.

Authors from anatomy and forensic medicine have given different opinions on the fusion status of manubrium with mesosternum and mesosternum with xiphisternum: Reddy, Mukherjee, and Parikh¹⁻³ have mentioned that the four pieces of the body of the sternum fuse with one another from below upwards between 14 to 25 years. Xiphisternum unites with the body at about 40 years and manubrium fuses with the body at about 60 years. Nandy⁵ has opined that the xiphoid process unites with the body of the sternum

above 40 years and manubrium unites with the body of the sternum above 50 years. Kannan, Mathiwaran, and P.V. Guharaj,^{4,6} opined that the four pieces of the sternum constituting the body unite from below upwards between 14 to 25 years whereas the xiphoid process unites with the body of the sternum at about the 40 years and the manubrium rarely unites with the body, except in old age. Aggrawal⁷ mentioned that the union of 3rd and 4th sternbrae occurs at 15 years, 2nd & 3rd at 20 years, 1st and 2nd at 25 years, whereas xiphisternum unites at 40 years and manubrium sterni unites with the body about 60 to 70 years and quite often remains un-united. Chaurasia²⁵ mentioned that the four pieces of the sternbrae fuse from below upward during puberty and this is completed by 25 years. The xiphoid process fuses with the body by 40 years of age but the manubrium with the body at old age was only about 10% of subjects that otherwise remain unfused throughout life.

Krogman²⁶ mentioned that segments three and four of the body fuse at 4 to 8 years, segments one and two at 8 to 25 years, and by this time the body is one piece. The

Table 3: Summary of the literature on fusion status of manubriosternal and xiphisternal joints

Authors	Population	Sample size, age groups (in years)	Manubrium Sternal Junction fusions status (in years)	Xiphisternal Junction fusion status (in years)	Fusion between S4-S3, S3-S2, S2-S1
Monum et al. ²¹	Thai (Males only)	136	Fusion ranges from 15 to 81	Fusion ranges from 15 – 70	15 -24
Bacci N. et al. ²²	South African	461 (25-74)	Highly variable	Highly variable	NA
Gautam et al. ⁸	Indian (Gujarati)	100 (>15 Years)	Starts at 40, completed by 55	Completed by 50	NA
Chandrakanth et al. ⁹	South Indian	118 (25 to 74 in males, 20 to 80 in females)	Earliest 35(M), 31(F), Fusion proportion increases with age. Not fused upto 70(M) and 75(F)	Earliest 30(M&F) Non fusion observed 48(M), 46(F) Fusion proportion increase s with age	NA
Silajiya et al. ¹⁰	Indian (Gujarati)	109	Fuses by 50(M)/ 59(F)	Fuses by 42(M)/ 44(F)	NA
Chopra et al. ¹¹	Haryana	200	Starts at 29 years in males and 35 years in females	Starts at 26 years for both sexes	NA
Garg A. et al. ¹²	Punjab	192 (35-65)	NA	Earliest at 36 (M) and 35(F) up to 59 (M) and 56(F)	NA
Singh and Pathak ¹³	North-West Indian	343	Fuses by 42(M)/38(F)	Fuses by 50(M)/46(F)	NA
Manoharan et al. ¹⁴	South Indian	100 (14-74)	Highly variable	Fuses in between 32 - 60	Fusion above 21 Years
Waghmare VKR et al. ¹⁵	Mumbai (India)	164 (25 to 65)	Fuses above 30 years	Fuses above 40 years	NA
Raveendran et al. ¹⁶	South India	153	Fuses between 40 to 70 years	Fuses between 40 to 70 years	Before 19 years
Taylor C I. et al. ¹⁷	Surat (Indian)	116 (10 to 70)	Above 40 years and completed by 60 years	Above 40 years	All four pieces by 21 to 30 years.
Wadhawan M. et al. ¹⁸	Delhi	100 (more than 18)	Starts at 41 to 45 in males – higher age above 56 years. Starts at 36 to 45 in females, higher age above 51 years	Seen at 18 to 20 years in both sexes and complete in 21 to 26 years.	NA
Kaneriya D. et al. ¹⁹	Surat	50 (more than 15)	Starts at 40, completed in above 50	Absent before 30, fused completely above 45 years	S4S3-15 to 20, S3S2 – puberty to 20, S2S1 – puberty to 25 years
Tayal I. et al. ²⁰	Punjab	500 (16 to More than 61)	Starts at 30, completed in 50 years	Begins after 40 years, complete by 55 years	Starts at Puberty and is completed by 25 years
Present study	Eastern India	102 (6 to 85)	Highly variable. Earliest: 17 yrs. Most fuse by 60 years and remain unfused or partial fuse even up to 80 years of age.	Earliest: 23 (F), 25(M) & all ossify by 40 years. Remain cartilaginous: 14% of cases above 40 years	S4 – S3 & S3 – S2 – 6yrs(F) & 8 yrs (M) -all fuse by 11 yrs. S2-S1 – all fuse by 20 years.

