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Original Research

To assess the accuracy of age estimation based on the appearance of the pisiform bone

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ABSTRACT:

Aim: To assess the accuracy of age estimation based on the appearance of the pisiform bone. **Materials and methods:** This research was conducted at the Department of Forensic Medicine as a descriptive cross-sectional study. A total of 200 X-rays were analyzed, with 100 belonging to men and 100 belonging to females. An individual's age was classified over a span of 1 year. The research received approval from the institutional ethics board. X-ray imaging was conducted to diagnose various orthopedic and surgical conditions. The research excluded individuals who were older than 15 years of age. X-rays showing congenital abnormalities or fractures were also not included in the research. The existence of an ossification center was categorized as "Appeared," whereas its absence was labeled as "Not Appeared." The X-rays were examined by two distinct radiologists in order to minimize any human error. **Results:** The research included a total of 200 youngsters, with an equal distribution of 100 boys and 100 girls. All the individuals were between the age range of 7 to 15 years. Within the age groups of 7-8 years, 8-9 years, and 9-10 years, there was an absence of men exhibiting the existence of the pisiform bone. The bone was not found in any of the youngsters. Within the age category of 10-11 years, the bone was present in 44.44% of the participants and absent in 55.56% of the subjects. Among the 11-12 year age group, the bone was present in 28.57% of the participants and absent in 71.43% of the subjects. All guys between the ages of 13-14 and 14-15 exhibited the existence of the pisiform bone. Table 2 shows the Age of appearance of Pisiform in females. Amongst 7-8 years and 8-9 years age group, there were no females that showed the presence on pisiform bone. The bone did not appear in any of the children. Amongst 9-10 years of age group, the bone appeared amongst 36.36% of the subjects and was not seen in 63.64% of the subjects. Amongst 10-11 years of age group, the bone appeared amongst 69.23% of the subjects and was not seen in 30.77% of the subjects. Amongst 11-12 years and 13-14 years of age group, the bone appeared amongst 50% of the subjects and was not seen in 50% of the subjects. Amongst 14-15 years of age, all the females showed presence of pisiform bone. **Conclusion:** Ossification starts at 10 years of age in boys and 9 years of age in girls, according to our research. All instances exhibited fully ossified bone by the age of 13. This information may be used for forensic purposes and in judicial proceedings.

Keywords: Age, Pisiform bone, X-rays

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INTRODUCTION

The human skeleton bones are pre-formed in the form of hyaline cartilage. This cartilage model is slowly converted into hard tissue by the process of osteogenesis that mostly begins from the centre, from which the process spreads to periphery, until the complete bones are ossified[1]. There are age dependent changes and there may be imbalance between bones from different areas of the same child. In most of the countries, the proof of a child being under or over the age of legal matters is needed for various legal

decisions and processes. If there is any confusion about the age of child, authorities and courts normally request a medical age certificate issued by experts[2]. The evaluation of bone age is most commonly done on the basis of X-rays of the hand and wrist, that are compared to similar reference atlases provided by Greulich and Pyle (GP) and Tanner and Whitehouse[3, 4]. Pisiform bone is ossified between the age of 9 to 13 years as shown in different studies[5,6] The aim of present study is to Evaluate the Age Estimation on the Appearance of Pisiform

Bone.

MATERIALS AND METHODS

This research was conducted at the Department of Forensic Medicine as a descriptive cross-sectional study. A total of 200 X-rays were analyzed, with 100 belonging to men and 100 belonging to females. An individual's age was classified over a span of 1 year. The research received approval from the institutional ethics board. X-ray imaging was conducted to diagnose various orthopedic and surgical conditions. The research excluded individuals who were older than 15 years of age. X-rays showing congenital abnormalities or fractures were also not included in the research. The existence of an ossification center was categorized as "Appeared," whereas its absence was labeled as "Not Appeared." The X-rays were examined by two distinct radiologists in order to minimize any human error. All the data thus obtained was arranged in a tabulated form and analysed using SPSS software version 21.0. P value of less than 0.05 was regarded as significant.

RESULTS

The research included a total of 200 youngsters, with an equal distribution of 100 boys and 100 girls. All the individuals were between the age range of 7 to 15 years.

