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ABSTRACT

Most of the people live in rural areas, most of them being illiterates and don’t remember their dates of birth. They do not feel that it is the due to intimate the birth of a child in their house to the authorities connected in maintaining birth and death registers. Due to this, the officials concerned find it difficult to maintain the records. Hence Indian courts have to depend often upon medical opinion for assessment of the age. The cases are referred to doctors for estimation of age. Usually as soon as a child is born, the date and hour of birth is recorded. Birth records from the registrar’s office, school records, and horoscope record are the main sources of obtaining the particulars about the age of a child. But these records are often not reliable in India, as most of the people live in villages and are illiterate, and they do not realize the importance of maintaining the proof of date of birth. The question of estimation of age is of importance both in living as well as in the dead. This study was conducted with materials and methods of school children and college students with age group of 12 to 18 years. For this study, anteroposterior and lateral views of radiographs of the elbow of both arms were taken and results were observed.

1. Introduction

India is a vast country with diversity in social customs, multiple religions, dietary habits and variations in climatic conditions. Their diet is deficient in essential constituents like vitamins, minerals due lack of knowledge regarding the nutritive value of food stuffs. These factors influence the growth of the human beings. The question of estimation of age is of importance both in the living as well as in the dead. Most of the people live in rural areas, and most of them being illiterates don’t remember their dates of birth. They do not feel that it is the due to intimate the birth of a child in their house to the authorities connected in maintaining birth and death registers. Usually as soon as a child is born, the date and hour of birth is recorded. Birth records from the registrar’s office, school records, and horoscope are the main sources of obtaining the particulars about the age of a child. But these records are often not reliable in India, as most of the people live in villages and are illiterate, and they do not realize the importance of maintaining the proof of date of birth.

In conditions where such authenticated records are not available, scientific methods of determination of age become necessary. These depend on the general physical development, eruption of deciduous or permanent teeth, attainment of puberty, study of eruption of wisdom teeth, study of union of epiphyses with diaphyses and the suture closure. Similarly in the dead, age determination problems may arise in different ways. Sometimes a complete human skeleton or a few bones or some fragments of the bones may be sent to the doctor. Under such circumstances depending on the available material, different methods have to be adopted for the determination of the age of the deceased to solve the civil and criminal problems.

In civil cases estimation of age becomes necessary in the following situations:

1. Giving one’s consent for any medical examination.
2. Employment in a factory or local mine.
3. Attainment of majority.
4. Attainment of majority in relation to right of property.
5. To make a will.
6. To exercise franchise in election.
7. To contract marriage.
8. As regards capacity for procreation involving impotence, sterility, legitimacy etc.

In criminal matters the following are the situations where age estimation is necessary:

1. Abortion.
2. Infanticide.
3. Criminal responsibility.

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Estimation of age is also necessary for determining the identity of an individual. An approximate age is of course an important link in any chain of identity data.

2. Materials and Methods

The material for this study are school children and college students numbering 100 (50 Boys and 50 Girls) from a local government and private High school of Kurnool town of Kurnool district of Andhra Pradesh state. The student falling within the age group of 12 to 18 years has been selected. The school children were picked up from 7th to 10th standards, which have been falling in the age group of 12 – 15 years, likewise college students were picked up in the age group of 16 to 18 years. Their exact date of births of the children and students were recorded from their parents and after verification in the school registers were found to be corrected. The boys and girls were selected from the lower income, middle income group and higher income groups. Their diet, height, weight, general build, whether vegetarian or non-vegetarian, activities like sports, present and past illnesses and their eruption of teeth have all been considered.

Antero posterior and lateral views of Radiographs of the elbow of both arms were taken for all cases. Altogether 100 X-ray photographs have been taken for these 100 students. All the X-rays are life size taken over film sizes of 12x10 cms.

All the students and children were subjected to physical examination and the findings were noted.

The boys and girls were selected from the lower income, middle income group and higher income groups. Their diet, height, weight, general build, whether vegetarian or non-vegetarian, activities like sports, present and past illnesses and their eruption of teeth have all been considered. X-Ray findings were recorded according to Stevenson's classification of four stages, namely non-union, beginning union, recent union and complete union (abbreviated as “O”, “B”, “R” and “C” respectively).

NON UNION:

X-Rays showing a clear gap between the epiphyseal and diaphyseal end, saw tooth like appearances have been put into this group of non-union designated as “O”.

BEGINNING UNION:

X-Ray showing a line replacing the hiatus between the diaphyseal and epiphyseal ends, not showing saw tooth like appearances have been put in this group of beginning union as abbreviated as “B”.

RECENT UNION:

X-Rays showing a faint line at the junction of the epiphyseal and diaphyseal ends have been put into this group and X-rays showing 3/4th of the epiphyseal line in this stage and 1/4th of this line replaced by bony density same in the epiphysis and diaphysis have been treated as recent union and designed as “R”.

COMPLETE UNION:

X-Rays showing the same bony architecture in the diaphysis and epiphysis and showing 1/4th of the line of the previous stage have been treated as complete union and designated as “C”.

