

FRONTAL SINUS ESTIMATION: A RELIABLE TOOL FOR SEXUAL DIMORPHISM?

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INTRODUCTION *Gender determination* is pivotal in establishing the biological profile of human remains. Secondary to the pelvis, the *skull* is one of the most important indicators for it. According to the literature, **various anatomical features** in the skull, such as brow ridge shape and nostril size, have been used. However, in cases of fracture and deformation, these may be futile. Owing to the **stability and considerably greater resistance** to external factors such as trauma and fractures, the **radiological assessment of frontal sinus** could be a useful indicator for sexual dimorphism.

AIM To establish the reliability of **morphometric measurements of the frontal sinus for sex determination** in an Indian subpopulation.

MATERIALS AND METHOD

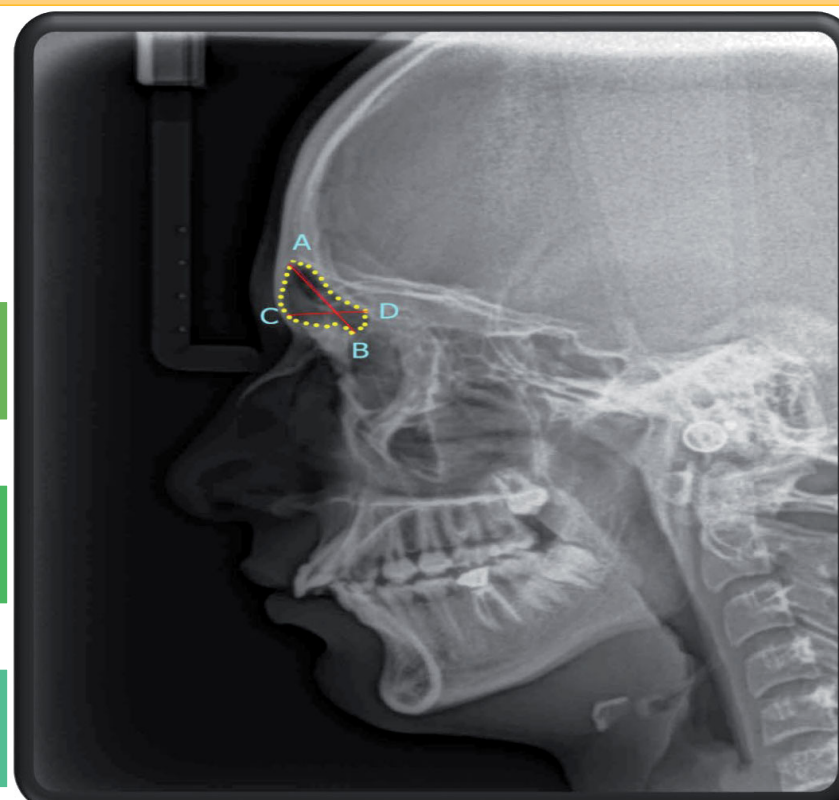
Lateral cephalograms of **120 patients > 20 yrs** were retrieved from our records following the inclusion and exclusion criteria.#

All the lateral cephalograms were obtained in accordance with the standard protocol.

The peripheral border of the frontal sinus was traced using **Adobe Photoshop Software**.

The maximum height (AB) and width (CD) were used to calculate the **frontal sinus index (AB/CD)**. The frontal sinus area and perimeter were also recorded.

The obtained data was subjected to **statistical analysis** using SPSS 19 statistical software.



Inclusion criteria:#

- ✓Patients >20 years were considered.
- ✓Lateral cephalograms were obtained in accordance with the standard protocol.

Exclusion criteria:#

- ✓Bilateral or unilateral lack of frontal sinus
- ✓Inflammation of frontal sinus
- ✓Frontal sinus tumour
- ✓Distortion of frontal sinus outline due to trauma
- ✓Frontal sinus outline was unclear.

RESULTS

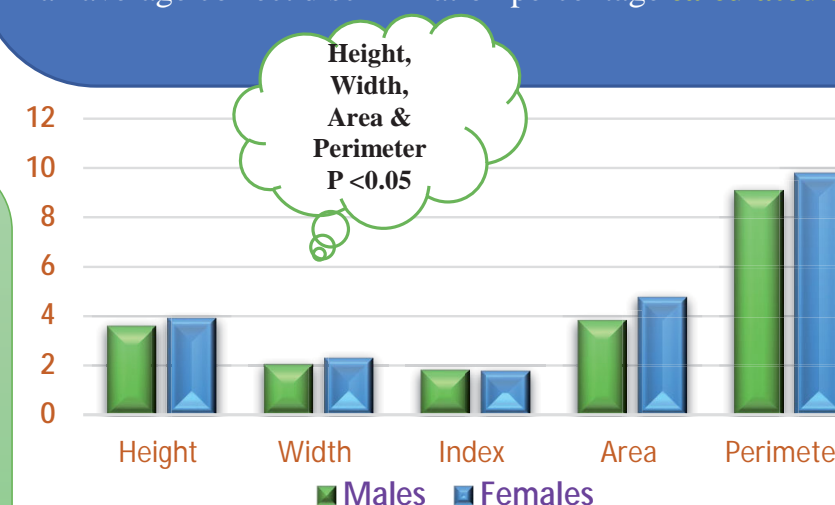
✓Normality of data was tested using the Shapiro Wilk test. The **data was normally distributed**, so the Mann Whitney test was applied to the **frontal sinus height, width, index, area, and perimeter, which were all statistically significant (<0.05)** except index.

✓A logistic regression was applied to obtain discriminant function analysis. After putting the values of frontal sinus area, index, and perimeter, a discriminant function equation was derived.

$$D = 5.604 - 0.257(\text{AREA}) + 0.175(\text{PERIMETER}) - 0.92(\text{INDEX})$$

According to the discrimination criteria, a calculated D value higher than the reference value ($D > 0.5$) indicated male, whereas a calculated D value less than reference value ($D < 0.5$) indicated female gender.

✓This accurately discriminated our data as 66.7% females and 63.3% males, with an average correct discrimination percentage **calculated to be 65%**.



Gender	% correct
Males	63.3%
Females	66.7%
Overall	65%

CONCLUSION The goal of our study was to develop a **low-cost system for sex determination** in the Indian scenario so that it is more suited to the monetary constraints that often plague the disaster management bodies. Our study revealed a **65% accuracy rate** in gender determination using frontal sinus height, width, index, area and perimeter. Though the accuracy rate was not found to be very high, yet it being a pilot study, we do suggest that **collaborative use of different parameters like area, index and perimeter with a larger sample size** might yield more accurate results.

REFERENCES

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DISCUSSION

Author Name	Evaluated Parameters	Type of Radiograph	Software used	% Accuracy
1.Luo H et al (2018) ¹	Area, Index	Lateral cephalogram	Nemo Ceph NX	76.6
2.Belaldavar et al (2014) ²	Area, height, width	AP radiograph	Adobe Photoshop	64.6
3.Kiran et al (2014) ³	Index	Lateral cephalogram	SIDEXIS XG	67.6
4.Goyal et al (2013) ⁴	Scallops, septa, presence of sinus	PNS radiograph	Manual	60
Present study/2021	Height, width, index, area & perimeter	Lateral cephalogram	Adobe Photoshop	65