

## Original Research Article

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# Demographic profile of subjects currently undergoing frontal sinusotomy for frontal sinusitis, in a tertiary health care facility of Punjab

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## ABSTRACT

**Background:** The demographic profile of patients with frontal sinusitis undergoing surgical intervention in the state of Punjab was analysed. The emphasis was on the age, gender and clinical presentation in this prospective study.

**Methods:** In this prospective study 85 patients of clinically diagnosed frontal sinusitis were randomly selected from the Rhinology clinics of Oto-rhino-laryngology services, Dayanand Medical College and Hospital Ludhiana; in a period of one and a half years (June 2008 to December 2009). All patients were taken up for functional endoscopic sinus surgery with frontal sinusotomy.

**Results:** 3 (3.53%) subjects, with frontal sinusitis were in the pediatric age group, 65 (76.47%) were males 20 (23.53%) females. Males outnumbered females by a ratio of 3.25:1. The age range varied from a minimum of 8 to a maximum of 86 years. 16 (18.8%) had a discharge in the right middle meatus and 21 (24.7%) over the Eustachian tube orifice. Right sided deviation of the nasal septum was in 13 (14.1%) patients, septal spur in 4 (4.7%) and hypertrophy of the inferior turbinate in 7 (8.2%).

**Conclusions:** Frontal sinusitis was seen in all ages with a male predominance. Nasal blockage on the right side rather than frank frontal headache was the primary complaint. Purulent discharge in the middle meatus and over the Eustachian type were the common findings. Pathology on histopathology encountered was mucosal hypertrophy followed by polyp in the sinus. There was no correlation of frontal sinusitis with the weight and height of the patients.

**Keywords:** Demography, Endoscopic sinus surgery, Frontal sinusitis

## INTRODUCTION

Galen in 691 AD noted the existence of the paranasal sinuses.<sup>1</sup> Vesalius in early 16<sup>th</sup> century described in detail the frontal, maxillary, and the sphenoid sinuses.<sup>2</sup> Wisdom emphasized that the frontal sinus is usually a paired structure.<sup>2</sup> Schaffer 1890 first documented the drainage pattern of the frontal sinus.<sup>3</sup>

The frontal sinuses, one on either side lie deep to the supra-ciliary ridges, between the outer and inner tables of

the frontal bone. They are rarely symmetrical. The septum between them usually deviating from the median plane. This sinus is usually larger in men compared to in women. 4% of the population does not develop both the frontal sinuses. SOM.<sup>4,5</sup> Any pathology in the sinuses is due to abnormal mucociliary flow resulting from alteration in the normal ventilation or drainage of that particular sinus. Messerklinger in 1978 suggested that in the pathogenesis of sinus pathology, the presence of "mucosal contact" areas is the single most important factor.<sup>6</sup> Narrowing of the drainage pathway of the frontal

sinus at any of its bony surroundings, due to mucosal edema, polyps, scarring, and adhesions secondary to trauma, infection, or previous surgery may lead to frontal sinus obstruction.<sup>7</sup> Various etiologies are responsible for the obstruction of the mucociliary drainage pathway and thus the frontal sinus remains the most challenging paranasal sinus to treat even with the advent of endoscopic sinus instrumentation.<sup>7</sup> Endoscopic frontal sinus surgery is difficult because of the technical challenges in surgical exposure of the entire sinus.<sup>8</sup>

In the present era the complications arising from sinusitis are rare since the introduction of broad spectrum oral and intravenous antibiotics. However sinusitis and its complications are still life-threatening and if neglected may result in high morbidity and mortality.

Endoscopic frontal sinusotomy has become the mainstay of treatment when an infected frontal sinus requires surgical drainage. It provides excellent visualization within the depths of the nasal cavity minus any facial scars.

Aim of the study was to determine the common clinical presentations and demographic profile of patients taken up for endoscopic surgery of the frontal sinus.

## METHODS

In this prospective study 85 patients clinically diagnosed with frontal sinusitis were randomly selected from the rhinology clinics of oto-rhino-laryngology services. Dayanand Medical College and Hospital, Ludhiana, in a period of one and a half years (June 2008 to December 2009). All patients were taken up for Functional endoscopic sinus surgery with frontal sinusotomy.

The study included 65 men, 20 women and 3 children (less than 14 years). They were all worked up and their height and weight was recorded.

### Inclusion criteria

Endoscopic frontal sinusotomy was undertaken in cases of: i) Computed tomographic evidence of frontal disease (opacification/air fluid level/mucosal hypertrophy). ii) Endoscopic evidence of frontal recess pathology (oedematous tissue/polyps/mucopurulent discharge/fungal debris). iii) Intractable frontal headaches in the presence of computed tomographic evidence of frontal disease.

