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Prevalence and Variations of Sesamoid Bones in the Hands of Patients Visiting Teaching Hospital of Kaski District: A Retrospective Study

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ABSTRACT

Introduction

Sesamoids are small, well-corticated, ovoid or nodular, may be bipartite or multipartite bones/ossifications found close to a bone or a joint that are subject to significant morphological variations. Although it is difficult to determine the symptomatic nature of these bones, imaging provides important diagnostic information. The objective of this study is to assess the prevalence and variations of sesamoid bone in hands of patients visiting a teaching hospital of Kaski district.

Methods

A hospital based retrospective cross-sectional study was conducted by analyzing X-rays of hand with Anteroposterior (AP) view, a total of 150 both male and female patients between the age group of 18 to 85 were imaged between August 1, 2022 to December 30, 2022 at Department of Radiology & Imaging (X-Ray Unit). Presence of sesamoid bone of hand was noted on 1st, 2nd, 3rd, 4th and 5th metacarpophalangeal joints (MCPj), and the 1st interphalangeal joint (IPj), separately. The data were analyzed for correlation using Pearson's correlation test. Ethical approval was taken from the Institutional Review Committee of Gandaki Medical College (Reference No. 159/079/080).

Results

The prevalence of sesamoid bone at 1st, 2nd, 3rd, 4th and 5th MCPj, and 1st IPj were 100 (100%), 60 (46%), 24(16%), 20(13.3%), 100(66.7%), and 114(76%) respectively. Variation was more prominent among females at 2nd, 3rdand 5th MCPj and 1st IPj, Also, SB variation was more prominent on left hand compared to right hand in 2nd, 4thand 5th MCPj and 1st IPj.

Conclusions

No significant correlation between the gender and laterality with presence or absence of SB in the hands were noted.

Keywords: age; gender; hand; sesamoid bone; x-ray.

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INTRODUCTION

Sesamoid Bones resembles the flat oval seed of Sesamum indicum, which functions to resist pressure, minimize friction and maintain the local circulation.[1,2] They are frequently noted over the meta-carpophalangeal joints (MCPj) of thumb, second finger, fifth finger, and interphalangeal joint (IPj).[3,4,5] There are sesamoid-related pathologies including fractures,[6] sesamoiditis,[7] and degeneration of sub-sesamoid joint.[8] Thus, it is clinically important to recognize these conditions because they are possibly misdiagnosed as other pathologies such as arthritis,[8] trigger thumb,[9] and chip fracture,[4] including trauma and degenerative disorders leading to incorrect treatments.[10] There is wide variation in the prevalence and distribution of SB of the hand in different ethnic groups.[11] Recent advancement is Technetium 99m-methyl diphosphonate (99mTc-MDP) which is used for diagnosed by focal increased uptake of the radioactive tracer.[12] The objective of this research was to assess the prevalence and variations of sesamoid bone in hands of patients visiting a teaching hospital so that descriptive diagnosis could be made.

METHODS

A retrospective cross-sectional study was designed for this study. Based on the study by Chen et al.[5] prevalence of 15.9%, judgment sampling (non-probability sampling) method was used and sample size was calculated to be 206,then adjusting the above sample size for finite population, using formula, sample size n=n/1+(n-1)/population, the sample size was calculated to be 150 and data were collected from the Department of Radiology & Imaging (X-Ray Unit) from August 1to December 30, 2022, Abnormal/fractured/sesamoid related pathologies such as sesamoiditis, degeneration of sub sesamoid joint x-ray was excluded from the study. Ethical approval was taken from the Institutional Review Committee of Gandaki Medical College. X-rays interpreted by the single radiologist were taken into the study to minimize the inter-examiner variability. The x-ray machine of GE (Model DX-500) was used with AGFA flat panel sensor (Model DR 14eG). The NX viewer computer was used for the data and the printer was of AGFA Company (Model DRYSTART 5302). X-rays interpreted as normal by the radiologist were analyzed to assess the prevalence and distribution of SB of hand. Prevalence of sesamoid bone was noted on AP

