

# Prevalence of Accessory Infraorbital Foramen in South India: An Anatomical Study

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**ABSTRACT:** Cross sectional observational study was carried out to estimate the prevalence of accessory infraorbital foramen on both sides in a collection of 200 skulls available in the Department of Anatomy, St John's Medical College, and other medical colleges of Bangalore, India. The data of the present study will be of considerably use to clinicians-anaesthetist following failure of infiltration of anaesthetic agent and an operating surgeon for preventing injury to the nerves.

## INTRODUCTION

Infraorbital foramen (IOF) is located on the anterior surface of the maxilla of norma frontalis. The infraorbital nerves and vessels exit through this foramen. Infraorbital nerve is the continuation of the maxillary nerve, which provides sensory supply to lower eyelid, lateral part of the nose, upper lip through its orbital, nasal and labial branches (Snell, 2008).

The foramen is usually single occasionally additional foramen ranging from two to four has been reported as accessory foramen. The reported prevalence of accessory foramen is 2.2 to 18.2% (Bery, '75; Canan, '99; Aziz, 2000; Higashizawa, 2001; Kazkayasi, 2001; Kyung, 2007) and is not applicable to all population, is variable between ethnic groups.

Sound knowledge of anatomic, ethnic variability, is essential for various surgical, anesthetic and growing cosmetic facial procedures. Infraorbital nerve block is one of the commonly preferred blocks for operative procedures of the face, as it can be easily approached either by transcutaneous or transoral

routes. On considering the clinical importance and variability the present study was undertaken to estimate the prevalence of accessory infraorbital foramen in South Indian skulls.

## MATERIAL AND METHODS

Cross sectional observational study was carried out on two hundred skulls (four hundred sides, 200 right and 200 left sides) from the collection of department of Anatomy, St John's medical college, Bangalore. There is no record of age or sex of these skulls. They are all presumed to be of mixed South Indian origin. Norma frontalis was inspected for the presence of accessory infraorbital foramen on the anterior surface of the maxilla. When present patency, number, shape, diameter (measured using digital calliper) and relation to main infraorbital foramen confirmed by observation. The damaged and broken skulls were excluded from the study. The results were analysed and expressed as percentage.

## RESULTS

Study was carried out on total of 400 sides of 200 dry adult skulls. AIOF was present in 13 out of 400 sides with Prevalence of 3.25 % (Unilateral in 12 sides and bilateral in 1 side). In 387 out of 400

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(96.75%) of the skulls AIOF was absent. Out of 13 skulls in which the AIOF was observed 1 out of 13 (7.6%) was bilateral and 12 out of 13 (92.3%) were unilateral, 6 (50%) on right side and 7 (58.33%) on left side. In three skulls AIOF was found to be confluent with main infraorbital foramen.

AIOF was located infero-medially in 7 out of 13 (53.84%) and medial- superior in 3 out of 13 (23%) and inferior in 2 out of 13 (15.3%), 1 out of 13 (7.6%) was inferior in position to the infraorbital foramen. The shape of the AIOF varied from round to oval with a diameter ranging from 0.5 to 2 mm.

### DISCUSSION

The accessory foramina when present transmit the branches of infraorbital nerves and vessels. Their occurrence is of immense importance for nerve block techniques. Failure of local infiltration anesthesia of the infraorbital nerve is thought to be due to the presence of anatomical variant foramina through which the nerve emerges. The knowledge of infraorbital nerve is essential following block anesthesia and invasive procedures of the maxillofacial surgeries following rhinoplasty, blepharoplasty fractures of orbitozygomatic regions of the face (Kyung, 2007).

Gruber (1875) was the first person to report that an additional foramen exists along with the infraorbital foramen, varying in number from one to five. Later in 1970 Kadanoff, *et al.* ('70) reported presence of accessory foramen among 1400 skulls as 9% double, 0.5% triple, 3% greater than three and have classified the foramen according to their location as six types- B1 to B6 as inferior, medial, infero-medial, lateral, infero-lateral and infero-medial. Leo *et al.* ('95) included the medial -superior location and thus total of seven locations have been described in literature.

The prevalence of the accessory infra orbital foramen has been used as epigenetic variant of non metrical cranial studies of several races across the world by Berry ('67) and Bery ('75). The measured prevalence has been expressed in percentages to number of skulls studied. Egypt 4.7%, Nigerian 6.7%, Palestine Lachish 2.9%, Palestine modern 6.4%, India (Punjab) 6.7%, Burma 7.5%, North America 6%, South America 13.2%, most being found in Mexicans 38%. However it has been reported that (500 half

skulls), in the Iowa collection did not have more than one foramen per half skull but two were divided by a partition. The reported incidence of the multiple foramina is found more on the left side than right side. As reported by Hani Hara and Ishida (2001)<sup>11</sup> the increased incidence of occurrence of the accessory infraorbital foramen has been reported to be among South East Asians.

The incidence of accessory infraorbital foramen including the present study and above mentioned studies have been summarised in the Table 1.

TABLE I

*Distribution of percentage of accessory infraorbital foramen documented across the world*

Authors	Population	Number of skulls/ cadaver studied	Percentage of AIOF
Kadanoff <i>et al.</i> (1970)		1400 skulls	9
Canon <i>et al.</i> (1999)	Turkey	467 (119crania/229maxilla)	1.28
Hindy and Abdel (1993)	Egypt	30 skulls/15 cadavers	10
Aziz <i>et al.</i> (2000)	American	47 cadavers	15
Kazkayasi <i>et al.</i> (2001)	Turkey	35 skulls/70 sides	5.7
Kazkayasi <i>et al.</i> (2001)	Turkey	10 cadavers (20 sides)	5
Elias <i>et al.</i> (2004)	Brazil	210 skulls	15.23
Bressan <i>et al.</i> (2004)	Italy	1064 skulls	4.7
Agthong <i>et al.</i> (2005)	Thais	110 skulls	4
Apinhasmit (2006)	Thais	106 skulls	3.8
Bhoopati <i>et al.</i> (2010)	South India	80 skulls	16.25
Saraladevi <i>et al.</i> (2011)	South India	125 skulls	9.6
Present study	South India (Karnataka)	200 skulls (400 sides)	3.25

In summary the prevalence of accessory infraorbital foramen in the present study is found to be 3.25% which is comparatively lesser than other reported studies. From literature it has been estimated that the prevalence of AIOF is variable and when present is observed to be more on left infero-medial side of the main infraorbital foramen. However the prevalence of the present study with the other reported studies was statistically not significant. The present study adds to the literature and reaffirms that the prevalence of accessory infraorbital foramen is variable between populations. A thorough knowledge

of the accessory foramen is essential prerequisite for the operating surgeon to prevent damage to the infraorbital nerve and to anaesthetist to re-evaluate the infiltration of anaesthetic dosage.

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