



**Metrical and non-metrical variations of supraorbital notch/foreman in Sudanese and Indian population**

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**Abstract**

**Background:** The supraorbital foramen is a bony opening that lies directly under the eyebrow, sometimes this foramen is incompletely known as the supraorbital notch, and they are transmitting nerves and vessels. Previous studies showed a variation in their position and shape, which are very important for surgeons.

**Objectives:** This study was aimed to evaluate the metrical and non-metrical of supraorbital notch/foreman in the Sudanese and Indian population.

**Material and methods:** 74 dry skulls were taken in India from medical colleges, and 67 dry skulls were taken in Sudan from medical colleges. Metric and non-metric measurements were applied for each skull. The metric (in millimeters) was the distance of the supraorbital notch/foreman from the midline by using a Vernier caliper, while non-metric by observation.

**Results:** The metric mean for Sudanese was 29.14, 31.52 on the right and left supraorbital notch/foreman respectively, while in Indian was 26.52, 28.23 on right and left supraorbital notch/foreman respectively. The non-metric for Sudanese on the right side was 16.4%, 43.3%, 40.3% for the foramen, notch, incomplete foramen respectively, and on the left, it's 20.9%,

41.8%, 37.3% was the foramen, notch, and incomplete foramen respectively, while for Indian right site was 24.32%, 35.14%, 40.54% as foramen, notch, and incomplete foramen respectively, and on the left side was 18.92%, 39.19%, and 41.89% for the foramen, notch, and incomplete foramen respectively.

**Conclusion:** The metric and non-metric of supraorbital foramen/notch of Sudanese and Indian populations are variants, and these variations make significant for clinicians to identify the locations of this foramen/notch and their nerve and vessels that passing though among the different races/ethnic human groups.

**Keywords:** metric, non-metric, supraorbital notch, foramen, Sudanese, Indian

**Introduction**

In 1878, an anthropology document report that there is a difference in craniofacial features as well as in body characteristics among the different races/ethnic groups. Differences in craniofacial anatomy among racial/ethnic groups is documented for a variety of structures throughout the face and skull through direct radiographical measurements or in cephalometrics. Craniofacial anatomy among racial groups has been documented in a variety of structures but the face and

skull regions are a particularly defining region of variability between different racial/ethnic groups. As well as the general shape of the skull vault, reflect climatic adaptation in at least some human groups, while most other measurements reflect neutral. These issues explicitly addressed in our recent preliminary study of the relationship between cranial anatomy and population history/climate [1].

In this study, we compared between Indian and Sudanese adult peoples by measured the diameter of the distance of the supraorbital notch/foramen from the midline, however, we observe where its foramen or notch or incomplete foramen, this observation is important for surgeons during operations, and to seeing if these diameters are different in those has a different geographical and climate areas. These goals have been achieved through the analysis of the collection of dry skulls from the medical schools in Sudan and India.

The supraorbital notch or foramen is located in front of the skull close to the upper margin of the bony orbit and it transmits the supraorbital nerve and vessels [2, 3].

The identification of the supraorbital notch or foramen is assisting during anterior orbital approach for control of supraorbital nerve block proved to be better operation as far as the patient's scares about the injections are concerned, and it's also proved to be less painful [4]. The clarifications of the anatomy of the anterior aspect of the skull have a clinical significance to decrease the damage of the supraorbital neurovascular bundle during anterior orbital surgical operations [5].

### Material and methods

Unknown sex adult's age between 45-65 years of samples of skulls were measured and examined in this study. Samples were taken randomly (simple random SRS). Moore and McCabe report that A simple random

sample (SRS) of size n consists of n individuals from the population chosen in such a way that every set of n individuals has an equal chance to be the sample selected [6]. 141 sound dry skulls (74 from India + 67 from Sudan) were collected from museums of medical colleges in these different countries. The Indian skull samples were taken from Indian medical college, (Nims medical college, Mahatma Gandhi medical college, and Unani medical colleges and the national institute of Ayurveda Jaipur, (Rajasthan). The Sudanese skull samples were taken from Kassala medical college, Dongle medical college and Read sea medical colleges. Samples were teaching collections of a similar population. Each skull was marked to avoid repetition. The diameter distances of supraorbital notch/foramen from midline were measured in millimeters for each skull by used a Vernier Caliper. The non-metric observation was carried out for supraorbital notch/foramen to each skull. Data analysis was applied by using the Statistical Package for the Social Sciences (SPSS) program. For each reading, the mean of theses reading was recorded.

### Result

Samples in this study were taken from the different geographical areas of Sudan and India, thus observing the race\ethnic group variations, as well as to demonstrate the location and shape of supraorbital notch/foramen.

The metric measurement in Sudanese showed that the mean of the distance analysis (in millimeters) of the supraorbital\notch\foramen from the midline are 29.14, 31.52 for the right and left supraorbital notch/foramen respectively, while the same parameters in Indian are 26.52, 28.23 for the right and left supraorbital notch/foramen respectively (Tables 1, 2).