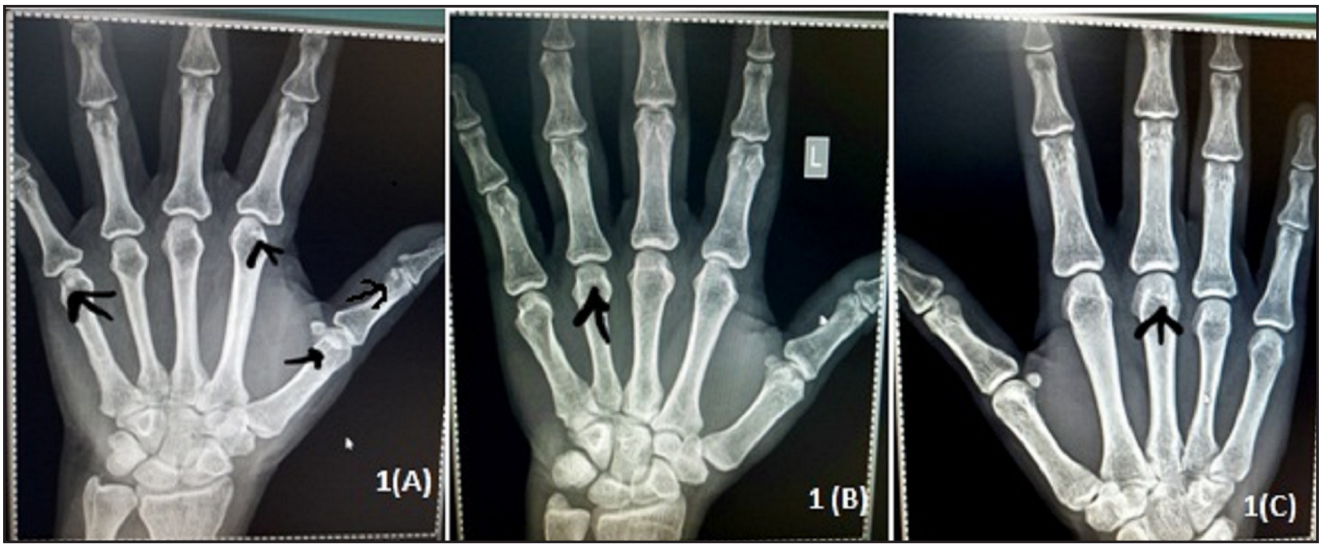

Figure. 1(A) PA X-ray film of left-hand showing SB in 1st, 2nd, 5th MCPj and 1st IPj. **1(B):** PA X-ray of left-hand showing SB in 4th MCPj. **1(C):** PA X-ray of right-hand showing bipartite SB in 3rd MCPj.

hand x-ray. The prevalence and variations of sesamoid bone of hand was noted separately at 1st, 2nd, 3rd, 4thand 5th MCPj and 1ST IPj. Figure 1 (A,B,C). All the data were recorded in the proforma for analysis in Microsoft Excel Sheet. Further statistical analysis was done using statistical package for the social sciences (SPSS) 20. The association of variables was tested by Pearson's rank correlation coefficient and p≤0.05 was considered significant, Confidence interval was kept at 95%.

RESULTS

A total of 150 patients between the age group of 18 to 85 years were enrolled in the study, Table 1, of which, 85 (56.67%) were male and 65(43.3%) were female. Majority of them, 51(34%) belonged to age group 18 to 28 years, 39(26%) patients belonged to age group 28 to 38 years, 20(13.3%) patients were from age group 38 to 48 years, 16(10.7%) patients from age group 48-58 years, 14(9.3%) patients belonged to age group 58 to 68 years, 8(5.3%) patients belonged to age group 68 to 78 years and 2(1.3%) patients were from age group 78 to 88 years. The Distribution and prevalence of sesamoid is shown in (Table 1).

There was no statistically significant correlation between the gender and laterality with presence or absence of sesamoid bones in the hands but the variation was more prominent in female (49.2%,16.9%,69.2%,83.1%) compared to Male (43.5%,15.3%, 64.7%, 70.6%) in compared to female at 2nd, 3rd, 5th MCPj and 1st IPj, whereas males had prominent SB on 4th MCPj 14.1% compared to female which was 12.3%. (Table 2).

Table 1. Distribution and prevalence of sesamoid bones in 150 hands.

Site	Frequency (%)
1st MCPj	150(100%)
2nd MCPj	69(46%)
3rd MCPj	24(16%)
4th MCPj	20(13.3%)
5th MCPj	100(66.7%)
1st IPj	114(76%)

Table 2. Difference between male and female subjects irrespective with laterality of hand.

Site	Male (n=85)	Female (n=65)	p-value
1st MCPj	85(100%)	65(100%)	N/A
2nd MCPj	37(43.5%)	32(49.2%)	0.488
3rd MCPj	13(15.3%)	11(16.9%)	0.787
4th MCPj	12(14.1%)	8(12.3%)	0.747
5th MCPj	55(64.7%)	45(69.2%)	0.56
1st IP j	60(70.6%)	54(83.1%)	0.076

Majority of x-rays of study population were right hands 80(53.3%) while 70(46.7%) of them were left hands, distribution of SB in 1st MCPj of right and left hand was found to be 100%, variation was more prominent in left hand (48.6%,14.3%,67.1%,81.4%) compared to right hand (43.8%,12.5%,66.3%,71.3%) in 2nd, 4thand 5th MCPj and 1st IPj, whereas right hand had prominent SB on 3rdMCPj 16.3% compared to right which was 15.7% (Table 3).

Table 3. Difference between right and left hands irrespective with gender.

Site	Right (n=80)	Left (n=70)	p-value
1st MCPj	80(100%)	70(100%)	N/A
2nd MCPj	35(43.8%)	34(48.6%)	0.554
3rd MCPj	13(16.3%)	11(15.7%)	0.929
4th MCPj	10(12.5%)	10(14.3%)	0.748
5th MCPj	53(66.3%)	47(67.1%)	0.908
1st IPj	57(71.3%)	57(81.4%)	0.145

MCP: Metacarpophalangeal joint; IPj: Interphalangeal joint; 1st: Thumb; 2nd: Index finger; 3rd: Middle finger; 4th: Ring finger; 5th: Little finger; n: number of samples.

