Age estimation by using radiological methods and its Comparison with clinical examination.

إعداد

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ABSTRACT - Background:

Many researchers paid attention to this subject and the different methods used for age estimation. The first persons to work on this issue was Pryor (1928) who undertook studying the time of appearance of the ossification center of the wrist bone and Krojman (1939) who studied time of epiphysis union. There were several different studies also done on the subject.

There was some controversy in the determination of time of appearance of ossification centers and fusion of epiphysis, due to different factors including: sex, nutrition, hereditary factor, geographical area, and race. There is special practical importance for age estimation in determining the age of certain individuals without birth certificate, who are attending school, getting married, joining the military draft, determination of criminal responsibility, and criminal abortion, it appears from all of the above that age establishment has a paramount importance in many situations.

The radiological examination constitutes a quick and precise method for estimating the age in persons who are 25 years of age or less, in addition to the
clinical examination such as weight, height, teeth, and signs of physiological puberty. In persons more than 25 years of age, it is impossible to estimate age precisely by radiological examination, due to complete appearance of ossification center and fusion of epiphysis. At the end of skeletal growth and development, only a few age dependent features like development of third molars and the bones of the hand and wrist remain to be used for age estimation by morphological methods, which result in a less accurate estimation of age.

**Objectives:**

The main purpose of this study is to evaluate the presence of any differences between using the clinical or the radiological examinations for the purpose of estimating the age. A second goal is find out the average age of appearance of the ossification centers and union of epiphyses of the bones of Yemeni subject in comparison with similar studies performed by several eastern and western researches.

**Methods and materials:**

The study was performed on 250 patients (129 males, 121 females), for the purpose of estimating the age between the first year of life to 29 years with birth certificates indicating their real age. This was performed at the Al-Gamhouria teaching hospital at the Aden city (Yemen), the sample was chosen randomly for the study in the period from December 2003 to May 2004.

All cases were exposed to radiological examination. For the patients aged 20 years and less a radiograph of the upper arm was taken. Patients who were 19 years and older a radiograph of the humerus was taken and for the subjects who were more than 20 years a radiograph of the pelvis was taken. These radiographs were compared with the clinical examination.
**Results:**

The study was performed on 250 subjects who had accurate birth certificates indicating their actual ages (the sample age range was from less then 1 year to 29 years of age) and were all submitted to clinical and x-ray examination. The analysis indicated that there were great differences between the age estimated by the clinical and radiological examinations in 175 cases (70%) by a mean difference of 1.6 years and a standard deviation of 0.6. This difference was most significant in the age group of 14-17 years (25.1%) followed by the age group of 2-5 years (24%) and finally the age group of one year and less was the age with the least difference (2.3%). The results showed that the appearance of ossification centers and union of epiphyses occur earlier in females than in males by about 1.5 years and a standard deviation of (0.7). The results also showed that there were differences in the time of appearance of ossification centers and union of epiphyses in Yemen subject compared with the subjects of some eastern and western origins.

**Conclusion:**

From the study we found that:

1. There are great differences between clinical and radiological examination with a mean of 1.6 years and a standard deviation of 0.6.

2. The differences between the clinical and radiological examination were more in the age group of 14-17 years 25.1% followed by the age group of 2-5 years 24%.
3. The difference between the appearance of the ossification centers and union of epiphyses occur earlier in female than male by about 1.5 years.

4. There were differences in the time of appearance of ossification centers and union of epiphyses in Yemeni subjects compared with the subjects of some eastern and western origin.

Keywords: age estimation, radiological examination, ossification centers, union of epiphyses.