The non-metric observations on that samples that were taken from Sudan were found that it's a foramen in {11} 16.4%, a notch in {27} 43.3%, and its incomplete foramen in {29} 40.3% this on the right site, and the same parameters were taken on the left side and it was found as follow; foramen {14} 20.9%, notch in {28} 41.8% and incomplete foramen in {25} 37.3% were these were out of the total 67 samples (Tables 3, 4) (Figures 1, 3). The same parameters were taken in Indian samples we reported the following result on the right site {18} 24.32% were foramen, {26} 35.14% were notch and {30} 40.54% were incomplete foramen, while on the left side it was {14} 18.92% was foramen, {29} 39.19% were notch and {31} 41.89% were incomplete foramen from the total 74 samples, (Tables 3, 4) (Figures 2, 4). Both samples metric and non-metric that taken from Sudan and those from India were showed different rang in measurements, locations of supraorbital notch/foramen. The foramen shape was less in Indian samples than that was recorded in Sudan samples, while notch shape was approximately the same in both populations of the study; moreover, the incomplete foramen shape was approximately the same on both samples. □

Table 1: The statistical analysis of the distance (in millimeters) in right supraorbital notch\foramen (R.S) and left supraorbital notch\foramen (L.S) from the midline for Sudanese

Analysis	R.S	L.S	Total samples
Mean	29.14	31.52	67
Standard deviation	1.433	1.812	

Table 2: The statistical analysis of the distance (in millimeters) in right supraorbital notch\foramen (R.S) and left supraorbital notch\foramen (L.S) from the midline for Indian

Analysis	R.S	L.S	Total samples
Mean	26.52	28.23	74
Standard deviation	4.729	3.999	

Table 3: Shows Observation of the left foramen\notch in Indian

Observation of the left supraorbital foramen\notch in Indian			Total
Foramen	Notch	Incomplete foramen	#
14	29	31	74
18.92%	39.19%	41.89%	100%

Table 4: Shows Observation of the right foramen\notch in Indian

Observation of the right supraorbital foramen\notch in Indian			Total
Foramen	Notch	Incomplete foramen	#
18	26	30	74
24.32%	35.14%	40.54%	100%

Table 5: Shows Observation of the left foramen\notch in Sudanese

Observation of the left foramen\notch in Sudanese			Total
Foramen	Notch	Incomplete foramen	#
14	28	25	67
20.9%	41.8%	37.3%	100%

Table 6: Shows Observation of the right foramen\notch in Sudanese

Observation Of The Right supraorbital Foramen\notch In Sudanese			Total
Foramen	Notch	Incomplete Foramen	#
11	27	29	67
16.4%	43.3%	40.3%	100%

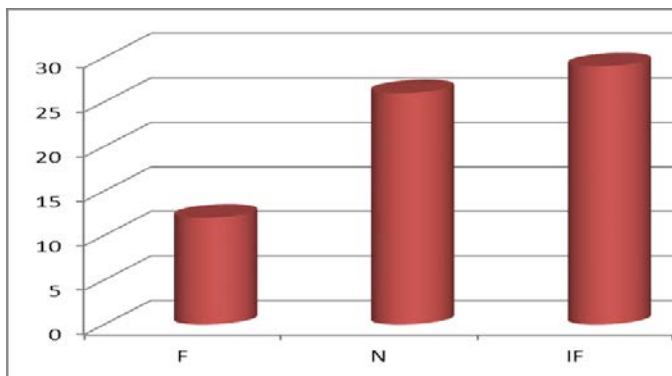


Figure 1: (Non-metrical) observations where its notch (N)\foramen (F) or incomplete foramen (IF), in Sudanese (RIGHT midline)

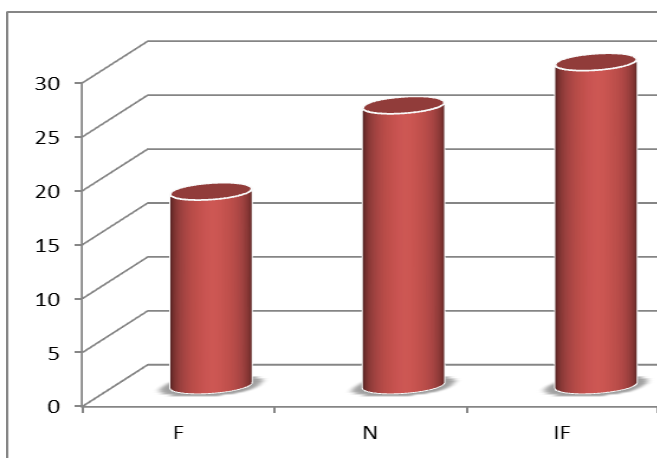


Figure 2: (Non-metrical) observations where its notch\foramen or incomplete foramen and the from the right midline in Indian.