### Exclusion criteria

The surgery was undertaken under local or general anesthesia as per fitness of the patient.

Endoscopy was performed with a 0, 30, 45 and 70 degree endoscope. It was first passed along the floor of the nose, while the septum, inferior meatus, inferior turbinate,

middle turbinate and nasopharynx were inspected. The telescope was then raised to expose the face of frontal recess and the frontal ostium.

In subjects with associated pathology of other paranasal sinuses pathology, e.g. polypi were removed and after performing anterior and posterior ethmoidectomy, a transnasal approach was undertaken to reach the frontal sinus. Some of the cases e.g. Sinonasal polyposis was operated with help of a microdebrider.

## Statistics

All statistical calculations were done using Statistical Package of Social Sciences (SPSS) 17 version statistical program for Microsoft windows (SPSS Inc. released 2008. SPSS statistic for windows, version 17.0, Chicago). Ethical approval of the study was taken from the Institutional Ethics Committee.

## RESULTS

The analysis of our study on the frontal sinus is discussed below:

**Table 1: Age and gender distribution (n=85).**

Age in years	Males n=65	Females n=20	Total n=85
	N (%)	N (%)	N (%)
<b>&lt;14</b>	2 (3.08)	1 (5)	3 (3.53)
<b>15-24</b>	15 (23.08)	5 (25)	20 (23.53)
<b>25-34</b>	19 (29.23)	2 (10)	21 (24.71)
<b>35-44</b>	10 (15.38)	6 (30)	16 (18.82)
<b>45-54</b>	10 (15.38)	3 (15)	13 (15.29)
<b>55-64</b>	7 (10.77)	2 (10)	9 (10.59)
<b>65-74</b>	1 (1.54)	1 (5)	2 (2.35)
<b>75-84</b>	0	0	0
<b>85-94</b>	1 (1.54)	0	1 (1.18)

n=Total number of specimens

**Table 2: Height and gender distribution (n=85).**

Height (cm)	Males n=65	Female n=20	Total n=85
	N (%)	N (%)	N (%)
<b>111-120</b>	0	1 (4.17)	1 (1.18)
<b>121-130</b>	1 (1.63)	0	1 (1.18)
<b>131-140</b>	1 (1.63)	1 (4.17)	2 (2.36)
<b>141-150</b>	1 (1.63)	1 (4.17)	2 (2.36)
<b>151-160</b>	13 (20.97)	13 (54.17)	26 (30.59)
<b>161-170</b>	40 (64.52)	8 (33.33)	48 (56.47)
<b>171-180</b>	5 (8.06)	0	5 (5.88)

n=Total number of specimens

Only 3 (3.53%) patients, with frontal sinusitis were in the pediatric age group, i.e. children below the age of 14 years. 65 (76.47%) of the subjects were males and there were 20 (23.53%) females. Males outnumbered females

by a ratio of 3.25:1. The age range varied from a minimum of 8 to a maximum of 86 years.

72.94% of the subjects were males and 28.23% were females. Males outnumbered females by a ratio of 2.6:1.

**Table 3: Weight and sex distribution (n=85).**

Weight (kg)	Male (70)	Female (15)	Total (85)
	N (%)	N (%)	N (%)
<b>21-30</b>	0	1 (6.67)	1 (1.18)
<b>31-40</b>	1 (1.43)	0	1 (1.18)
<b>41-50</b>	8 (11.43)	0	8 (9.41)
<b>51-60</b>	20 (28.57)	7 (46.67)	27 (31.76)
<b>61-70</b>	28 (40)	3 (20)	31 (36.47)
<b>71-80</b>	11 (15.71)	2 (13.33)	13 (15.29)
<b>81-90</b>	2 (2.86)	2 (13.33)	4 (4.71)

n=Total number of specimens

The height range varied from a minimum of 120 cm to a maximum of 177.5 cm. Maximum no. of male subjects 40 (64.52%) having height between 161-170 cm and maximum number of female subjects 13 (54.17%) having height between 151-160 cm.

Table 3 shows that 82.35% of the subjects were males and 17.65% were females. Males outnumbered females by a ratio of 4.67:1.

**Table 4: Chief complaints of the patients (n=85).**

Complaints	Number	Percentage
<b>Frontal headache</b>	26	30.5
<b>Anterior nasal discharge</b>	35	41.1
<b>Posterior nasal discharge</b>	38	44.7
<b>Nasal blockage</b>		
Right side	42	49.4
Left side	37	43.5

n= Number of patients

**Table 5: Clinical findings on anterior rhinoscopy examination (n=85).**

	Number	Percentage
<b>Discharge in middle meatus</b>		
Right side	16	18.8
Left side	9	10.5
<b>Deviated nasal septum</b>		
Right side	12	14.1
Left side	5	5.8
<b>Nasal spur</b>		
Right side	4	4.7
Left side	4	4.7
<b>Inferior turbinate hypertrophy</b>		
Right side	7	8.2
Left side	7	8.2

n=Total number of cases

The weight range varied from a minimum of 28 kg to a maximum of 90 kg. Maximum number of male subjects 20 (40%) having weight between 61-70 kg and maximum number of female subjects 7 (46.67%) having weight between 51-60 kg. The chief complaint that the patients of frontal sinusitis presented with, prior to surgery was nasal blockage on right side in 42 (49.4%) cases and the least common complaint was frontal headache in 26 (30.5%) patients (Table 4).

