

Study on the Appearance and Fusion of Iliac Crust Epiphyseal Center among Natives of Ajmer Region

Nirjhar Mathur¹, Vipin Gupta², R. K. Mathur³

¹Intern Doctor, J.L.N Medical College, Ajmer; ²MD (Forensic Medicine) Resident Doctor, J.L.N Medical College, Ajmer; ³Sr. Professor (Forensic Medicine), J.L.N Medical College, Ajmer

Abstract

Introduction:- Scientific determination of age of an individual is required for the law enforcement agencies in both civil and criminal matters.

Aims and Objects:- Statistical study on the appearance and fusion of ossification centers of iliac crust among natives of Ajmer region and comparative study between both sexes.

Material and Method:- This prospective study has been conducted on 102 subject (48 males and 54 females) of the Ajmer region in Rajasthan of known age group between 13-21 years in the Department of Forensic Medicine and Toxicology in J.L.N. Medical College and Associated Hospitals, Ajmer between 1stApril 2019 to 31stMarch 2020.

Inclusion Criteria:- Cases whom parents are born at Ajmer region. Case subjects are also residing at Ajmer since birth, consented for study

Exclusion Criteria

1. They should not be with any physical disability, congenital, nutritional or endocrinal anomaly.
2. Person should have accurate record of their birth date.

Observation:-

In Males appearance of iliac crest in present study was found at the age 15yrs age in all cases. Simultaneously fusion of iliac crest was found at the age of 19.3 yrs in 100% cases.

Similarly In female's appearance of iliac crest in present study was found at the age 14.2yrs age in 100% cases. Similarly fusion of iliac crest was found in majority of cases appeared at the age of 19 yrs in all cases.

Conclusion:- iliac crest fusion is found earlier in females of Ajmer region

Key Words:- Iliac bone, ossification center, radiological examination

Introduction

Scientific determination of age of an individual is a necessity for the law enforcement agencies in both

civil and criminal matters, determination of age became more important where illiteracy is a common feature and awareness for birth registration is too less. Various processes and methods have been evolved through decades. As a matter of fact, estimation of age is being starts from the moment of conception. During the span of life, various features of growth and development occur in a chronological order. Survey Committee (2014) on medicolegal practices in India¹ had recommended to the government to encourage Zone wise study of problem

Corresponding Author:-

Dr. Vipin Gupta

MD (Forensic Medicine) Resident Doctor, J.L.N Medical College, Ajmer

Email: anupamjohry@gmail.com

of determination of age. Applicability of regional data is vital importance in academic medical issues and legal proceedings as various regional factors also effects on ossification of bones². Extensive work on determination of age of an individual on the basis of epiphyseal union has been carried out in different countries of world as well as in different states in India.

“Owing to variation in climate, dietary, hereditary and other factors affecting the people of different provinces of India, it cannot be reasonably expected to formulate a uniform standard for determination of age of union of epiphyses for the whole of India.”(Franklin) in Modi’s Jurisprudence and Toxicology, 1988)².

Keeping in view the above statement and also that no recent study what-so-ever has been done in Ajmer region of Rajasthan where mixed population resides, the present study has been undertaken to explore the pattern of diaphyseo-epiphyseal union in the iliac bones of pelvis,

Aims and Objects:-

Aims:-

-to collect systematic statistical data of ossification center appearance and fusion of iliac crest

Primary Objectives

1. Study on the age of appearance and fusion of ossification centers of iliac bone
2. Comparative study on appearance and fusion of ossification centers in girls and boys.

Secondary Objectives:-

1. -Study of secondary sexual characteristics with respect to appearance and fusion of ossification centers of iliac bone

Material and Method

The 102 subjects were selected randomly from various schools, the cases attending the OPD of the Department of Forensic Medicine and Toxicology in J.L.N. Hospital Ajmer and from various faculty members and staff.

The subjects selected for study were between the age group of 13-14 years, 14-15 years, 15-16 years, 16-17 years, 17-18 years, 18-19 years, 19—20 years and 20—21 years. Age, as stated by them was further confirmed by obtaining a copy of birth certificate or from school record duly verified by the head of the school.

After obtaining informed consent for their radiological and clinical examination x-ray of their pelvis, hip joint were taken.