M: Male, F- Female, NA- Not Available/Applicable

manubrium fuses with the body in old age. At the base of the sternal body, there is a cartilage that may or may not ossify. Iscan²⁷ describes the fusion for different sternbrae with each other as 3rd & 4th between 4 and 15 years, 2nd to 3rd between 11 and 20 years, 1st with rest of the sternbrae between 15 and 25 years whereas for xiphisternum the fusion occurs at an older age and for manubriosternal joint, it is highly variable. Larsen, W.J.²⁸ - Human Embryology mentions the fusion of different sternbrae from below upwards as 3rd & 4th - 4 to 10 years, 2nd to 3rd & 4th - 11 to 16 years, 1st with rest of fused sternbrae - 15 to 20 years. Louise Scheuer and Sue Black²³ mentioned in the book on developmental juvenile osteology that the fusion of the sternum follows a caudocranial fashion. The fusion of the 3rd to 4th sternbrae occurs within 3 years which then fuses with the 2nd around the time of puberty ranging from age 11 to 16 years. The fusion of the first sternbrae occurs at the end of puberty i.e. 15 to 20 years. They also mentioned that the fusion of two adjacent sternbrae starts from the posterior than the anterior followed by the lateral surface. However, they mentioned that the complete fusion of mesosternum does not occur until 30 years for which they concluded that sternum is probably of limited value in the accurate determination of age at death in the juvenile. Several studies are available on the estimation of age from the sternum based upon the fusion of manubrium and xiphoid process with the body in different populations in India as well as in other populations. The studies with varied results on the fusion of manubrium- mesosternum and mesosternum – xiphisternum joints are summarized in Table 3.

Different studies reported only partial information about the fusion status of all joints of sternum i.e. manubrium sterni, xiphisterna & joints among sternbrae without mentioning the earliest age of fusion, the age by which all fuses, and the proportions that remain unfused. Most articles both inside and outside India are not highlighted the fusion age between different sternbrae. However, few studies mention that fusion starts around puberty and is completely fused between 19-30 years of age.^{14,16,17,19-21} It is worth mentioning here that in the current study, the fusion between S4-S3 and S3-S2 starts as early as 6 years in females & 8 years in males and was completed at or above 11 years of age in both the sexes. Also, the earliest age of fusion between S2 and S1 has been observed at 8 years of age in males with partial fusion observed till 15 years of age in females and 19 years in males; whereas the complete fusion was observed at 20 years or above in both the sexes. These findings are consistent with findings observed by Krogman,²⁶ Iscan,²⁷ and Larsen, W.J.²⁸ Though the literature on fusion age for xiphisternal joint shows as early as 15 years of age with variable upper age ranges from above 50 years of age up to 70 years of age, our study shows the earliest age being 23 in females and 25 years in males and

all fuses by 41 years of age, which is in agreement with findings documented by several Indian authors.^{1-7,25} The xiphisternum was also found to be cartilaginous in 33% of cases between 20 to 40 years of age and 14% above 40 years of age and is also observed till the age of 85 years as reported by Krogman²⁶ and Cunningham et al.²³