The following points were studied and noted particularly:

IN THE ELBOW JOINT:

1. The fusion of the trohlea and capitulum to each other and then to the lateral epicondyle.
2. The fusion of the lateral epicondyle to the diaphysis for the lower end of the humerus.
3. The fusion of the medial epicondyle to the diaphysis.
4. The fusion of the proximal epiphyses of radius and ulna, with their diaphyses.

Estimated age

1. O = Non Union
2. B = Beginning of Union
3. R = Recent Union
4. C = Complete Union

Observations:

The findings of the epiphysis union have been observed

It was observed that the styloid processes of radius and ulna had fused with their respective epiphyses earlier than 14 years in all the cases studied.

The trohlea and capitulum were found fused to each other and then to the lateral epicondyle in all the cases earlier than 14 years. The fusion in all these cases was 100% complete.

It has been found out from this study that the epiphysis for the medial epicondyle was completely fused with the diaphysis by 15-16 years of age in 75% of females examined and by 15-16 years in 36.4% of males, examined.

1. The epiphysis for the lateral epicondyle fused completely with the diaphysis by 13-14 years of age in 85.7% of females and by 14-15 years in 100% of females and in males by 15-16 years only 63.6% showed complete union.
2. The epiphysis for the head of the radius was completely fused in 100% of females in the age group of 15-16 years and in males by 15-16 years only 27.3% showed complete union.

The epiphysis for the olecranon got completely fused in 71.1% of females in the age group of 13-14 years and 15-16 years in 100% of females and in males by the age of 15-16 years only 45.5% of cases showed complete union.

Discussion:

In females the estimated age is found to be equal to the actual age in 24 % of cases. The estimated age is found to be less than the actual age in 24% of cases by 4.5 months of age. Estimated age is found to be more than the actual age in 52% of cases by 8.5 months of age. So the average error in females is 6.5 months than the actual age.
In males the estimated age is found to be 1 equal to the actual age in 40% of cases. The estimated age is found to be less. Than the actual age in 28% of cases by 7.5 months of age. The estimated age is found to be more than the actual age in 32% of cases by 5.5 months of age. It is interesting to note that both in the females and males belonging to this age group the range of error is in the age estimation is 6.5 months.

The other factors:-
1. Sex: It has been found to vary considerably in both the sexes as stated earlier.
2. Height: Little significance. In one case, the boy was taller than the rest of the boys examined and the union of the epiphysis was more advanced. This observation was also by Lee Gross Carr, Mittal, Loomba etc.
3. Weight: The body weight does not influence the fusion of epiphyses as seen in conformity with that of Mittal and Loomba.
4. General build: No significance has been found.
5. Diet: It has a little significance. Girls of the same age but used to non-vegetarian diet have shown advanced stages of fusion in epiphyses.
6. Teeth: In this study it has been found that out of 25 girl’s only one girl of 15Y-5M-9days has shown eruption of Right Lower third molar tooth. In the other cases there was a gap for the future eruption of 3rd molar. Similarly out of 25 boys only two boys have shown all the third molars erupted at the ages of 15 years 8 months 15 days and 15 years 11 months 4 days respectively. Other boys of this age group have shown only space after 2nd molar.
7. Past illness: In this study all the 50 students did not give any history of major illnesses.
8. Activities: All the students studied are habituated to some sort of indoor or outdoor games and activities and this appears to have no significance on the rate of epiphyseal union.
9. Economic conditions: Some scientists say that there is no relation of economic condition to the epiphyseal union. But scientists like schintz, Beanch and fiddl oppose this view and say that the economic condition has some effect on the epiphyseal union. This study shows more advanced epiphyseal union in the children of the higher income group in comparison to the children of the lower income group of the same ages. The reason is an indirect one, because the height income group people can afford a better quality of diet rich in protein, fat and vitamins etc.
10. Religion and caste: No significance at all.
11. Racial and provincial differences: This study shows that the epiphyseal union among the people of Andhra Pradesh is similar to that of the Indians in Madras and Vidharbha: one year earlier than in the Bengalis in Calcutta and the people of Uttar Pradesh.

Conclusion:
From this study it can be concluded that:
1. The epiphyseal union around the elbow joint can be used for age estimation among the adolescents between the ages of 14-16 years both for the females and males.
2. The study of epiphyseal union gives only a marginal error of 6 months of age both for the females and males.
3. The epiphyses for the lower ends of humerus is best studied by anteroposterior view.
4. The epiphyses for the upper ends of radius and ulna are studied by both anteroposterior and lateral view. The fusion of olecranon is best studied in the lateral view only, so for its study a lateral view is a must. The head of radius can be studied both by anteroposterior and lateral view.
5. As it was observed that the ossification is bilaterally symmetrical, X-ray photographs of one side only is sufficient.
6. It can amply be said that to estimate the age among the adolescents between the ages of 14-16 years the radiographs of the elbow joint taking both anteroposterior and lateral view are sufficient.

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