DISCUSSION

Several radiographic studies have documented the prevalence and distribution of SB of the

hand. Most of the studies have concluded that SB in 1st MCPj were constant in all cases. The two SB in the 1st MCP joint ossifies early at around 10 years of age. Kose et al.[11] conducted study by taking 923 hand radiographs and concluded that two SB (ulnar and radial) were always present at the 1st MCPj (100%). Similarly, Chen et al.[5]conducted study by taking 850 adult hand radiographs and reported the prevalence of SB at 1st MCPj in all the cases (100%). Ting et al.[13] conducted study by taking total of 307 hand radiographs and he also reported that SB at the 1st MCPj were at the rate of 100% which is similar to above studies. The prevalence of SB at 1st MCPj was at the rate of 100% in our study which is similar to above other studies. In the study conducted by Kose et al.[11] he found that there were 36.6% of population with the presence of SB at 2nd MCPj of hand which is lower than the prevalence rate of SB at 2nd MCPj in this study as we found 46% prevalence rate of SB at 2nd MCPj. Likewise, Chen et al.[5] study reported 60.8% prevalence rate of SB in 2nd MCPj which can be considered as higher rate than my study. Also, Ting et al.[13] reported 59% prevalence rate of SB at 2nd MCPj which was close to Chen et al.[5] study and higher rate than the present study. Kose et al.[11] reported the prevalence of SB at 3rd MCPj of hand in only 1.3% of their study population and considered SB at 3rd MCPj as rare. Chen et al.[5] and Ting et al.[13] studies reported the prevalence of SB at 3rd MCPj of hand at the rate of 3.9% and 2.93% respectively. Whereas, in our study we found 16% prevalence rate of SB at 3rd MCPj of hand which was found to be different from the conclusion of above-mentioned other studies. According to study conducted by Kose et al.[11] he concluded that the prevalence of sesamoid bone at 4th MCPj was rare 0.9%. Likewise, Ting et al.[13] reported 0% prevalence rate of sesamoid bone at 4th MCPj of hand. Furthermore, Chen et al.[5] reported 1.3% prevalence rate at 4th MCPj. In this study, it was found that 13.3% prevalence rate of sesamoid bone at 4th MCPj which is higher rate than the conclusion of above-mentioned studies. Kose et al.[11] reported 53.2% prevalence rate of sesamoid bone at 5th MCPj of hand which is low prevalence rate as compared to the current study 66.7%. Chen et al.[5] reported 59.1% prevalence rate of sesamoid bone at 5th MCPj which is also low than this study. Likewise, Ting et al.[13] reported 47.6% prevalence rate of SB at 5th MCPj which is also lower than the conclusion of this study. Kose et al.[11] reported that the prevalence rate of SB at 1st IPj was 21.3%. Similarly, Chen et al.[5] and Ting et al.[13] reported 15.5% and 28% prevalence rate of sesamoid bone at 1st IPj respectively. Furthermore, Sun et al.[14] reported 67% prevalence rate of SB at 1st IPj of hand. Whereas, the prevalence of SB at 1st IPj was at the rate of 76% which is different from the conclusion of other studies. Kose et al.[11] and Ting et al.[13] studies statistically examined the correlation between the gender and laterality with presence and absence of SB in the hands. Kose et al.[11] reported sexual differences in 2nd and 3rd MCPj SB, both with higher prevalence in female subjects. Ting et al.[13] reported that sesamoid bones were statistically more common in 1st IPj in female subjects 0.006%. In this study, there was no difference between gender and laterality with presence and absence of SB in the hands in any localization. This study may help to establish the reference value of distribution and variations of SB in hand in our set up which will be helpful to diagnose various pathological conditions. The reference values obtained in our set up will be compared with those of other available studies in the literature. Despite the adequate sample size, it was still small for generalization of the study result as it may not be representative of the varying ethnic and racial groups in our country. Observation of the presence of SB cab be subjected to observation error, and this could be improved with CT or MRI scans. In addition, the data may not be considered true as the patients were referred having certain clinical condition which warrants

the need of the hand CT or MRI scan. Therefore, further studies for prevalence and distribution of SB in hand with large sample size using other imaging modalities as MRI would add more accuracy in results. A symmetry pattern of SB of the hand is unknown so, further studies focusing on lacking issues will be beneficial to improve the knowledge about the SB of the hand.

CONCLUSIONS

The prevalence of sesamoid bones of the hand in 1st, 2nd, 3rd, 4thand 5th MCPj and 1st IPj was found to be 100%, 46%, 16%, 13.3%, 66.7% and 76% respectively. Variation was more prominent in females and was found to be more in left hand compared to right hand irrespective of gender. There was no statistically significant correlation between the gender and laterality with presence or absence of SB in the hands.

Conflict of interest: None

Source of Finding: None

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