The findings on the manubrio-sternal joint fusion age remain diverse. For example, many authors stated the age of manubrio-sternal joint fusion is around 60 years or older age, or fusion only in 10% cases,²⁵ at older age²⁶ and variable.²⁷ It is also observed that the fusion of the manubriosternal joint may start at the earliest 15 years of age with a variable upper age range extending from 50 to 81 years of age and may remain not fused up to 70 years in males and 75 years in females.²⁸ It is interesting to note here that in the present study, though the complete fusion of the manubriosternal joint was observed as early as 17 years of age in females and 24 years in the males, the fusion percentage increases with different age groups irrespective of sex and reaches the maximum at 51-60 years of age (69% being fused). Even after 60 years age, the fusion process continues and partial fusion observed up to 80 years of age in females and 78 years in male, with 42% remain as non-fused. It is important to note here that the findings of the present study are limited because of its relatively smaller sample size and its observational nature.

5. Conclusions

The present study revealed the earliest complete fusion of manubrium with the body was observed to be 17 years in females and 24 years in males with increasing frequency afterward and reaching a maximum at 51 to 60 years (69%). It was also observed that in 42% of cases, it remains non-fused above 60 years of age. Because of this wide variability in the fusion process of manubrium with the body of the sternum, the applicability of its role in estimating the age beyond 60 years is inconclusive. Fusion of each segment of mesosternum was observed from below upward and completed at or above 20 years of age in all cases irrespective of sex. Xiphisternum remains as cartilaginous in 17% of cases beyond 60 years of age with the maximum age being 85 years. If it ossifies as bone then it is fused in almost all cases above 40 years. Henceforth, we suggest that the fusion of each segment of the body of the sternum and mesosternal-xiphoid fusion is preferable to determine the age above 20 years and age around 40 years, respectively.

6. Source of Funding

This intramural study was funded by AIIMS Bhubaneswar ref no: T/IM-F/18-19/01.

7. Conflict of Interest

None.

