



Age Identification From Appearance Of Pisiform Bone: A Radiological Study

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Abstract:

Background: Age estimation is done by various physical, radiological examination of bones and dental examination. The appearance of ossification center of pisiform bone is indicator for identify age in children up to 13years. In this study the age of appearance of pisiform among the Kolhapur city children is estimated.

Materials And Methods: It is a prospective cross sectional descriptive study conducted in department of Anatomy, D.Y. Patil Medical College, Kolhapur. The AP view of X-Rays of both hand (left & right) with wrist of the children aged 1 to 22 years were taken. The appearance or non appearance of Pisiform and the age of appearance were analysed.

Results: Total 450 subjects of age groups were divided in nine age groups. The mean age of appearance of pisiform was 9.71 years in males and 8.67 years in females on right and left side. All the subjects had pisiform bone appeared at the age of 11 years and above.

Conclusion: The Pisiform appears early in females than males.

Keywords: Age estimation, ossification center, Pisiform

Introduction:

Identification of age is based on specific physical characteristics unique to a person. For that height, weight, eruption of teeth, appearance of secondary sexual characteristics, appearance and fusion of ossification centers are the main criteria's used which are accurate.(1) by correlation of physical, dental and skeletal developmental parameters.(2) This method is important in many medico-legal circumstances involving both civil and criminal cases.(3) The age group between 7 and 12 years has got significant medicolegal importance such as criminal responsibility, kidnapping, child labour, consent, rape and awarding judicial punishment mainly in non documented cases. Radiological study for appearance and fusion of ossification centers of bone is no doubt suitable for age determination up to completion of bone development. (4) Many Indian

and foreign researchers work on it and concluded that various factors like race, geography, climate, diet, heredity, metabolic disorders and endocrine factors affects normal process of appearance and fusion of ossification centers, eruption of teeth. To strengthen this fact it becomes a necessity to have a local data for each population in the interest of proper dispensation of Justice.

Materials And Methods:

The present study to estimate the age of children based on radiographic evaluation of the appearance of ossification center of pisiform bone was undertaken in the department of Anatomy, D.Y. Patil medical college, Kolhapur. The study group consists of 450 subjects divided in nine age groups ranging from 01 to 22 years, each containing 50 subjects (25

males & 25 Females). The subjects are selected among the Kolhapur city of Maharashtra.

Inclusion criteria: Subjects those born and brought up in Kolhapur city of Maharashtra & having proper age proof certificates either birth certificate or school leaving certificate. The actual age of the subjects selected for the present study are verified by evaluation of date of birth certificates or school certificates.

Exclusion criteria: Congenital anomalies and other skeletal abnormalities of the hand.

Written informed consent is obtained from the concerned parents or guardians of each subject prior to the examination, if the age of the subject is below 12 years. Consent is obtained from the subject himself, if age is above 12 years. The following statistical methods are applied in the present study to evaluate the age at which ossification center of pisiform appears. Descriptive statistical analysis is done by using SPSS (23.0) version software.

Results:

Table 1: Showing the mean age of appearance of Pisiform in years

Age Groups	Side	Mean age	
		Male	Female
1 to 6	RS	-	-
	LS	-	-
6 to 11	RS	9.71	8.67
	LS	9.71	8.67
11 to 13	RS	11.83	11.78
	LS	11.83	11.78
13 to 14	RS	13.1	13.058
	LS	13.1	13.058
14 to 15	RS	14.29	14.27
	LS	14.29	14.27
15 to 16	RS	15.09	15.07
	LS	15.09	15.07
16 to 17	RS	16.14	16.22
	LS	16.14	16.22
17 to 18	RS	17.05	17.05
	LS	17.05	17.05
18 to 22	RS	20.16	19.91
	LS	20.16	19.91

Table No. 1 shows that in 225 males at the mean age 9.71 years Pisiform is appeared in both hands in males & at the age of 8.67 years Pisiform is appeared in both hands in females.. The appearance of ossification center of pisiform is increase as the age advances. The average range of age for appearance of pisiform is between 9 and 11 year.

