



An observational study of epiphyseal fusion around wrist and shoulder Joint in 16 to 22 years age group in Jaipur region

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Citation this Article: Kiran Chokrayat, Anil Solanki, Dhruv Singh Meena, Sumanta Dutta, Mukesh Mittal, Naveen K. Simatwal, “An observational study of epiphyseal fusion around wrist and shoulder Joint in 16 to 22 years age group in Jaipur region”, IJMSIR- March - 2022, Vol – 7, Issue - 2, P. No. 161 – 164.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Determination of the age of an individual from fusion of the ossification centers is considered a reasonable well accepted method in the field of medico-legal. Study aimed to assess radiological age from epiphyseal union of lower end of radius - ulna and proximal humeral epiphysis. An analytical Observational study was carried out among 96 subjects of 16-22 years age group at tertiary care center, Jaipur during period of June to December 2021. Complete fusion of distal end of ulna with its shaft was seen in the age group of 18-19 years in both males and female subjects and complete fusion of lower end of radius with its shaft was seen at age group of 17-18 years in females and 18-19 years in males. 100% complete epiphyseal fusion at wrist joint was

noticed at the age of 18-19 years in males and 17-18 years in females. Lower end of radius and proximal epiphyseal humerus end fusion along with partial fusion of lower end of ulna is nearer to 17-18 years.

Keywords: Epiphysis, Humerus, Radius, Ulna, Wrist joint.

Introduction

Medico-legal professionals are increasingly being requested to determine the age of people who may not have official birth certificates. Civil and criminal investigations are one of the most typical grounds for assessing chronological age in an unrecognized living individual. The age at which penalties rise in severity has been set at a specific age, which is 18 years old, the age at which an individual is regarded a legal adult. [1]

Determining one's age is a significant burden from the prospective of justice administration. [2]

The age of adolescent and young adult skeletons can be estimated by the timing of epiphyseal union. The timing of epiphyseal union is fairly consistent, with minimal variations among research groups and geographical areas. [3] The minimal discrepancies in fusion ages could be caused by changes in environment, economics, genetic, and dietary factors. [4] Furthermore, sexual differences in epiphysis maturation time have been well reported. In the majority of studies, females showed earlier fusion than their male counterparts. [5]

The age of epiphyseal fusion of the distal end of the radius and ulna is bilaterally similar, meaning it occurs in both hands at the same time. Between the ages of 16 and 22, the lower end (epiphysis) of the radius and ulna fuses with their respective diaphysis, according to several studies. [6] Around the age of 18, the closure of the proximal humeral epiphysis is significant in defining gender and radiographic bone age. [7] As a result, when the radius and ulna epiphyses have closed, the proximal humeral epiphysis will be assessed to estimate bone age during this significant age period.

Material and method

Study Type – Analytical type of observational study.

Study Design- Cross-sectional study design.

Study Place - Departments of Forensic Medicine in association with Department of Radiology, SMS Medical College and Attached Hospitals, Jaipur.

Study Period- June 2021 to December 2021.

Study permission- Research Review Board of Institute & Ethics Committee at SMS Medical College, Jaipur.

Results and discussion

A total of 96 study subjects of 16 to 22 years of age group were included. Equal number (48) of cases of each

gender was included, which were further divided in 6 sub-groups in each gender. Amongst the subjects Hindu predominated (86.50%). Majority of the study subjects were rural regions (55.20%). Most of subjects from rural region were females (50.94%). Higher group of study subjects were vegetarian (82.3%). The mean value of weight of male and female subjects was respectively 65.79 ± 5.23 kg and 51.50 ± 3.04 kg. The mean height of male was 178.56 ± 2.04 cm and 160.93 ± 2.23 cm in female. Pubic, axillary, chest hair and Adam's apple had appeared in 100% male subjects. The secondary sexual characters had appeared in all female study subjects. Lower end of radius was fused in majority of both genders (66.7% in male & 79.2% in female). Lower end of ulna was fused in majority of both genders (66.7% in male & 66.7% in female). Proximal humeral epiphysis fused in 66.7% male subjects and 79.2% female subjects. Male showed a higher correlation between recorded and Radiological ages in the present study (83.33%) as compared to females (66.67%). Non-correlation of radiological age to chronological age was seen in 16.67% males and 33.33% females.

It was observed in our study that complete fusion of distal end of ulna with its shaft was seen in the age group of 18-19 years in both males and female subjects and complete fusion of lower end of radius with its shaft was seen at age group of 17-18 years in females and 18-19 years in males. 100% complete epiphyseal fusion at wrist joint was noticed at the age of 18-19 years in males and 17-18 years in females in Jaipur region, similarly to observe by Raichandani L. et al. [8], who discovered average age for complete epiphyseal fusion of lower end of radius. Buri S. et al. [9], Beryl S. et al. [10], had found similar results. Abimbola et al. [11] revealed that entire fusion of the radius and ulna for males and females

occurred uniformly between the ages of 18 and 19 years. Maharshi A. [12], Vaishnawa et al. [13] also supporting the present study. P.S. Igbigbi [14], N. Hassan [15], were found that the present study is quite similar as the age of fusion of lower end of radius and ulna is one year earlier in female study subjects as compare to male. A study conducted by Harshwardhan K. K. et al. [16]; Wankhade P.A. et al. [17], Memon et al. [18] stated that age of epiphyseal fusion of lower end of radius and ulna in males of North East Pradesh found to be 17-18 years, which is one year earlier as compare to the result of present study. Aiman Al-Qtaitat et al. [19], Rajdev, B M et al. [20], Nemade, et al. [21] observed that results were not correlate to present study where the age of epiphyseal fusion of radius and ulna in both gender 2-3 year earlier

Conclusion

After comparison of observational data of radiological ossification in between wrist and shoulder joint, in our study it is evident that fusion of distal of radius and proximal humeral epiphysis are going at same pace and fusion of lower end of ulna is found legging behind one year than fusion of lower end of radius and proximal humerus end. It means that lower end of radius and proximal epiphyseal humerus end fusion along with partial fusion of lower end of ulna is nearer to 17-18 years. The empirical evidences of the current study indicate that ages of union of epiphysis around wrist joint i. e. for lower end of radius and ulna both, it is found to be 17-18 years for girls & 18-19 years for boys in Jaipur region.

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