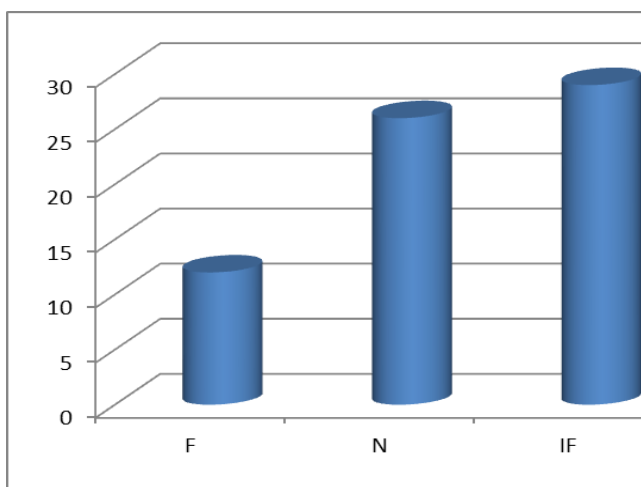


Figure 3: (Non-metrical) observations where its notch (N)\foramen (F) Or incomplete foramen (IF), in Sudanese (LEFT midline)

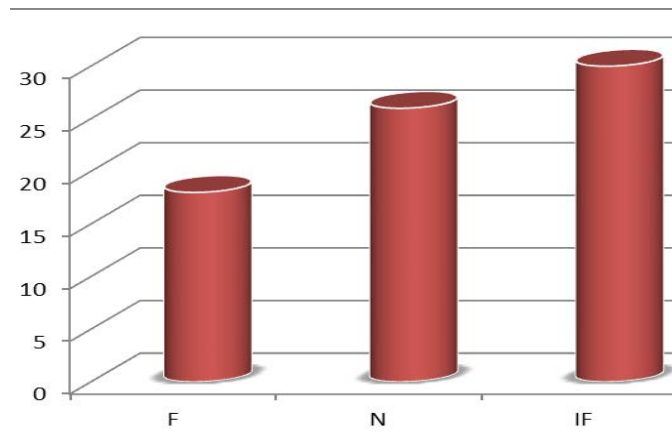


Figure 4: (Non-metrical) observations where its notch\foramen Or incomplete foramen and the from the left midline. In Indian

### Discussion

The supraorbital foramen or notch transmits supraorbital neurovascular bundles, and the identification of these nerves and vessels is important for surgeons during nerve block or to establish the positions of supraorbital vessels during the maxillofacial surgeries [4, 5]. In our study, we identified the metric and non-metric of the supraorbital notch/foramen and this information is very useful for the clinician to do their procedures. The anatomical variations of supraorbital notch/foramen are variable due to the distinct and geographical distributions of the population [11]. The samples in this study were taken from a different geographical area (India and Sudan), thus to observe the race\ethnic group variations and we founded that the metric measurements showed a significant difference between Indian and Sudanese, and also we observed on non-metrical measurements concerning the supraorbital\foramen\notch on the right and left where it's foramen, notch or incomplete foramen both samples that were taken from Sudan and those from India.

In the previous study, one hundred dry human skulls were collected from north India and the metric mean of

the distances of supraorbital notch or foramen from midline was 21.66, 21.51 on the right and left respectively, while the non-metric observation demonstrated that its notch in 43.8%, foramen in 17.7% and depression (incomplete foramen) in 13.5%<sup>[7]</sup>. Although, 106 Thai skulls revealed that the supraorbital notch (66.5%) was found more frequently than the supraorbital foramen (33.5%)<sup>[8]</sup>. The morphology and morphometric of supraorbital notch/foramen were identified on 83 dry adult human skulls were collected from the Medical College, Manipal, and they founded that the mean of distance for supraorbital notch/foramen from the midline was 22.24 and on the right side, 17.77% accessory supraorbital foramina were seen medial, 62.2% were observed lateral and 28.88% were found superior to the main supraorbital notch/foramen, while on the left side, 20% accessory supraorbital foramina were observed medial, 40% were located lateral and 30% were found superior to the main supraorbital notch/foramen<sup>[9]</sup>. In our study, we did not found accessory supraorbital notch or foramen as decided in the Manipal area populations. A total of 65 Indian dry skulls were investigated to the anatomy of supraorbital foramen or notch, among them and founded 52.3% had a notch, and 31.2% had foramina<sup>[10]</sup>. All of these previous studies are correlated to our findings and showed significant variations of locations and shape of supraorbital notch/foramen for different geographical human groups.

### Conclusion

The supraorbital notch/foramen is variables in their locations, shapes according to the geographical areas, as in our findings that there was a significant difference between the Indian and Sudanese populations. This information is very important for surgical doctors to

clarifications the positions of supraorbital nerve and vessels during their surgical entrances.

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