



A prospective study to appearances of ossification centers in the carpal bones in boys of age group 5 years to 12 years in western Rajasthan Jodhpur region

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Abstract

Background: *The study of hand skeleton and consecutive appearance of ossification points in the carpal bones not only determines the chronic metabolic disturbances in childhood also help to establish the age of and individual. The aim of this study to evaluate the appearances of ossification centers in the carpal bones in boys of age group 5 years to 12 years in western Rajasthan Jodhpur region.*

Material & Methods: *The radiological prospective study of "appearances of ossification centers in the carpal bones in boys of age group 5 years to 12 years in western Rajasthan jodhpur region" was conducted in western Rajasthan jodhpur region studying in various schools of jodhpur district. The children were selected for the study in the age group of 5 to 12 years and are from the boys. While selecting the cases for study, priority was given to children of those parents who remember the exact date of birth of their child.*

Results: *Amongst Jodhpur boys we found that first trapezoid, then trapezium and subsequently scaphoid appears. This observation of the present study is quite different to that of other various workers as others have reported appearance of Scaphoid earlier to that of Trapezoid-Trapezium. Therefore when compared it may be stated that in the present series Trapezoid and Trapezium appear before the appearance of scaphoid bone, whereas the scaphoid appears before the appearance of Trapezoid and Trapezium as per observation of other past workers.*

Conclusion: *We concluded that trapezium, trapezoid and scaphoid carpals appeared between the age of 5 to 9 years. These three carpals may appear simultaneously or at different times, but generally scaphoid appear prior to remaining two.*

Keywords: *Carpal bones, Ossification, Male, Trapezoid, Trapezium, Scaphoid.*

Introduction

A survey committee (1964)¹ reporting on medico legal practices in India, recommended to the government that a zone wise study of the problem of determination of age is to be encouraged.

Although some work on this line has been done in this country, there are differences in the findings of the basic determinants in different parts of this country and data available are inadequate.

In India, even after frequent stress paid on birth and death registration, most of the people not following it, hence the age verification is a great problem among the literates.

The Determination of age of an individual by radiological observation of the time of appearance and fusion of ossification centers is a matter of great medicolegal and academic interest. The literature shows that the first person to do scientific work on this study was Pryor(1928)² who undertook studying the time of appearance of ossification center of the wrist bone and Krogman (1978)³ who studied the time of epiphysis union. The study of hand skeleton and consecutive appearance of ossification points in the carpal bones not only determines the chronic metabolic disturbances in childhood also help to establish the age of and individual. In the present study estimation of age in the individual of age varying between 5 year to 12 years will, be conducted using the appearance of ossification of carpal bones in boys of the western Rajasthan (Jodhpur) region.

Material & Methods

The radiological prospective study of "appearances of ossification centers in the carpal bones in boys of age group 5 years to 12 years in western Rajasthan jodhpur region" was conducted in western Rajasthan jodhpur region studying in various schools of jodhpur district. The children were selected for the study in the age group of 5 to 12 years and are from the boys.

Inclusion criteria

1. Boys of the age group 5 to 12 year were included in study.
2. Their age as stated by their parents will be considered along with date of birth certificate and further was confirmed by obtaining birth certificate of from school record.

Exclusion criteria

1. Subject not consenting for skiagraphy
2. Subject not having valid documentation for proof of age / date of birth

3. All boys below 5 years and above 12 years were excluded from the study
4. Male child with affecting the growth of bones appearance of fusion centers e.g. congenital deformities fracture cases, chronic illness or on chronic steroid therapy were excluded from the study.

Methods

While selecting the cases for study, priority was given to children of those parents who remember the exact date of birth of their child. In case of any confusion as regard the date of birth the various relevant document about the date of birth were examined. Only the healthy children i.e. those who were not suffering from any congenital or nutrition deficiency diseases were considered for the study.

Statistical analysis: All observation was noted on a common standard proforma and later the findings will tabulated to draw necessary conclusion. A predesigned proforma will fill up for every case, master chart was prepared.

Results & Discussion

Keeping in view that the time of appearance of various carpal bones in a human being varies with geographic distribution and that it is possible to determine the approximate age of a child by radiological examination of the wrist joint till adolescent age and that the survey committee (1964)¹ on medicolegal practice in India, had recommended to Govt, for encouraging zone-wise study of the problem of determination of age. In the study 85 male child were randomly selected, whose age was 5 year to 12 years and who attend the Dr. S.N. Medical College and Associated Group of Hospitals, Jodhpur for various purposes.

In this study in the children of age group 5 to 12 years and the bone capitata is seen in the X-Ray of each child including the age group of 5 to 6 years of males, we cannot observe on the time of appearance of this carpal bone as in the literature the appearance of this carpal bone is very early, and much earlier to the age group of the children which we have studied.

Our study is similar to that of Flecker (1942)⁴ on one hand. Much later appearance of this bone so much of never before 6 years in the U.P. female children have been reported by Hasan and Narayan (1963)⁵. The present study did not find appearance of this bone in the boys of 5 to 6 years of Jodhpur city. Further in the boys of age group 6 to 7 years of Jodhpur region the incidence of appearance of this bone was over 60%. This observation of mine is in the line with the findings of M.Hasan and D. Narayan (1963)⁵ in U.P. Boys.

The time of appearance of trapezium is 6 to 7 years amongst the boys of Jodhpur region and is in line with that of Paterson (1929)⁶ in English boys and Galstaun (1937)⁷ in Bengalese boys, but differs to Flecker (1942)⁴ in the boys of Australia and in the boys of U.P. as

per study of Hasan and Narayan (1963)⁵. As regards the appearance of scaphoid in Jodhpur boys the appearance is somewhat late by a year or so to the children of other provinces.

