

## A STUDY OF THE PALATINE FORAMEN IN DRY HUMAN SKULLS IN SOUTH-SOUTH NIGERIA

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### ABSTRACT

*A study of the palatine foramen in dry human skulls in south-south Nigeria was carried out to investigate the size, asymmetry and variations in the foramina. One hundred and fifty dry human skulls of Nigerians were studied. They all had full eruption of the upper third molar without missing any teeth. The parameters studied were greater palatine foramen and lesser palatine foramen. Results revealed that the mean distance of greater palatine foramen to the mid-line was  $15.04 \pm 2.1$ mm on the right side and  $14.3 \pm 1.5$ mm on the left side. The mean distance of the greater palatine foramen from the incisive fossa was  $41.2 \pm 4.8$ mm on the right side and  $41.1 \pm 5.0$ mm on the left side. The mean distance of greater palatine foramen from the posterior border of the hard palate was  $4.98 \pm 1.2$ mm on the right side and  $5.1 \pm 1.53$ mm on the left side. The most common location of greater palatine foramen was opposite the 3<sup>rd</sup> maxillary molar (75.30 %) and less common between the 2<sup>nd</sup> and 3<sup>rd</sup> molar (33%). The mean of the lesser foramen was  $1.3 \pm 0.51$ mm on the right side and  $1.19 \pm 0.4$ mm on the left side. There was no significant difference between the right and left sides of the palatine foramen. This observation may be helpful in the peripheral block of maxillary nerve through the greater palatine foramen.*

Key words: Palatine foramen, Human skulls, South-South Nigeria.

### INTRODUCTION

The palatine foramen consists of the greater palatine foramen (GPF) and the lesser palatine foramen (LPF). On both sides of the posterolateral angle of the hard palate is the greater palatine foramen for the transmission of the descending palatine vessels and anterior palatine nerves, and running forward and medially from it, there is a groove, for these same vessels and nerve (Moore, 2006). The lesser palatine foramen is any of the smaller opening on the posterolateral aspect of the hard palate immediately behind the greater palatine foramen. It transmits the smaller palatine nerves and vessels. The greater palatine foramen (GPF) is related to the upper 3<sup>rd</sup> molar tooth in most of

the skulls. The shape of the foramen is elongated anteroposteriorly; however an unusually crescent shaped foramen is rare (Ajmani, 1994). The palatine foramen has been described as being near the palatal border (Williams *et al.*, 1995), the GPF was found to lie 15mm from the palatal midline and 1.9mm anterior to the posterior border of the hard palate in East Indians (Westmoreland and Blanton, 1982). In Negroid skulls, the location of the foramen was 10–16 mm anteromedial to the pterygoid hamulus and was usually distal to the third maxillary molar on its midpalatal aspect (Langenegger *et al.*, 1983). In a study on Kenyan skulls, 76% of cases showed the location of GPF opposite the third maxillary

molar. In Chinese skulls, the GPF was commonly located between the second and third maxillary molars. The foramen was located at a distance of 4.11mm from the posterior border of the hard palate and 16mm from the mid-sagittal plane (Ajmani, 1994).

The location of the GPF from the posterior border of the hard palate in Indian skulls was 3.7 mm, and in Nigerian skulls 3.5 mm, and this is fairly consistent. The foramen was commonly located medial to the third maxillary molar. (Jaffar and Hamadh, 2003). The mean distance from the sagittal plane to the greater palatine foramen on the right side was  $1.54 \pm 0.021$ cm in Nigerian skulls and on the left  $1.54 \pm 0.021$  cm (Ajmani, 2004). According to Didia *et al.*, (2009) the most common location of the GPF was between the maxillary second and third molars (55.26%) and it less commonly opens opposite the second maxillary molar (13.16%).

A study of 132 adult, dried, unsexed Indian skulls from the west coastal area of Southern India was carried out by Saralaya and Nayak (2007). All the skulls studied were normal and free of any pathological changes, with fully erupted third molars. The statistical analysis indicated there was no significant difference in the measurement between the right and left side with regards to the distance of greater palatine foramen (GPF) to the midline, GPF to the incisive fossa, and GPF to the posterior border of the hard palate ( $p < 0.01$ ). The relationship of the GPF to the maxillary molar was variable. In 74.6% of skulls the GPF was located opposite the third maxillary molars, whereas 24.2% showed the GPF between the second and third molars. In 0.4% of the skulls, the GPF was located opposite the second molars, and in 0.8% of skulls, the GPF were situated beyond the third molar. The number of lesser palatine foramen (LPF) on both sides was not symmetrical and varied from one to four. In two skulls, the LPF on the left side was double. Evaluation of the relative position of the greater palatine foramen (GPF) is for precise injection

of local anaesthetic, for optimal pain control in maxillofacial and dental surgeries.