Graph 1: Showing the mean age of appearance of Pisiform in years

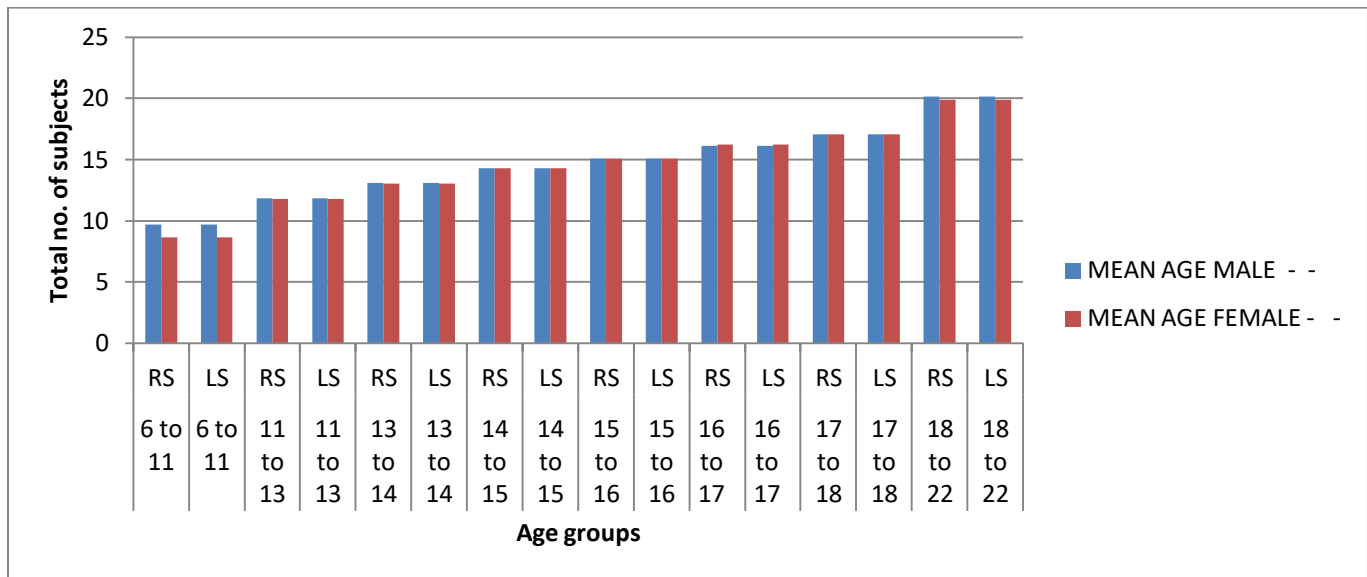


Table 2: Ossification pattern of Pisiform in the males

Age group (Years)	Side	Not appeared(n=25)	Appeared(n=25)
01-06	R	25	00
	L	25	00
06-11	R	22	03
	L	22	03
11-13	R	16	09
	L	16	09
13-14	R	02	23
	L	02	23
14-15	R	02	23
	L	02	23
15-16	R	00	25
	L	00	25
16-17	R	00	25
	L	00	25
17-18	R	00	25
	L	00	25
18-22	R	00	25
	L	00	25

Table no.2 shows that in males in the age group 1-6 the Pisiform is not appeared in all 25 subjects. In the age group 13-14 Pisiform is appeared maximally in 23 subjects (90%).

