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SUPRAORBITAL FORAMEN - MORPHOMETRIC STUDY AND CLINICAL IMPLICATIONS IN ADULT INDIAN SKULLS

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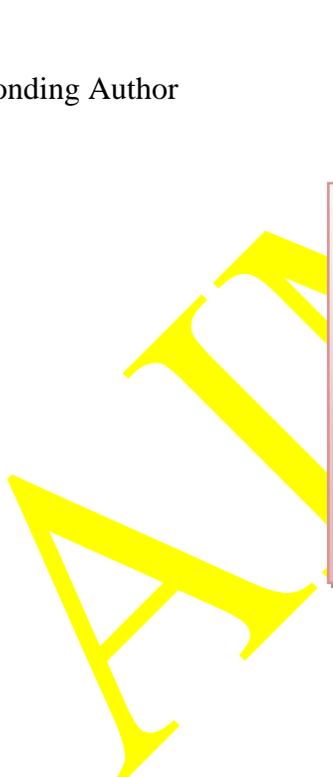
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ABSTRACT

Introduction: Supraorbital foramen is present at the junction of lateral two-third and medial one third of supraorbital margin. According to previous studies^[1,2] in 25% of cases supraorbital notch is converted into foramen by ossification of periosteal ligament bridging it. Supraorbital nerve and vessels are important structures passing through this notch. Supraorbital nerve is the important cutaneous nerve which passes through the supraorbital foramen during procedures, as absolute but the supraorbital block an imaginary straight line is drawn vertically from the pupil up towards the supraorbital margin.^[4] No anatomical landmark is considered for locating exact position of SOF, thus increasing the rate of failure of the block.^[5]

Methods: A total of 100 dry skulls (60 male and 40 female) were collected and observed for the study. Various parameters in the sagittal and transverse planes were noted from supraorbital foramen on both sides, together with its vertical and horizontal dimensions. In addition, the location of supraorbital foramen with respect to midline and frontozygomatic suture were noted. **Results:** The study of 100 adult skulls revealed that the SON (71% on right and 70% on left) was found more frequently than the SOF (29% on right and 30% on left). The distance between centre of SOF/SON and midline was found to be statistically significant on right and left sides. **Conclusion:** This study makes possible the identification of exact position of supraorbital foramen and also discuss its racial variation.

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Keywords: Morphometry, Supraorbital foramen, Supraorbital

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INTRODUCTION

Supraorbital foramen (SOF) is present at the junction of lateral two-third and medial one third of supraorbital margin. According to previous studies^[1,2] in 25% of cases supraorbital notch is converted into foramen by ossification of periosteal ligament bridging it. Supraorbital nerve and vessels are important structures passing through this notch. Supraorbital nerve is the important cutaneous nerve which passes through the supraorbital foramen during procedures, as absolute but the supraorbital block an imaginary straight line is drawn vertically from the pupil up towards the supraorbital margin.^[4] No anatomical landmark is considered for locating exact position of SOF, thus increasing the rate of failure of the block.^[5]

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MATERIALS AND METHODS

A total of 100 dry skulls (60 male and 40 female) collected from medical and dental colleges of Teerthanker Mahaveer University, India, were used for the study. We excluded skulls of children and skulls with damaged orbit and nasal bone.

All parameters were measured in the following planes:

Sagittal plane: A plane parallel to the mid-sagittal plane and passing through the center of SOF was adopted for taking various vertical dimensions.

Transverse plane: A plane passing through the center of SOF and perpendicular to the above-mentioned sagittal plane was used for measuring transverse dimensions.

After aligning the skull in Frankfurt horizontal plane (using rulers and manipulating or adding sand bags as required), following parameters were measured to evaluate the location of SOF on both sides of skull. The measurements related to SOF were taken with double-tipped compass and then transferred to calipers (least count 0.01 mm) to measure the distances. The dimensions were taken three times by the same person and mean was taken, thus increasing the accuracy of the data.

From the above measurements, mean and standard deviation (mean±SD), median, range and mode were calculated. Data analysis was done using Statistical Package for Social Sciences (SPSS) 19 version. Results were statistically significant.

