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A trend of early epiphyseal fusion in Bengali female as compared to Galstaun's data

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Abstract:*The present study is conducted to assess the applicability of age old Galstaun's data to determine age from closure of secondary centers of ossification in Bengali population. Radiographs of elbow & wrist joints are taken from adolescent females of known age of 9 up to 18 years attending three Medical Colleges of West Bengal. Results are compared with Galstaun's chart to note a trend of early epiphyseal union, if any. Early fusion is observed in 8% to 13.5% cases with respect to different ossification centers of elbow & wrist. Reasons for this trend may be attributed to early onset of menarche and improved nutritional status to some extent.*

Keywords: *epiphyseal fusion, female, wrist & elbow joints*

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I. Introduction

Appearance of Ossification centres of the different bones and their fusion with respective diaphysis occur at different ages and for a particular bone, time of appearance & fusion with the respective diaphysis in a particular individual is specific. The centres of ossification of the long bones forming upper limb form a unique combination where the individual ossification centres appear and fuse with the respective diaphyses following a definite sequence at regular intervals with a variation of 1 to 2 years from birth up to 18 years of age. The rates of maturity of skeleton structures are variable in different populations. It has been established that the appearance and fusion of centres of ossification are to some extent influenced by various factors like geographical distribution, food habit, physical activity, hormonal and metabolic factors. It is also observed that the time of appearance and fusions of these centres not only vary in different countries but also in different geographic locations of the same country.

Present study has been undertaken to assess the age of fusion of ossification centres of upper limb bones in the population of age group between 9 up to 18 years adolescent girls attending three medical colleges of West Bengal, which represents a heterogeneous combination of different communities from throughout West Bengal, to see whether the values available in the age old existing Galstaun's charts (1937) are still appropriate or some change has occurred in the ossification activities of the bones due to changing scenario of the atmosphere, dietary habits and others. With this view in mind, subjects of known age group are chosen and the result of radiological examination of epiphyseal closure around wrist & elbow is compared to the previous study of Galstaun.

Galstaun G (1937)**[1]** studied around 7000 Bengali subjects from all strata of the population and on compilation (both ordinarily and with the help of the statistical machine) of the observation, deduced that in girls the average age for fusion of capitulum with lateral epicondyle between 10 & 12 years (sometimes the 3 components fuse together and the mass formed unite with the shaft, while in the other cases, the capitulum fuses first and the others later), epiphysis for medial epicondyle with shaft at 14 years, head of radius with diaphysis around 14 years, tip of olecranon process of ulna at 15 yrs, distal end of radius between $16^{1}/_{2}$ to18 yrs, distal end of ulna by 17 yrs.

II. Materials And Methods

This study was carried out in 775 female subjects, between age group of 9 up to 18 years attending these three Medical Colleges [NRS Medical College, Kolkata; College of Medicine & JNM Hospital, Kalyani; Malda Medical College.] who were resident of West Bengal. Only normal healthy females whose exact dates of birth were known were included in the study. Radiographs of wrist joint (AP view) & elbow joint (AP & Lateral view) were taken from 305 subjects & 560 subjects respectively.Age group wise distribution of subjects was as follows. Number of subjects in age group of 9 to less than 10 years, 10 to less than 11 years, 11 to less than 12 years, 12 to less than 13 years, 13 to less than 14 years, 14 to less than 15 years, 15 to less than 16 years, 16 to less than 17 years and from 17 up to 18 years were 70, 70, 70, 80, 90, 90, 90, 100 & 115 respectively.

Inclusion criteria
• Apparently normal healthy female between age group:from 9 up to 18 years.
• Who have documentary evidence for date of birth.
• Date of delivery, birth certificates, and school records.

Exclusion criteria
• Any chronic illness, congenital heart disease etc.
• Short stature.
• Severe malnutrition i.e., weight age < 60%
• Endocrinal disorders.
• Chronic drug intake, anti-epileptic drugs, steroids etc.