This study is aimed at determining the relative distance, direction and variations of palatine foramen to the midline.

## MATERIALS AND METHODS

This study was carried out using a total number of one hundred and fifty dry adult human male skulls which were gotten from the laboratories of the Department of Human Anatomy University of Benin, Department of Human Anatomy, Abia State University, Department of Human Anatomy, Delta State University and Department of Human Anatomy, University of Port Harcourt. All skulls studied were normal and free of any pathological changes, with fully erupted third molars. All the distances were measured with a digital vernier caliper to the nearest millimeter.

Each skull was examined for the following:

- (i) Shortest perpendicular distance of the GPF to the midline
- (ii) Distance of the GPF from the incisive fossa.
- (iii) Distance of the GPF from the posterior border of hard palate

Data was analyzed using T- test.

## RESULTS

The result of this study is as presented in table 1, showing the mean and standard deviation (SD) of the Right and Left Distances of the Greater Palatine Foramen (GPF) from the Midline, the Incisive Fossa, Posterior Border of the Hard Palate and Number of Lesser Palatine Foramina. The mean of the shortest perpendicular distance of GPF to the midline and number of lesser palatine foramen of the right was greater than that of the left. While for the distance of the GPF from the posterior border of the hard palate, the mean for right was greater than that of the Left. Table 2, shows the relationship of GPF to the maxillary molars.

**Table 1:** Table showing the mean and standard deviation (SD) of the Right and Left Distances of the Greater Palatine Foramen (GPF) from the Midline, the Incisive Fossa, Posterior Border of the Hard Palate and Number of Lesser Palatine Foramina.

Measured Parameters	Mean± SD	
	Right (mm)	Left (mm)
Shortest perpendicular distance of GPF to the midline	15.04± 2.1	14.3± 1.5
Distance of the GPF from the incisive fossa	41.2± 4.8	41.1± 5.0
Distance of the GPF from the posterior border of the hard palate	4.98± 1.2	5.1 ± 5.13
Number of lesser palatine foramen (LPF)	1.3 ± 0.51	1.19 ± 0.4

GPF = Greater palatine foramen.

**Table 2:** Table showing the relation of GPF to the maxillary molars.

Relation to the maxillary molars	Right side n (%)	Left side n (%)	Total n (%)
Second molar	2 (1.3)	1 (0.7)	3 (2)
Between second and third molars	35 (23.3)	33 (22)	88 (22.7)
Third molar	111 (74)	113 (75.3)	224 (74.6)
Behind third molar	2 (1.3)	3 (2)	5 (1.65)
Total	150 (100)	150 (100)	300 (100)

GPF= Greater palatine foramen.

## DISCUSSION

The present study has indicated that the location of greater palatine foramen (GPF) was more variable. Ajmani (1994) observed that the location of the GPF was opposite the 3rd maxillary molars in 64% of adult Indian skulls while in this study, we observed that the location of the GPF was opposite the 3rd maxillary molars in 74.6% of the skulls and the location of GPF opposite the second maxillary molar in only 2% of the skulls, beyond the third maxillary molar it was 1.65% and between the second and the third maxillary molars is 22.7%. Westmoreland and Blanton (1982) found a mean distance of 0.19cm from the posterior border of the hard palate while on both sides, Ajmani (1994) found this distance to be 3.7mm in Indian skulls. Most of the skulls in this present study showed flat palatal vaults 97.33% (n=146) whereas 2.67% (n=4) showed arched palate. The palatal growth takes place in length in the sagittal plane anterior to the GPF. The total number of lesser palatine foramen (LPF) studied was three hundred and seventy one (371). Bilateral symmetry in the number of LPF was seen in 115 which represents 76.67% of the skulls studied. In 2 skulls the LPF was absent on the left side representing (1.33%) while in 1 skull the LPF was absent on the right side representing (0.67%). In 32 skulls the number of LPF in the right and left was asymmetric, representing (21.33%).

The present study has given an insight into the relative position of the GPF in the skulls found in our environment. The study also shows that the perpendicular distance of GPF in the skulls studied was approximately 15mm, the distance of GPF to the incisive fossa was approximately 41mm. The data obtained will be useful to maxillofacial surgeons and anaesthetists during surgery in order to note the

position of the neurovascular bundles of the palatine foramen.

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