Exclusion criteria:-

- Subjects having congenital, pathological, traumatic, Nutritional loco-motor disorders were excluded.
- Subjects having age not within study age groups are not included our study

Observation

Table No. 1: Age and Sex wise distribution of subjects

Age group (in years)	Male		Female		Total	Percentage
	Number	Percentage	Number	Percentage		
13-14	8	7.84	5	4.9	13	12/4
14-15	9	8.82	6	5.88	15	14.70
15-16	7	6.86	10	9.80	17	16.66
16-17	3	2.94	8	7.84	11	10.78
17-18	6	5.88	9	8.82	15	14.70
18-19	5	4.90	8	7.84	13	12.74
19-20	3	2.94	5	4.90	8	7.84
20-21	7	6.86	3	2.94	10	9.80
Total	48	47.04	54	52.94	102	100

Table No. 1 depicts the age and sex wise distribution of 102 cases in the present study. All the cases were distributed in eight age groups. There were 48 males and 54 females and male to female ratio was 8:9 in all the age groups.

Table No. 2: Distribution of secondary sexual characters vis-a-vis age in males

Age group	Number of Cases	Presence of Hair						Voice			
		Pubic		Axillary		Upper Lip		High pitched		Low pitched	
		No.	%	No.	%	No.	%	No.	%	No.	%
13-14	8	2	25	-	-	-	-	8	100	-	-
14-15	9	8	88.8	3	33.3	-	-	9	100	-	-
15-16	7	7	100	6	85.7	3	42.8	4	57.1	3	42.8
16-17	3	3	100	3	100	2	66.6	1	33.3	2	66.6
17-18	6	6	100	6	100	6	100	-	-	6	100
18-19	5	5	100	5	100	5	100	-	-	5	100
19-20	3	3	100	3	100	3	100	-	-	3	100
20-21	7	7	100	7	100	7	100	-	-	7	100

Table No. 2 depicts the distribution of various secondary sexual characters in male subjects involving appearance of hair and character of the voice. It is clear that pubic hair appears in majority of cases (88.8%) in 14-15 yrs age

group; Axillary hair at 15-16 yrs age group in 85.7% cases and upper lip hair at 16-17 yrs age group in 66.6% cases.

The character of voice becomes low pitched in age group 16-17 years in majority of cases (66.6%) in present study and by the end of 18 years it becomes low pitched in cent percent cases. However it is low pitched in 42.8% cases in 15-16 years age group. None of the case reported of hoarseness of the voice in 14-15 years group.

Table No. 3
Distribution of secondary sexual characters vis-a-vis age in females

Age group	Number of Cases	Presence of hair				Development of Breast	
		Pubic		Axi lary			
		No.	%	No	%		No.
13-14	5	3	60	2	40	2	40
14-15	6	6	100	4	66.6	3	50
15-16	10	10	100	10	100	10	100
16-17	8	8	100	8	100	8	100
17-18	9	9	100	9	100	9	100
18-19	8	8	100	8	100	8	100
19-20	5	5	100	5	100	5	100
20-21	3	3	100	3	100	3	100

Table No. 3 depicting appearance of pubic hair in females in majority of cases (60%) at 13-14 years age group and at the completion of 15 years in 100% cases. Axillary hair appears in 66.6% cases in 14-15 years age group and present in cent percent cases in 15-16 years age group. However their presence is in 40% cases at 13-14 years age group. Development of breast is a continuous process and in this study, cases of breast development was 40% in 13-14 years age group, 50% in 14-15 years age group and found in cent percent females by the end of 16 years.

Table No. 4: Incidence of Epiphyseal appearance and fusion of ossification centers for iliac crest in males

Age group in Years	Number of Cases	Iliac crest			
		Appearance		Fusion	
		No.	%	No.	%
13-14	8			-	-
14-15	9	3	33.3	-	-
15-16	7	5	71.42	-	-
16-17	3	3	100	-	-
17-18	6	6	100	-	-
18-19	5	5	100	1	20
19-20	3	3	100	2	66.6
20-21	7	7	100	7	100

Table No. 4 shows incidence of appearance and fusion of ossification centers for iliac crest in males. Iliac crest was found appeared in 71.42% cases in 15-16 years age group and reaches to 100% in 16-17 years age group. However the incidence of appearance for iliac crest was 33.3% in 14-15 years age group. In none of the

case iliac crest found appeared in 13-14 years age group.

Fusion of iliac crest was found in 100% cases in 20-21 years age group in males but in majority of cases (66.6%) it was found fused in 19-20 years age group. However incidence of fusion of iliac crest is 20% in 18-19 years age group in this study.