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RESULTS

Table 1: Incidence of various types of combinations of supraorbital notches/formina.

| Combinations in the same skull | | Number of Skulls (n) | Percentage (%) |
|--------------------------------|------|----------------------|----------------|
| Right | Left | | |
| N | N | 62 | 62 |
| F | F | 21 | 21 |
| N | F | 9 | 9 |
| F | N | 8 | 8 |

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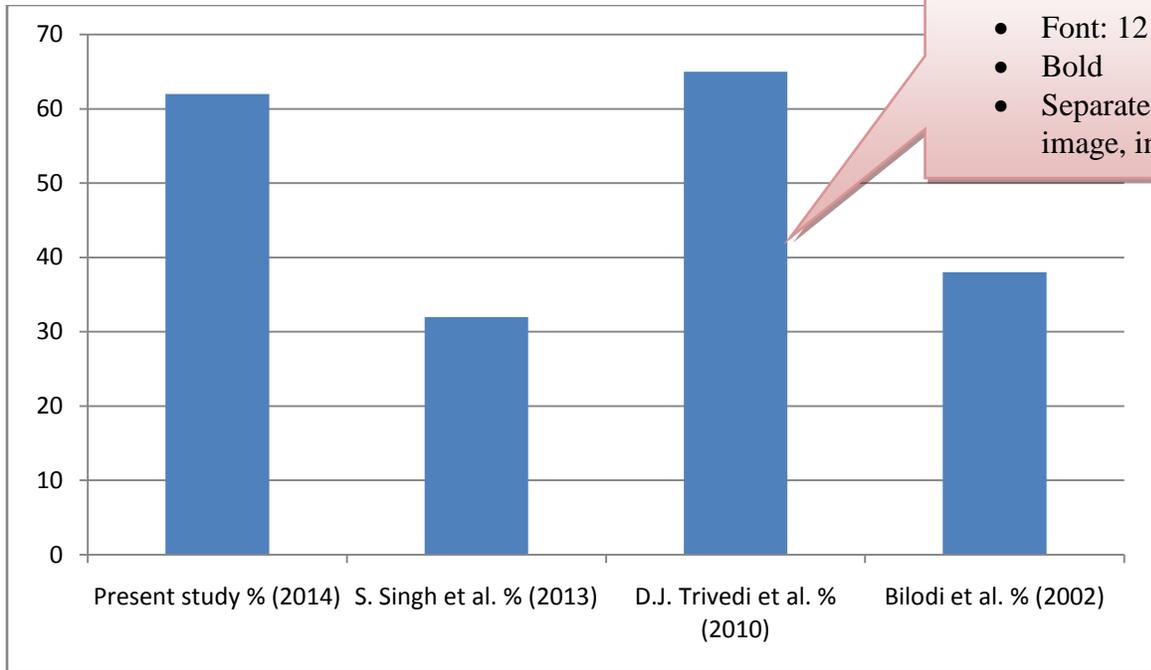


Fig. 1: Comparison of types of combination between present study and other studies.



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Fig. 2: Line a represents the distance between SOF and fronto-zygomatic suture.

The study of 100 adult skulls revealed that the SON (71% on right and 70% on left) was found more frequently than the SOF (29% on right and 30% on left). Of all the cases, 62% had bilateral SON (Figure 3), while 21% had bilateral SOF (Figure 4). 17% of skulls showed foramen on one side and notch on the other side (Table 1).

The dimensions of SOF and its linear relationship with surrounding anatomical landmarks on the skull are summarized in (Table 2). The mean vertical and horizontal diameters of SOF on the right side are 2.75 ± 0.55 and 4.62 ± 0.83 mm, while those on the left side are 2.35 ± 0.23 and 4.31 ± 0.51 mm, respectively (Table 2). The mean distance between the right and left SON/SOF and the midline; mean distance between right and left SON/SOF and fronto-zygomatic sutures are shown in Table 2. When these parameters were compared between the right and left sides, the distance between centre of SOF/SON and midline was found to be statistically significant.

DISCUSSION

In our study we observed the incidence of various combinations of SOF/SON found in Indian skulls and compared our findings with previous studies in (Table 3). Our findings emphasize the ethnic variations in the occurrence of SOF/SON as supported by other studies.^[6,7] We consider that the diversity could be a result of factors such as age, sex, and race as pointed by other studies.

We measured the shortest distance between the SOF and midline which was found to be 21.94 ± 0.32 and 20.11 ± 0.73 mm on right and left sides ($p < 0.001$) respectively. It is interesting to note that in one of the studies conducted on North Indian skulls, the average distance between the SOF/SON and the midline was 24 mm, which is slightly higher than the current observation. However, a much longer (29 mm) distance between the SOF and midline was observed in a study conducted on a Korean population.^[8]

CONCLUSION

This study helps determine the precise location of SOF in relation to various anatomical structures, particularly midline and fronto-zygomatic suture. The landmarks described could be identified and effectively applied with success in various clinical scenarios, thereby decreasing the risk of failures and complications.

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