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Original Research Paper

Age Estimation from Sternum for Age Group 25 Years Onwards

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Abstract

Age is one of the important parameters for the Identification of an individual whether the individual is alive, dead or human remains. A criminal will tell his age wrong to the investigating agencies to get less punishment from the court. Various government agencies are giving benefits like employment, pension and medical reimbursement according to age of a person. The age plays a vital role in sports competition. A person who's age more than 60 years is a senior citizen. The railways authority gives concession of 40% to male senior citizens and 50% to female senior citizens. The benefits are also on the income tax. Age is also important in onset of various diseases. The sternum can be visualized by radiography for age estimation. The earliest age of fusion of the Xiphisternum with the body of the sternum was 26 years in the males and 26 years in the females also. The earliest age of fusion of the manubrium with the body of the sternum was 29 years in males and 35 years in the females

Key Words: Age, Identification, Xiphisternum, Manubrium, Sternum

Introduction:

In our country at the age of 35 years, an Indian citizen can become president, vice president and governor of any state. There is a proposal to increase the retirement age of officials of Government, statuary bodies, autonomous bodies from 60 to 70 years. Medical council of India has increased the retirement age of medical teachers from 65 to 70years.

A person who's age more than 60 years is a senior citizen. The railways authority gives concession of 40% to male senior citizens and 50% to female senior citizens. The benefits are also on the income tax. Income tax department has made changes in tax slabs 2013-2014 for Senior citizens (Aged 60 years but less than 80 years).

In commerce, some businesses offer customers of a certain age a "senior discount". The age at which these discounts are available vary between 55, 60 or 65, and other criteria may also apply. Sometimes a special "senior discount card" or other proof of age needs to be obtained and produced to show entitlement.

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Masset [1] mentioned that due to extreme variability of closure of the cranial sutures, they cannot be considered dependable for precise age estimation. Singh and Gorea [2] found that the changes like lipping of the lumbar vertebrae and its changes in the disc are not of much help as these changes can appear at different times after 40 years of the age.

The age estimation from pubic symphysis is also variable due stresses from pregnancy and parturition.

Material and Methods:

The present study comprises a total of 228 subjects from both sexes (males and females) from age 25 years onwards. 28 cases are discarded because of poor quality X–ray and non- availability of proof of birth. Therefore, 200 cases were taken for analysis. The cases were taken from the general population as patients admitted in departments, their relatives and police personnel visiting the M.M.I.M.S.R. Mullana.

The study cases were divided into nine age groups. Only those cases were considered whose records were available for date of birth from ration card, matric certificate, birth certificate, identity card, driving license, voters card, service record and PAN card etc.

Those who were not having any proof of birth at the time of exposure were given stamped envelopes and advised to send the same by post. The cases, in which their date

of birth was not certain, were not considered in this study.

The X-Ray Sternum Lateral View was taken of study cases after obtaining their written consent. In this study only bonafide residents, who do not show any disease in respect to anterior chest wall were considered.

The diseased or damaged anterior chest wall cases were discarded. The female cases were taken less because of poor quality of X–Ray film due to over shadowing of the breast tissue. The Status of Fusion of Xiphisternum and Manubrium with the body of sternum was studied. The partial fusion or equivocal (3) was not taken, as it is very difficult to comment from the X–ray about partial fusion. In grade 2 (complete fusion), only those cases were considered which shows complete fusion of the joints.

Where there is doubt of partial or no fusion, such cases were taken in grade 1: not fused. After all this, 10 X–ray showed equivocal fusion at xiphisternal joint which were put in grade E and were not considered for analysis of the fusion of xiphisternal joint.

Table A: Grading of fusion of Xiphisternal Joint

Sr. No	Fusion of Joints	Grading
1	Not Fused	1
2	Complete Fusion	2
3	Equivocal	3

Observations and Results:

The study was conducted during the period of August 2010 to September 2012 and 228 cases were studied that were taken randomly amongst patients, their relatives and police officers visiting M.M.I.M.S.R. Mullana.

Out of 200 cases studied, we can appreciate fusion and non-fusion of manubrium with the body of sternum clearly in all cases while 13 cases shows equivocal findings of fusion at xiphisternal joint.

Present study showed that the earliest age of fusion of the Xiphisternum with the body of the sternum was 26 years in the males and 26 years in the females also. (Table 1) But our study also showed late fusion of Xiphisternum with body of sternum at 81 years in males and 80 years in females.