On anterior rhinoscopy maximum cases, i.e. 16 (18.8%) had a discharge in the right middle meatus. A small group of patients presented with associated right sided deviated nasal septum in 13 (14.1%) subjects, septal spur in 4 (4.7%) and hypertrophy of the inferior turbinate in 7 (8.2%) (Table 5).

**Table 6: Clinical findings on posterior rhinoscopy examination (n=85).**

	Number	Percentage
<b>Discharge in fossa of Rosenmüller</b>	2	2.3
<b>Discharge in front of Eustachian tube</b>	8	9.41
<b>Discharge in behind Eustachian tube</b>	7	8.23
<b>Discharge over Eustachian tube</b>	21	24.7
<b>Polyp</b>		
Right side	7	8.23
Left side	5	5.88
<b>Nasopharyngeal mass</b>	1	1.18

n=Total number of case

On posterior rhinoscopy, maximum number of cases i.e. 21 (24.7%), had a discharge over the Eustachian tube orifice. A small group of patients presented with findings like greenish brown/black crests/sub mucosal swelling in the nasopharynx.

**Table 7: Type of Pathology in frontal sinus, on frontal sinusotomy (n=24).**

Pathology	Number	Percentage
<b>Fluid: Purulent</b>	4	16.67
<b>Retained mucus</b>	1	4.17
<b>Fungal debris</b>	5	20.83
<b>Polyp</b>	8	33.33
<b>Mucosal hypertrophy</b>	12	50

In 71.76% cases, no pathology was encountered and the sinus was found healthy. Pathology was encountered in 24 (28.24%) patients. Majority of these, 12 (50%) patients had mucosal hypertrophy followed by polyp in the sinus, 8 (33.3%) patients.

## DISCUSSION

In the present study frontal sinusitis was seen in only 3 (3.53%) children though the age range varied from 8 to

86 years. Males out-numbered females by a ratio of 3.25:1.65 (76.47%) of the subjects were males and there were 20 (23.53%) females.

The height range varied from a minimum of 120 cm to a maximum of 177.5 cm. Maximum no. of male subjects (64.52%) having height between 161-170 cm and maximum number of female subjects (54.17%) having height between 151 and 160 cm. The weight range varied from a minimum of 28 kg to a maximum of 90 kg. Maximum number of male subjects (40%) having weight between 61-70 kg and maximum number of female subjects (46.67%) having weight between 51-60 kg.

Variations in the anatomy of the nose and paranasal sinuses are not uncommon in the pediatric age group. Vis a vis absence of a definitive relationship between anatomical variations and sinus disease, local, systemic or environmental factors appear to be more significant in pediatric sinusitis than the anatomic variations.<sup>9</sup>

The Albert Einstein College of Medicine and affiliated hospitals retrospective analysis of 50 subjects with acute frontal sinusitis (1981-1984) reported 38 (76%) males and 12 (24%) females. When subdivided into adult (older than 21 years of age) and adolescent (11 to 21 years of age) subgroups, a similar male predominance was noted. Among adults (28 patients), 21 (75%) were male and 7 (25%) were female. Among adolescents (22 patients), 17 (77%) were male and 5 (23%) were female. They found that male adolescents at a higher risk (3 patients) subgroup for developing intracranial complications secondary to their sinus infections.<sup>10</sup>

The chief complaint that the patients presented to us with; prior to surgery was nasal blockage on the right side in 42 cases i.e. 49.4% and the least frequent complaint was frontal headache in 26 (30.5%) cases. Symptoms of frontal sinusitis include headache, rhinorrhea and fever. Acute frontal sinusitis presents with pain around the eye and the forehead region. Externally redness and swelling of the upper eyelid may be seen. Most prevalent symptom of frontal sinus disease is frontal headache. The frontal headache shows characteristic periodicity. It comes on waking, gradually increases and reaches its peak by about midday and then subsides. It is also known as "office headache".<sup>11</sup>