Amongst Jodhpur boys we found that first trapezoid, then trapezium and subsequently scaphoid appears. This observation of the present study is quite different to that of other various workers as others have reported appearance of Scaphoid earlier to that of Trapezoid-Trapezium. Therefore when compared it may be stated that in the present series Trapezoid and Trapezium appear before the appearance of scaphoid bone, whereas the scaphoid appears before the appearance of Trapezoid and Trapezium as per observation of other past workers.

Table : Comparison of various studies

Studies	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
PATERSON (1929) ENGLAND	6 months	6 months	3-4 years	4-5 years	6 years	6 years	6 years	12-14 years
FLECKER (1942) AUSTRALIA	6 months	10-11 months	4 years	4 years	5 years	6 years	6 years	11 years
GALSTAUN (1937) BENGAL	6 months	8-14 months	3-4 years	5 years	7 years	4-7 years	7-11 years	12-17 years
HASAN & NARAYAN (1963) U.P.	Within 6 months	Within 6 months	5 years	6 years	8 years	7 years	7 years	13 years
PRESENT STUDY, Jodhpur (RAJ.)	Below 5 years	Below 5 years	Below 5 years	6-7 years	6-7 years	6-7 years	7-8 years	11-12 years

Table No. 1: Distribution of age

Age Group in Years	Total no Cases	Percentage
5-6 Years	11	12.94%
6-7 Years	9	10.58%
7-8 Years	11	12.94%
8-9 Years	9	10.58%
9-10 Years	15	17.64%
10-11 Years	10	11.76%
11-12 Years	20	23.52%
Total	85	100%

Table 1: Number of cases examined in each age group

Table 2: showing incidence of appearance of various carpal bones in male children of jodhpur region examined in the age group of 5 to 6 years

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
11	11	11	10	1	0	1	0	0
PRACENTAGE	100%	100%	90.90%	9.09%	0%	9.09%	0%	0%

Table 3: showing incidence of appearance of various carpal bones in male children of jodhpur region examined in the age group of 6 to 7 years.

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
9	9	9	9	8	3	6	2	0
PRACENTAGE	100%	100%	100%	88.88%	33.33%	66.66%	22.22%	0%

Table 4: showing incidence of appearance of various carpal bones in male children of Jodhpur region examined in the age group of 7 to 8 years.

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
11	11	11	11	11	9	11	11	0
PRACENTAGE	100%	100%	100%	100%	81.81%	100%	100%	0%

Table 5: showing incidence of appearance of various carpal bones in male children of Jodhpur region examined in the age group of 8 to 9 years.

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
9	9	9	9	9	9	9	9	0
PRACENTAGE	100%	100%	100%	100%	100%	100%	100%	0%

Table 6: showing incidence of appearance of various carpal bones in male children of Jodhpur region examined in the age group of 9 to 10 years.

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
15	15	15	15	15	15	15	15	0
PRACENTAGE	100%	100%	100%	100%	100%	100%	100%	0%

Table 7: showing incidence of appearance of various carpal bones in male children of Jodhpur region examined in the age group of 10 to 11 years.

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
10	10	10	10	10	10	10	10	1
PRACENTAGE	100%	100%	100%	100%	100%	100%	100%	10%

Table 8: showing incidence of appearance of various carpal bones in male children of Jodhpur region examined in the age group of 11 to 12 years.

TOTAL CASE EXAMINED	TOTAL NUMBER OF MALE CHILDREN SHOWING APPEARANCE OF VARIOUS CARPAL BONE							
	CAPITATE	HAMATE	TRIQUETRAL	LUNATE	TRAPEZIUM	TRAPEZOID	SCAPHOID	PISIFORM
20	20	20	20	20	20	20	20	16
PRACENTAGE	100%	100%	100%	100%	100%	100%	100%	80%

Table no. 9: showing average age of appearance of carpal bone in male children examined

CARPAL BONE	APPEARANCE IN YEAR
CAPITATE	BELOW 5 YEARS
HAMATE	BELOW 5 YEARS
TRIQUETRAL	BELOW 5 YEARS
LUNATE	6 TO 7 YEARS
TRAPEZIUM	6 TO 7 YEARS
TRAPEZOID	6 TO 7 YEARS
SCAPHOID	7 TO 8 YEARS
PISIFORM	11 TO 12 YEARS

Conclusion

We concluded that trapezium, trapezoid and scaphoid carpals appeared between the age of 5 to 9 years. These three carpals may appear simultaneously or at different times, but generally scaphoid appear prior to remaining two.

References

1. Survey Committee (1964): Survey Committee report on Medicolegal Practice in India, Director General of Health Services. Ministry of Health, New Delhi.
2. Pryor JW. Difference in the Ossification of the Male and Female Skeleton. *J Anat.* 1928 Jul;62(Pt 4):499-506.
3. Krogman, W.M 1978. Human skeleton in forensic medicine, 3rd printing pp-18-71.
4. Flecker H. Time of appearance and fusion of ossification centers as observed by roengetographic methods: *American Journal of Roengetology*; 1942,47,97-159.
5. Hasan, M. and Narayan, D. (1964), Radiological study of the postnatal ossification of the upper end of Humerous in U.P. Indians. *J. Anat. Soc. India*, 13: 70-75.
6. Paterson RS. Some factors influencing epiphyseal growth and union. *January 18, 1929*:691-695.
7. Galstaun G. (1937); A study of ossification as observed in Indian subject. *Indian Journal Medical Research (IJMR)*, Vol. 25,267-324.