



A radiographic demonstration of appearance and union times of three shoulder ossification centers in 10-18 years age group at S.M.S. hospital Jaipur during 2020-21

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Abstract

The study of appearance and union of epiphysis of bones is accepted method for age estimation of individual. However many studies conducted on different bones respective to their development according to age. This study conducted on shoulder joint bones to establish relations between age and appearance and union of shoulder bones epiphysis radiographically. The present study has been conducted on 53 males and 36 females falling in the age group of 10-18 years, which are selected randomly from various wards, OPD of various specialty Department of S.M.S. Hospital, Jaipur.

Complete fusion of head of humerus appeared from the age of 16 years in males and from 15 years in females. Complete fusion of acromion process of males is present from the age of 16 years and from 14 years in females. The epiphyseal line of coracoid process in males disappeared from 17 years and from 16 years in females. It is concluded that shoulder joint also give the relation

between age but age range and much deviation to age, it is consider less important than wrist, elbow and pelvis.

Keywords: Acromion, Coracoid process, Epiphysis, Head of humerus.

Introduction

India is a developing country with irregular and erratic certification of births despite strict protocols. The data of births is not properly maintained and sometimes falsification of age documents is used as a practice to get an undue advantage as per various statutory norms. Contradictory data of the same individual of births and age are also found due to erratic information provided for a different document for identity due to lack of cross checking of these records. For these reasons, forensic experts are often required to give expert opinion for age estimation in legal matters, both civil and criminal.

Reporting on medico-legal exercise in India, a survey committee recommended to the Government of India, that a region wise analysis for the problem of determination of age is to be motivated. The Indian

population differs widely from the western population in hereditary, dietary, socio-financial and ethnic factors. The difference in appearance and union is not due to the race, but is due to the genetic and deistic factors and environment has got its roles [1]. By histological study, nutrition and its deficiency played a definite role in assessing the age [2]. Nutritional deficiencies affect the skeletal maturation more during early childhood than during adolescence [3]. There is influence of hormonal disturbances on the skeletal maturation also present [4]. Different anthropological observations have been mentioned in populations belonging to various geographical regions due to numerous factors. Generally, the formula used for estimating age, sex or stature of one population cannot be evenly applied to all other population group [5]. For this reason, specific records of particular population are required to be analyzed and formula for each population is to be derived.

Material & Methods

The present study has been conducted on 89 males and females, which are selected randomly from various hospital wards and various departments OPD of S.M.S. Hospital, Jaipur, age group 10-18 years during 2020-21. in order to understand the pattern of appearance of ossification centre and fusion of epiphyseal union in head of humerus, acromian process, coracoids in shoulder joint by radiological examination. In school going subjects, date of birth was confirmed from the verbal statement or birth proof.

Exclusion criteria: 1.) Subjects with Chronic illness, endocrinal disorders, radiographs that displayed major anomalies or Previous skeletal trauma (e.g., fractures) of the bones of the shoulder joint, severe malnutrition-weight age <60%, Short stature, Chronic drug intake affecting development like e.g. - antiepileptic drug,

steroid. For analysis of observation and discussion the whole process of epiphyseal union divided into stages as below [6]

Proximal Humerus epiphysis

Phase 1 : Open union: A continuous radiolucent line, observed along the contours of the entire epiphysis.

Phase 2 : Fusing: Epiphyseal union has begun or is just about to start. In early stages, this is indicated by a haziness that occurs centrally along the epiphysis. As union progresses, radiolucency becomes less apparent, however evidence of faint black lines remains.

Phase 3 : Unfused notch: Union is complete other than in a small area along the periphery of bone. This is typically evidenced by a blackened notch located under the greater tubercle.

Phase 4 : Complete union: No areas of radiolucency are identified. The line of fusion may still be recognizable however as a 'white' radiopaque line.

Acromion epiphysis

Phase 1 : Not present: No epiphysis is observed. The acromion is marked by a rounded and perhaps billowed surface.

Phase 2 : Present; open or fusing: The epiphysis is present and a radiolucent line is clearly visible.

Phase 3 : Complete union: No line of radiolucency is evident.