The average age of fusion of the xiphisternum with the body of the sternum is 54.33 years in males and 57.86 years in females. (Table 2) In our study the earliest age of fusion of the manubrium with the body of the sternum was 29 years in males and 35 years in the females. (Table 3)

But in this study late fusion of the manubrium with the body of sternum was also occurred at the age of 80 years in both males and females. The average age of fusion of the manubrium with the body of the sternum is 56.40 years in males and 61.09 years in females.

Discussion:

The results of present study are comparable with the research of previous studies. Krogman [3] concluded that xiphoid process fuses with body of sternum after 40 years. Glaister [4] mentioned that xiphoid process fuses with body at 40 and in advanced life the manubrium is occasionally joins the body, only the superficial part of intervening cartilage is converted into bone.

Jit and Bakshi [5] studied 772 male and 208 female and found that non fusion of manubrium could be seen above 60 years of age. Das [6] concluded that the fusion at manubrio-corporal junction the age is above 28 years. Dogra [7] mentioned that firm bony union between first and middle portion of sternum does not occur until late in life. Singh et al [8] noted that earliest age at which fusion of joint start at 26 years in male and 31 years in female.

Gautam et al [9] concluded that manubrium fusion begins at the age of 40 and completed at the age of 50 years. Garg [10] found xiphoid process fusion at 36 years in male and 35 years in female but in the present study we concluded earliest age of fusion is 26 years for both male and female.

Conclusion:

The age estimation of a person should be done from sternum in old age persons. The skull sutures criteria should also be considered along with the general physical examination of a person. The radiation exposure to living persons should be avoided.

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Table 1: Cases According to Age and Sex

Age Grps (Yrs)	Cases for Study		Equivocal		Total Cases
	Male	Female	Male	Female	
25-30	11	2	0	1	14
31-35	7	2	0	0	9
35 - 40	16	0	2	0	18
41 – 45	18	4	1	0	23
46 – 50	22	2	0	0	24
51 – 55	22	1	1	1	25
56 – 60	19	6	2	2	29
61 – 65	17	8	0	0	25
66 onwards	22	8	1	2	33
Total	154	33	7	6	200
	187		13		

Table 2
Relationship between Fusions of Xiphoid Process with the Body of Sternum

Age Grps (Yrs)	Complete Fusion		Partial Fusion		Absent	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
25-30	6 (5.7)	2 (7.4)	0 (0)	1(16.7)	5(12.8)	0(0)
31-35	1(0.9)	1(3.7)	0(0)	0(0)	6(15.4)	1(16.7)
36 - 40	7(6.7)	0(0)	2(28.6)	0(0)	9(23.1)	0(0)
41 – 45	8(7.6)	2(7.4)	1914.3)	0(0)	10(25.6)	2(33.3)
46 – 50	15(14.3)	2(7.4)	0(0)	0(0)	717.9	0(0)
51 – 55	18(17.2)	1(3.7)	1(14.3)	1(16.7)	4(10.3)	0(0)
56 – 60	17(16.2)	5(18.5)	2(28.6)	2(33.3)	2(5.1)	1(16.7)
61 – 65	17(16.2)	8(29.6)	0(0)	0(0)	0(0)	0(0)
66 onwards	16(15.2)	6(22.5)	1(14.3)	2(33.3)	6(15.4)	2(33.3)

Table 3
Relationship between Fusions of Manubrium Process with the Body of Sternum

Age Grps (Yrs)	Complete Fusion		Partial Fusion		Absent	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
25-30	2(7.4)	0(0)	0(0)	0(0)	9(6.8)	3(10.7)
31-35	0(0)	1(9.1)	0(0)	0(0)	6(4.5)	1(3.6)
36 - 40	3(11.1)	0(0)	0(0)	0(0)	15(11.3)	0(0)
41 – 45	2(7.4)	0(0)	0(0)	0(0)	17(12.8)	4(14.3)
46 – 50	2(7.4)	1(9.1)	0(0)	0(0)	20(15.0)	1(3.6)
51 – 55	3(11.1)	0(0)	0(0)	0(0)	20(15.00	2(7.2)
56 – 60	3(11.1)	2(18.2)	0(0)	0(0)	18(13.5)	6(21.4)
61 – 65	6(22.2)	4(36.4)	0(0)	0(0)	11(8.3)	4(14.3)
66 onwards	6(22.2)	3(27.3)	0(0)	0(0)	17(12.80	7(25)