Table 1 displays the chronological occurrence of the Pisiform bone in men. Within the age groups of 7-8 years, 8-9 years, and 9-10 years, there was an absence of men exhibiting the existence of the pisiform bone. The bone was not found in any of the youngsters. Within the age category of 10-11 years, the bone was present in 44.44% of the participants and absent in 55.56% of the subjects. Among the 11-12 year age group, the bone was present in 28.57% of the participants and absent in 71.43% of the subjects. All guys between the ages of 13-14 and 14-15 exhibited the existence of the pisiform bone. Table 2 shows the Age of appearance of Pisiform in females. Amongst 7-8 years and 8-9 years age group, there were no females that showed the presence on pisiform bone. The bone did not appear in any of the children. Amongst 9-10 years of age group, the bone appeared amongst 36.36% of the subjects and was not seen in 63.64% of the subjects. Amongst 10-11 years of age group, the bone appeared amongst 69.23% of the subjects and was not seen in 30.77% of the subjects. Amongst 11-12 years and 13-14 years of age group, the bone appeared amongst 50% of the subjects and was not seen in 50% of the subjects. Amongst 14-15 years of age, all the females showed presence of pisiform bone.

Table 1: Age of appearance of Pisiform in males

Age(years)	Appeared numbers=44	Not appeared number=56	Total	Percentage
7-8	0	11	11	11
8-9	0	7	7	7
9-10	0	13	13	13
10-11	4	5	9	9
11-12	8	20	28	28
12-13	0	0	0	0
13-14	16	0	16	16
14-15	16	0	16	16

Table 2: Age of appearance of Pisiform in females

Age(years)	Appeared numbers=58	Not appeared number=42	Total	Percentage
7-8	0	12	12	12
8-9	0	8	8	8
9-10	4	7	11	11
10-11	9	4	13	13
11-12	5	6	11	11
12-13	6	5	11	11
13-14	19	0	19	19
14-15	15	0	15	15

DISCUSSION

A huge number of ossification centres are first observed in embryonic life, some of them appear much later during their prenatal life, and others after birth. Some bones are calcified from a single center, like, carpus and tarsus. Majority bones are ossified from different separate centres, one of which Most appear near the middle of the future ossification. This center is related with progressive ossification towards the ends of

bone. Age estimation is determined by the observation of various parameters. The age of ossification of the Pisiform bone can be a crucial evidence to support for the estimation of age between the range of 9 to 14 years. The hand – wrist area consists of various small bones that have a predictable and scheduled way of appearance of centres of ossification and union of the epiphysis from birth of the child to maturity. Hence, this area is one of the crucial parts to be examined for

the estimation of age[6]. The helpfulness of carpal bones in judgment of age has been shown in other studies also[7-10]. In our study, amongst males, 7-8 years, 8-9 years and 9-10 years age group, there were no males that showed the presence on pisiform bone. The bone did not appear in any of the children. Amongst 10-11 years of age group, the bone appeared amongst 44.44% of the subjects and was not seen in 55.56% of the subjects. Amongst 11-12 years of age group, the bone appeared amongst 28.57% of the subjects and was not seen in 71.43% of the subjects. Amongst 13- 14 years and 14-15 years of age, all the males showed presence of pisiform bone. Amongst females, 7-8 years and 8-9 years age group, there were no females that showed the presence on pisiform bone. The bone did not appear in any of the children. Amongst 9-10 years of age group, the bone appeared amongst 36.36% of the subjects and was not seen in 63.64% of the subjects. Amongst 10-11 years of age group, the bone appeared amongst 69.23% of the subjects and was not seen in 30.77% of the subjects. Amongst 11-12 years and 13-14 years of age group, the bone appeared amongst 50% of the subjects and was not seen in 50% of the subjects. Amongst 14-15 years of age, all the females showed presence of pisiform bone. Srivastav et al[11] did a radiographic study on pediatric subjects of Rajasthan, India between the birth to 12 years of age amongst both the sexes. It ossified at the age of 10 years in all the subjects. As studied by Patil et al[5] the minimum age of ossification of Pisiform was 8 years in both sexes, amongst the children of Vijaypur, India.

CONCLUSION

Ossification starts at 10 years of age in boys and 9 years of age in girls, according to our research. All instances exhibited fully ossified bone by the age of 13. This information may be used for forensic purposes and in judicial proceedings.

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