Complete history about the dietary habits, menstruation, general physical examination including height and weight of the subjects and proper clinical examination to detect any disease or deformity, which may affect union of the epiphyses, dental data assessment to tally the stated age, were done. Then, only the healthy girls in the age group of 9 up to 18 years were selected and subjected to radiological examination (after taking proper protective measures to prevent irradiation to the subject as per the standing norms).Regarding status of fusion, Degree-3(i.e. fusion completed)[2] is accepted as complete epiphyseal closure, i.e. radio-opaque area is seen in entire length of joining surface and no radiolucent line is seen in between two bones. The white line of fusion is disregarded.

III. Results& Discussion

For wrist joint, in relation to union of epiphyseal centre of lower end of radius & lower end of ulna with respective shafts, only 8.83% & 13.5% subjects showed early fusion as compared to lower age limits of respective Galstaun's data, as depicted in table 1 & table 2.With regards to elbow joint, as observed in table 3, 4, 5 & 6, in relation to fusion of different secondary centers of ossification, namely tip of olecranon, head of radius, medial epicondyle & lateral epicondyle, it is found that earlier union with respective diaphysis occurs in 13.5%, 12.6%, 13.5% & 7.9% of subjects respectively when tallied with Galstaun'schart.As pubertal age in female is found to be advanced by 4 months per decade throughout the world[3], there may exist a possibility of early skeletal maturity in them during pubertal age. This, along with improvement of nutritional status & dietary habits might be the causal factors for a tendency of early epiphyseal closure in modern era.

Tables: Observation of fusion activity of epiphyseal centres around wrist joint with their respective diaphysis:

Table-1 Fusion of epiphyseal centre of lower end of radius with respective diaphysis:

Age of fusion in years	
Less than $16^{1}/_{2}$	As per Galstaun [$16^{1}/_{2}$-18]
19 (8.83%)	196(91.16%)

Table – 2 Fusion of epiphyseal centre of lower end of ulna with respective diaphysis:

Age of fusion in years	
Less than 17	As per Galstaun [17]
18 (13.5%)	115 (86.5%)

Observation of fusion activity of epiphyseal centres around elbow joint with their respective diaphysis:

Table – 3 Fusion of epiphyseal centre of tip of olecranon with respective diaphysis:

Age of fusion in years	
Less than 15	As per Galstaun [15]
14 (13.5%)	90 (86.5%)

Table – 4 Fusion of epiphyseal centre of head of radius with respective diaphysis:

Age of fusion in years	
Less than 14	As per Galstaun [14]
13 (12.6%)	90 (87.3%)

Table – 5 Fusion of epiphyseal centre of medial epicondyle of humeruswith respective diaphysis:

Age of fusion in years	
Less than 14	As per Galstaun [14]
14 (13.5%)	90 (86.5%)

Table – 6 Fusion of epiphyseal centre of lateral epicondyle of humeruswith respective diaphysis i.e. with capitulum:

Age of fusion in years	
Less than 10	As per Galstaun [10-12]
12 (7.9%)	140 (92.1%)

IV. Conclusion

Only in 8% to 13.5% of the total studied cases, epiphyseal fusion occurred between 6 months to 1 year earlier as compared to Galstaun's chart; however the rest of the observations are within the range of Galstaun's chart. In this study, the skeletal maturity in female was observed to be earlier. This raises the possibility that in female, the maturity age is advanced because of early onset of puberty& better nutrition in present era..

References

[1]. Galstaun G., A study of ossification as observed in Indian subjects. Ind. J. Med. 25 (1937), 267–324
[2]. Krogman WM, Iscan, MY. The human skeleton in Forensic Medicine, Charles C.Thomas Publisher, Illinois, USA. II Edition, 1986.
[3]. Jeffcoates Principles of Gynaecology, 5th Edition 1996, V.R. Tindall (editor)Butterworth Heinemann, Oxford, p.81.

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