References

- Reddy K. The Essentials of Forensic Medicine and Toxicology. 33rd ed. Murthy O, editor. New Delhi: Jaypee Brothers Medical Publishers; 2014.
- Karmakar RN. J.B. Mukherjee's Forensic Medicine & Toxicology. 5th ed. Kolkata: Academic Publishers; 2018.
- Parikh C. Parikh's Textbook of Medical Jurisprudence Forensic Medicine and Toxicology for Classrooms and Courtrooms. 7th ed. Subrahmanyam B, editor. New Delhi, India: CBS Publishers & Distributors; 2017.
- Guharaj P, Gupta S. Forensic Medicine and Toxicology. 3rd ed. Hyderabad: Universities Press; 2019.
- Nandy A. Nandy's Handbook of Forensic Medicine and Toxicology. 1st ed. Kolkata, India: New Central Book Agency; 2013.
- Modi. A Textbook of Medical Jurisprudence and Toxicology. *Gurgon: Lexis Nexis*. 2012;.
- Aggrawal A. Estimation of age in the living: in matters civil and criminal. *J Anat*. 2009;doi:10.1111/j.1469-7580.2009.01048.x.
- Gautam RS, Shah GV, Jadav HR, Gohil BJ. The Human Sternum - as An Index of Age & Sex. *J Anat Soccity India*. 2003;52(1):20–3.
- Chandrakanth HV, Kanchan T, Krishan K, Arun M, Kumar GNP. Estimation of age from human sternum: An autopsy study on a sample from South India. *Int J Legal Med*. 2012;126(6):863–8.
- Silajiya DA, Khubchandani HT, Soni SN, Vora DH, Patel DS. Radiological age estimation from sternum. *Natl J Integr Res Med*. 2013;4(4):108–14.
- Chopra M, Singh H, Kohli K, Aggarwal O. Age estimation from sternum for age group 25 years onwards January. *J Indian Acad Forensic Med*. 2014;36(4):340–2.
- Garg A, Goyal N, Gorea RK, Bhardwaj. Radiological age estimation from manubrio-sternal joint in living population of Punjab. *J Punjab Acad Forensic Med Toxicol*. 2011;11(2):69–71.
- Singh J, Pathak RK. Sex and age related non-metric variation of the human sternum in a Northwest Indian postmortem sample: A pilot study. *Forensic Sci Int*. 2013;228(1-3):1–12.
- Manoharan C, Dhanalakshmi V, Thangam D, Joe AE. Estimation of age from human sternum-an autopsy study. *Indian J Forensic Community Med*. 2016;3(2):128–128.
- Waghmare V, Gaikwad RB, Vaibhav S. Determination of the age with the help of ossification of the sternum. *Indian J Pharm Biomed Res*. 2012;3(1):5–6.
- Raveendran R, Sasikala K, Sivasuthan S. *Age Determination from Sternum Medicolegal Updat*. 2017;17(1):196–204.
- Tailor CI, Silajiya D, Govekar G, Chaudhari VP, Rajdev B, Gajera CN. Age determination by gross and radiological aspect of sternum. *J Indian Acad Forensic Med*. 2013;35(1):21–26.
- Wadhawan M, Murari A, Murali G. Estimation of age from the fusion of mesosternum with manubrium and xiphisternum in Delhi: A comparative study. *J Indian Acad Forensic Med*. 2009;31(2):103–109.
- Kaneriya D, Umarvanshi B, Patil D, Mehta C, Chauhan K, Vora R. Age Determination From Fusion of the Sternal Elements. *Int J Basic Appl Med Sci*. 2013;3(2):22–31.
- Tayal I, Rai G, Gargi J, Chanana A. Medico-legal importance of sternum in age estimation-an autopsy study. *J Punjab Acad Forensic Med Toxicol*. 2013;13(2):80–85.
- Monum T, Mekjaidee K, Pattamapaspong N, Prasitwattanaseree S. Age estimation by chest plate radiographs in a Thai male population. *Sci Justice*. 2017;57(3):169–73.
- Bacci N, Nchabeleng EK, Billings BK. Forensic age-at-death estimation from the sternum in a black South African population. *Forensic Sci Int*. 2018;282:233. doi:10.1016/j.forsciint.2017.11.002..
- Cunningham C, Scheuer L, Black S. *Developmental Juvenile Osteology*. New York: Academic Press; 2016. p. 220–230.
- Ashley GT. The relationship between the pattern of ossification and the definitive shape of the mesosternum in man. *J Anat*. 1956;90(1):87–105.
- Garg K, Mittal P, Chandrupatta M. B.D Chaurasia's Human Anatomy. vol. Volume 1. 8th ed. New Delhi: CBS Publishers & Distributors; 2019.
- Krogman WM, Iscan MY. *Human Skeleton in Forensic Medicine*. 2nd ed. Illinois: Charles C Thomas Pub Ltd; 1986. p. 215.
- Iscan MY, Steyn M. *The Human Skeleton in Forensic Medicine Hardcover*. 3rd ed. Springfield, Illinois: Charles C Thomas Publisher, Ltd; 2013.
- Larsen WJ. *Human embryology*. 2nd ed. New York: Churchill Livingstone; 1997.

Author biography

Manas R Sahu, Additional Professor  <https://orcid.org/0000-0003-0514-8939>

Prabhas R Tripathy, Additional Professor

Manoj K Mohanty, Professor and HOD

Kimi Soumya Padhi, Senior Resident

Alagarasan Naveen, Senior Resident

Cite this article: Sahu MR, Tripathy PR, Mohanty MK, Padhi KS, Naveen A. Age estimation from sternum of eastern Indian population: Autopsy based study. *Indian J Forensic Community Med* 2022;9(2):59–64.