

## Age Determination from Radiological Study of Shoulder Joint



### Radiology

KEYWORDS : Age estimation, radiological, shoulder joint

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### ABSTRACT

*Identification of a human being is an important aspect while dealing with medical cases. Age determination is an integral part of identification. Joints in upper limb like Shoulder joint help in identifying individuals at their age of majority. Radiology is a method of investigating not only in medical cases as therapeutic but also as an investigative aid in medico-legal cases.*

### Introduction:

Radiology is defined as that special branch of medicine employing ionizing radiant energy in the diagnosis and treatment of disease. Forensic radiology comprises of the performance, interpretation, and reportage of those radiological examinations and procedures that have to do with court and law.<sup>1</sup> Identification plays a major role in cases of medicolegal cases, mass disasters, putrefied bodies etc. Among the various factors used for identification, age is one of the main factor. Age of an individual can be determined based on the epiphysis fusion of the bones. This fusion ages vary from community to community and India being a country of diversity, setting a specific age for all would be difficult. This study aims to find the normal age of ossification centers in the Rajasthan population.

### Aims and Objectives

Estimating the age of fusion of ossification centers at shoulder joint

### Material and Method

The research study was conducted at a tertiary care hospital, Udaipur, Rajasthan. Ethical clearance was taken from the institutional ethical committee and Informed consent was taken from the volunteers.

The sample size was 100.

### Inclusion criteria:

- Apparently healthy compliant individuals
- Age group 12 to 18 years
- Individuals with school certificate or birth certificate

### Exclusion criteria:

- Malnourished individuals
- Individuals with developmental abnormality

X-rays of shoulder joint of the compliant volunteers was taken at the department of radiology. In our study, the designations of stages used by McKern & Stewart (1957) were adapted to produce the staging method as outlined below <sup>2</sup>:

F0 – Non-union,

F1 – Active Union

F2 – Complete Union

### Results and Observations:

Our study revealed that the

Complete fusion of Coracoid base was seen at the age of 13 to 14 years,

Complete fusion of Acromion was seen at the age of 15 to 16 years,

Complete fusion of conjoint epiphysis of humerus (proximal end) was seen at the age of 16 to 17 years, as depicted in the following table no 1.

**Table 1: Co-relation of age vs stage of fusion of epiphyseal centers**

		Age in years					
		12-13	13-14	14-15	15-16	16-17	17-18
Stages of Fusion	Coracoid base of scapula	F1	F2	F2	F2	F2	F2
	Acromion of scapula	F0	F1	F1	F2	F2	F2
	Conjoint epiphysis of Humerus	F0	F1	F1	F1	F2	F2

The table shows that at the age of 12 to 13 both acromion and conjoint epiphysis had not fused but after the age of 13 both the centers showed the start of union. The acromion fused completely by the age of 15 to 16 while the conjoint epiphysis fused a year later between 16 to 17 years.

### Discussion:

Identification of an individual is based on several factors, like gender, age, stature etc. Identification of age by radiological method is a fine method with record maintenance. Studies have been done for age determination using radiological method of joints like elbow, wrist and hip joint. Study of shoulder joint is comparatively very less. Shoulder joint helps in determining age between 14 to 18 years and has medicolegal significance especially in criminal liability cases. The study of bone union has been considered as a reasonable scientific and accepted method for estimation of age by the judiciary courts worldwide.<sup>3</sup> Zydek et al. in his study on the upper end of the humerus opined that due to lack of statistical correlation between chronological age and atrophy of the spongy structure within the upper end of the humerus, the assessment of humerus structure should be omitted in age estimation.<sup>4</sup> A recent study by Wachholz L et al and Walker R et al have opined about reliability of bone age estimation based on radiographic evaluation of proximal end of humerus, which is in contrary to zydek's study.<sup>5,6</sup>

Our study showed that the complete fusion of coracoid base of scapula is between 13 to 14 years, which is contrary to the result showed by the saini et al.<sup>7</sup> Our study showed that complete fusion of acromion of scapula is between 15 to 16 years, contrary to the study by the saini et al.<sup>7</sup>

Our study showed that the complete fusion of humerus (proximal end) is between 16 to 17 years which is similar to the results of studies by Anil agarwal and Memon et al while study by Erol et al. has showed contrary results with the age of fusion more than 18 years.<sup>8,9,10</sup>

**Limitations of study:**

Very sparse study have been done on age by shoulder joint using radiological investigation, hence more work has to be done based on gender and geographical distribution.

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