Table No. 5 Incidence of Epiphyseal appearance and fusion of Iliac bone vis-a-vis age in female of Ajmer region

Age group in Years	Number of Cases	Iliac crest			
		Appearance		Fusion	
		No.	%	No.	%
13-14	5	2	40	-	-
14-15	6	5	83.3	-	-
15-16	10	10	100	-	-
16-17	8	8	100	-	-
17-18	9	9	100	-	-
18-19	8	8	100	4	50
19-20	5	5	100	4	80
20-21	3	3	100	3	100

The Table No. 5 reveals incidence of appearance and fusion of iliac crest in females. Iliac crest appears in 40% cases in 13-14 age group. In majority of cases, (83.3%) it appears in 14-15 age group and in 15-16 years age group it appears in 100% cases. The incidence of fusion of iliac crest was 0% in 17-18 years age groups in females. It was found fused in 50% cases in 18-19 years age group and in majority of cases (80%) it was found fused in 19-20 years age group. None the case was found unfused after 20 years of age.

about 2-3 mm diameter or a small crescent or a thin line just over medial 1/3 part of ilium on anterior side, in beginning with passage of age it spreads over brim ilium as a crest.

Iliac crest was found appeared in 71.42% cases in 15-16 years age group and reaches to 100% in 16-17 years age group. However the incidence of appearance for iliac crest was 33.3% in 14-15 years age group. In none of the case iliac crest found appeared in 13-14 years age group.

Discussion

Epiphysis for Iliac crest:

Epiphyseal center for iliac crest in present study is found appeared in majority (83.3%) of females in age group 14-15 years. It is appeared as an irregular dot of

Fusion of iliac crest was found in 100% cases in 20-21 years age group in males but in majority of cases (66.6%) it was found fused in 19-20 years age group. However incidence of fusion of iliac crest is 20% in 18-19 years age group in this study.

In our study axillary hair developed 100 percent cases at 16-17 yrs in male and 15 to 16 yrs in female. Hence can be used to correlate it with radiological finding in respect to appearance of iliac crest ossification center appearance.

Table No. 6: Ages of appearance and fusion of iliac crest According to different workers

S.No.	Workers	Place of Study	Appearance		Fusion	
			Female	Male	Female	Male
In India						
1	Hepworth (1929)	Punjab	-	-	19	-
2	Pillai (1936)	Madras	14-18	-	14-18	-
3	Galastaun (1937)	Bengal	14	17	17-19	19-20
4	Agarwal&Pathak (1957)	Punjab	-		18.5-19	20
5	Bajaj et. al (1976)	Delhi	15.3	-	19	-
6	Sakxena&Vyas (1969)	M. P	-	-	18-19	20
7	I Git& Singh (1971)	Punjab	12-17.5	-	20-21	19-21
8	Das Gupta et al (1974)	U. P.	-	-	19-20	21-22
9	Kolte&Fakhrudin (1976)	Maharashtra	13-16	-	17-22	-
10	Anjana Mathur (1984)	Ajmer Rajasthan	14-16	-	17-21	-
11	Yogesh (1994)	Marwar Rajasthan	15-16	16-17	18-19	18-19
12	ApurvaNandy (1995)	Bengal			19-20	
13	Bhatia B. L. (1996)	Central Rajasthan	14-15	15.5-16.5	18-19	19-20
14.	Jain Sheetal (1996)	Jaipur Rajasthan	-	-	17-18	18-19
14	Bairwa H. L. (1998)	Jaipur Rajasthan	15-16	15-16	17-18	18-19
15	DuttaSumant (2000)	Jaipur Rajasthan	14-16	-	18-19	19-20
16	Present Study (2002)	Jaipur Rajasthan	14-15	14.5-15.5	18.5-19.5	19.5-20.5
In Foreign Countries						
17	Davis and Parson (1927)	England	18	18	23	23
18	Flecker (1932)	Australia	14	-	15-16	18

Conclusion

1. In Female subjects appearance and fusion of various epiphyseal centers occurs 6 months to 1¹/₂ years earlier than in males.

2. In both sexes appearance and fusion of various epiphyseal centers occurs earlier in Indian subjects than in subjects of European countries.

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Conflicts of Interest:- Nil

Ethical Clearance: taken from appropriate authorities

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