Graph No. – 2 showing ossification pattern of carpal bones in male subjects

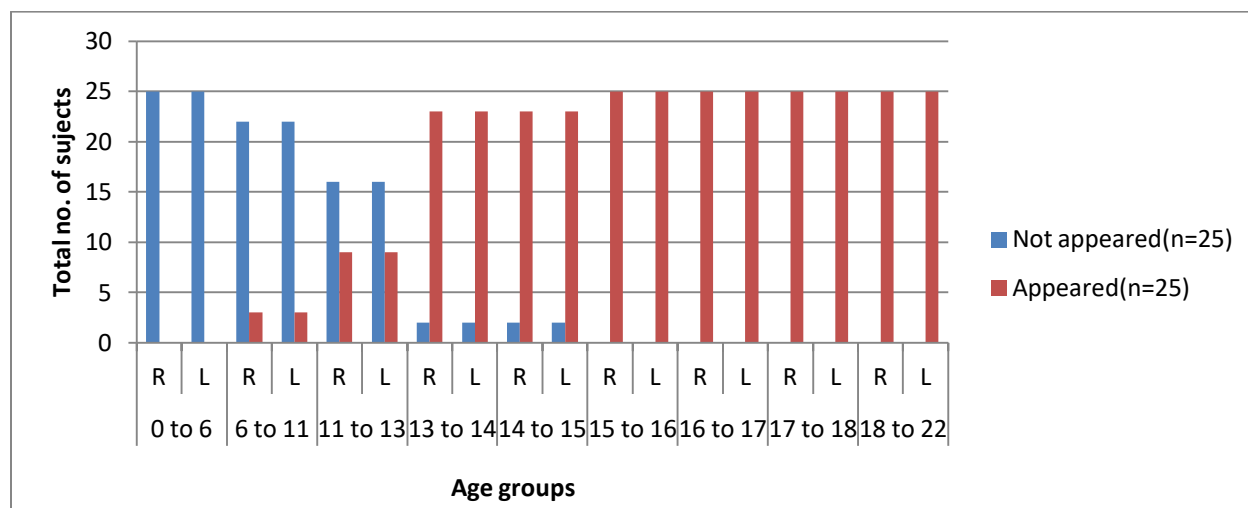
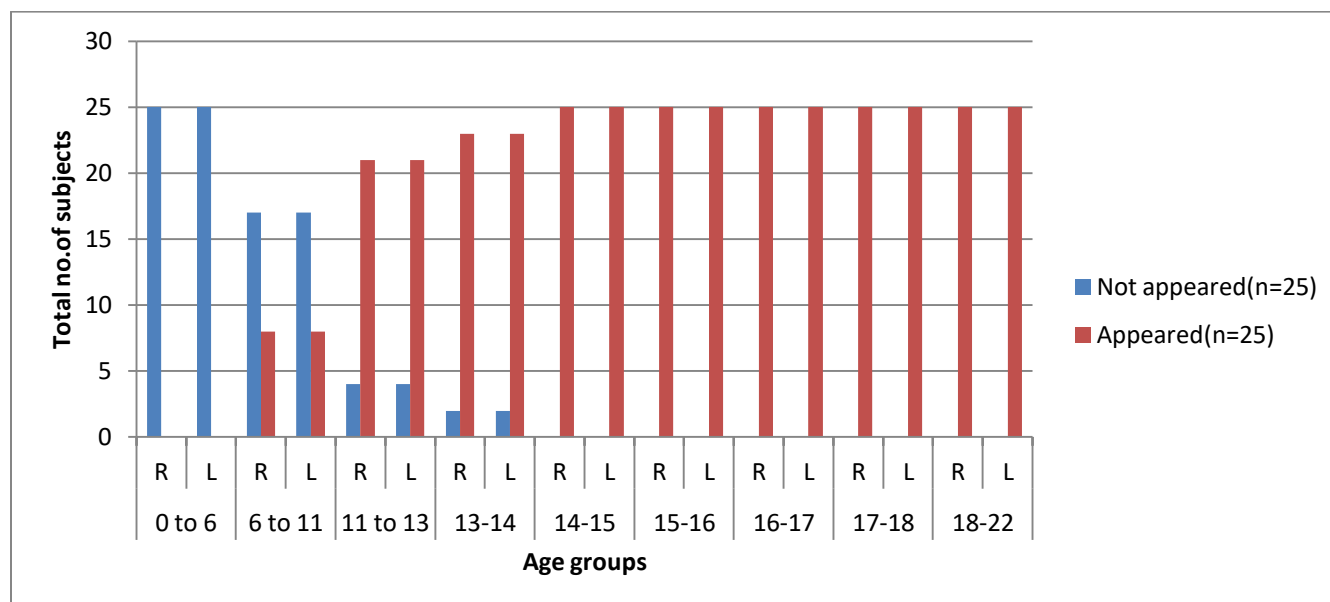


Table 3: Ossification pattern of Pisiform in the females

Age group (years)	Side	Not appeared(n=25)	Appeared(n=25)
01-06	R	25	00
	L	25	00
06-11	R	17	08
	L	17	08
11-13	R	04	21
	L	04	21
13-14	R	02	23
	L	02	23
14-15	R	00	25
	L	00	25
15-16	R	00	25
	L	00	25
16-17	R	00	25
	L	00	25
17-18	R	00	25
	L	00	25
18-22	R	00	25
	L	00	25

Table no.3 shows that in females in the age group 1-6 Pisiform not appeared in all 25 subjects same as like in males. In the age group 11-13 Pisiform appeared maximally in 21 subjects (84 %) which is earlier in females than males.

Graph No. 3 Showing ossification pattern of carpal bones in female subjects



Discussion:

In India & foreign countries various studies have been conducted on ossification pattern of many bones in body. These studies found that the appearance and fusion of ossification centers are influenced by various factors such as geographic, racial, environmental, climatic, hereditary, nutritional, endocrinal abnormalities and metabolic disorders [4]. In present study ossification of Pisiform bone is assessed. We found that at the mean age 9.71years Pisiform appears in males and 8.67 years in females. Kangne et al. [1] study on Bengalis observed that the ossification center of pisiform appears by 9-12 years in females and 12-17 years in males. Hence appearance of ossification center is earlier in south Indians compared to the Bengalis and this study correlates with the literature. It is also observed in the present study that pisiform appears earlier (may be 1 years) in females compared to males, which is accordant with the results given by earlier studies. Halasagi et al. [7] studied the appearance of pisiform

in both male and female subjects and observed that it appears by 11 years in females and by 13 years in males. So the average range of age for appearance of pisiform ossification center in this province is in between 9 & 11 years in females and between 10 & 12 years in males. Ashwani et al. [8] included 244 healthy children of both sexes up to 12 years of age. Capitate and Hamate were first (during infancy) and Pisiform (9-12 years) was last to ossify. S.S. Bhise et al. [10] studied the appearance of pisiform bone in both males and females observed that it appeared by 10-11 years in females and 12- 13 years in males. Appearance of last carpal i.e. Pisiform has been reported at the age of 9 to 12 and 10 to 12 years in the males and females respectively. All other studies (Indian and abroad) showed almost similar age of ossification of Pisiform with a difference of ±1 year.

Conclusion:

Pisiform bone ossification centre appeared earlier in females than males.

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