Corocoid Angle/apex

Phase 1 : Present; open or fusing: The epiphysis is clearly visible sitting on top of or at the tip of, the coracoid process. A radiolucent line is clearly visible.

Results

Open union (phase 1) of head of humerus in males present from 10 years to 16 years of age and 10-15 years in females. Fusion appeared (phase 2) of head of humerus start from 13 years of age and remain present

till 18 years of age of males and 13 years to 17 years in females. Unfused notch (phase 3) of head of humerus of males present from the age of 14 years to till 18 years of age and in females also the same. Complete fusion (phase 4) of head of humerus appeared from the age of 16 years in males and 15 years in females.

No epiphysis (phase 0) of acromion process present in all males from 10-14 years and 10-13 years in females. Epiphyseal line (phase 1) of acromion process of males found appeared from the age of 14 to 18 years of age and 13 to 18 years in females. Complete fusion (phase 4) of

acromion process of males is present from the age of 16 years and from 14 years in females.

The epiphyseal line (phase 1) of coracoid process in males present from 10 years to 17 years and shown 100% till the age of 15 years and the epiphyseal line (phase 1) disappeared from 17 years and thereafter. The epiphyseal line (phase 1) of coracoid process in females is present from 10 years to 16 years, it was in 100% females till the age of 14 years and the epiphyseal line (phase 1) disappeared from 16 years onwards.

Table 1: Age of appearance and Fusion of Head of humerus

Sn.	Age (yrs)	No. of Cases	Phase 1		Phase 2		Phase 3		Phase 4	
			M %	F %	M %	F %	M %	F %	M %	F %
1.	10-11	11	100	100	-	-	-	-	-	-
2.	11-12	12	100	100	-	-	-	-	-	-
3.	12-13	13	100	100	-	-	-	-	-	-
4.	13-14	9	80	50	20	50	-	-	-	-
5.	14-15	10	40	40	40	40	20	20	-	-
6.	15-16	13	25	-	37.5	40	37.5	40	-	20
7.	16-17	9	-	-	60	50	20	25	20	25
8.	17-18	12	-	-	25	-	37.5	50	37.5	50

Table 2: Age of appearance and fusion in Acromion Process

Sn.	Age (yrs)	No. of Cases	Phase 0		Phase 1		Phase 4	
			M %	F %	M %	F %	M %	F %
1.	10-11	11	100	100	-	-	-	-
2.	11-12	12	100	100	-	-	-	-
3.	12-13	13	100	100	-	-	-	-
4.	13-14	9	100	50	-	50	-	-
6.	14-15	10	60	-	40	80	-	20
5.	15-16	13	-	-	100	80	-	20
7.	16-17	9	-	-	80	50	20	50
8.	17-18	12	-	-	25	25	75	75

Table 3: Age wise distribution of phase 1 assigned to the coracoid angle/ apex

Sn.	Age (yrs.)	No. of Cases	Phase 1	
			M	F
1.	10-11	11	100%	100%
2.	11-12	12	100%	100%
3.	12-13	13	100%	100%
4.	13-14	9	100%	100%
5.	14-15	10	100%	80%
6.	15-16	13	75%	20%
7.	16-17	9	60%	-
8.	17-18	12	-	-

Discussion

Present study shows complete fusion in males from 16 years whereas in Buri S [7] showed complete fusion from 17 years and Mazumdar A [8] showed complete fusion of head of humerus from 15 years of age. Sahni P [2] showed 5% males show complete fusion at the age of 14 and 15. Present study findings are similar to Schaefer M⁶ in appearance of phase according to age group but there is difference in mean age of phases in both studies which can be attributed to the difference in individual ages of study participants. The study consistent with Galastaun [9], Chaurassia B.D. [10], T.A. Gonzales [11], Peter L. Williams [12] and SC Shanks [13], L.A. Waddae [14], C.K. Parikh, K. S [15]. Narayan Reddy [16], F.E. Camps [17], J. V. Basmajian [18], Krogman [19] and corresponds with Pillai [20], Flecker [21], Bernard Knight [22]

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