On anterior rhinoscopy most cases, 16 (18.8%) had a discharge in the right middle meatus. A small group of patients presented with associated right sided deviated nasal septum, i.e. 13 (14.1%) patients, septal spur 4 (4.7%) and hypertrophy of the inferior turbinate 7 (8.2%) patients. On posterior rhinoscopy, most cases, 21 (24.7%) had a discharge over the Eustachian tube orifice. A small group of patients presented with findings like greenish brown/black crests/sub mucosal swelling in the nasopharynx. In 71.76% cases, no pathology was encountered and the sinus was found healthy. Pathology was encountered in 24 (28.24%) patients. Majority of these; 12 (50%) patients, had mucosal hypertrophy

followed by polyp in the sinus, 8 (33.3%). Acute frontal sinusitis is characterized by nasal symptoms like nasal congestion and purulent discharge. Chronic frontal sinusitis is characterized by persisting headache in the absence of other symptoms. Tenderness on pressing the floor of frontal sinus immediately above the inner canthus is diagnostic of frontal sinusitis. Tapping of the supraorbital ridge causes severe pain.<sup>12</sup>

The Castellanos et al study of 246 patients with undiagnosed headache, after unrewarding neurologic evaluation, were evaluated both by examination routine sinus radiographs and flexible fiberoptic 98 had only rhinoscopic evidence of sinusitis (group I), 84 patients had both rhinoscopic and radiographic evidence of sinusitis (group II), and 64 patients had neither rhinoscopic nor radiographic evidence of sinusitis (group III). Antibiotic treatment resulted in relief of headaches in 94% of group I, 75% of group II, and 5% of group III patients. The distribution of sinus infections found by both rhinoscopy and radiography were similar; however, rhinoscopy may have found the disease earlier than radiography. Flexible fiberoptic rhinoscopy is an efficient method for the office diagnosis of sinusitis.<sup>13</sup>

The role of supraorbital ethmoid cell in frontal sinusitis was described by Owen et al.<sup>14</sup> Sluder et al described that closure of infundibulum and frontonasal opening leads to negative pressure resulting in headache.<sup>15</sup> Stammberger et al demonstrated that hypoxia in the sinuses can give a sensation of pain.<sup>16</sup> If neglected, acute or chronic frontal sinusitis may progress to osteomyelitis, cellulitis, or subperiosteal, (Pott's puffy tumor), intracranial, or intraorbital abscesses. True incidence of frontal sinus complications, is unknown. An increased risk is seen in men in 2<sup>nd</sup> or 3<sup>rd</sup> decade because of the increased vascularity of the diploic system and growth of the frontal sinus.<sup>17</sup>

A retrospective study of 90 patients with sinusitis seen over a ten year period between 1988 and 1997 in the ENT Department, University College Hospital, Madan was done and those that had complications were further analysed to meet the objectives of this study. There were 90 patients seen with sinusitis over the ten years period, out of which 33 (37%) cases had complications, 17 males and 16 females (M:F- 1:1). The average age of cases with complications was 28 years (age range 2.5-75 years). 66.6% of the complications cases occurred in age group under 30 years of age. Thus children and young adults were mostly affected. Twenty-six cases (79%) of chronic sinusitis developed complications while in acute sinusitis there were 7 cases (21%). The site affected most commonly by complications was the orbit (41%) followed by Sinus wall (32%), oropharynx (18%), intracranial (5%); no car complications were seen. The type of complications seen at various sites and their incidence were also highlighted. Thus with this study it is hoped that clinicians would be reminded that complications of sinusitis still occur and hence be aware

of the necessity to recognize and prevent them as rapidly as possible to avoid serious consequence.<sup>18</sup>

Frontal sinusitis is a chronic disease that is ameliorated but often not cured with endoscopic intervention.<sup>19</sup> Incidence of the frontal sinusitis following frontal sinus surgery is not exactly known. Reports quote a 2% to 11% rate of frontal sinusitis symptoms with 1% to 5% of patients requiring revision surgery.<sup>20-23</sup>

Neel et al demonstrated the necessity of long-term follow up in patency of sinus surgery. Failure rate with a modified Lynch procedure grew from 7% at a mean follow-up of 3.7 years to 30% at 7 years.<sup>24</sup>

In our series, male patients comparatively opted for surgery more due to probably more awareness and loss of working hours due to sinusitis. The typical presentation of forehead ache during office hours was not that common, as patient had already taken multiple courses of antibiotics with partial relief by the time consultation was taken at our tertiary care facility.

Limitations of the study are patients with frontal sinusitis with renal, cardiac, chest ailments or bleeding diathesis could not be taken up for surgery.

## CONCLUSION

Patients with frontal sinusitis were seen in the broad age range from 8 to 86 years with a male predominance. Nasal blockage on the right side rather than frontal headache was the primary complaint. Purulent discharge in the middle meatus and over the Eustachian type were the common findings. Pathology on histopathology encountered was mucosal hypertrophy followed by polyp in the sinus. There was no correlation of frontal sinusitis with the weight and height of the patients.

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