ISSN: 2091-2889 (online)
2091-2412 (print)

Received: 06 Mar 2025
Accepted: 20 Apr 2025
Published: 30 Apr 2025

DOI: 10.54530/jcmc.1644

OPEN ACCESS

Prevalence and clinico-radiological profile of chronic rhino-sinusitis in patients visiting a tertiary care hospital

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Peer reviewed

Abstract

Introduction: Chronic rhinosinusitis (CRS) is a long-term inflammatory condition of the nasal and paranasal sinuses that significantly impairs quality of life and requires on-going management. This study aimed to evaluate the clinical and radiological profiles of CRS in patients from a tertiary care hospital in western Nepal.

Method: A hospital-based descriptive cross-sectional study was conducted among all patients visiting the outpatient as well as in patient department of Otorhinolaryngology at Manipal Teaching Hospital, Pokhara Nepal from 09 Apr to 08 Dec 2024, after obtaining ethical approval. Convenience sampling was employed, and 1050 patients were screened for CRS using the Task Force Criteria. Data were collected using a structured proforma, clinical examination, and radiological evaluation. Descriptive statistics were expressed as frequencies and percentages, and association were analysed using chi-square tests, as appropriate.

Result: Among the 1050 patients screened, the prevalence of chronic rhinosinusitis was 100(9.52%). Nasal blockage was the most common symptom, seen in 67(67.00%) patients, and septal deviation was noted in 74(74.00%) patients during anterior rhinoscopy. CT findings revealed anterior ethmoidal sinusitis in 95(95.00%) patients and maxillary sinusitis in 74(74.00%) patients. Anatomical variations identified on CT included septal deviation in 78(78.00%), concha bullosa in 41(41.00%), and Agger Nasi cells in 38(38.00%). A significant correlation was found between deviated nasal septum (DNS) and contralateral concha bullosa ($r=0.34$, $p<0.01$).

Conclusion: CRS predominantly affects young adults, with anterior ethmoidal sinusitis being more prevalent. CT imaging revealed a high prevalence of anatomical variations. Significant correlation between DNS and contralateral concha bullosa was observed.

How to cite

Ghimire B, Koirala KP, Rijal KC, Gautam S, Sapkota S, Shrestha N, Thapa M. Prevalence and clinico-radiological profile of chronic rhino-sinusitis in patients visiting a tertiary care hospital. Journal of Chitwan Medical College. 2025;15(52):66-73.

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Introduction

Chronic rhinosinusitis (CRS) is a persistent inflammation of the nasal passages and paranasal sinuses, diagnosed by the presence of at least two symptoms lasting 12 weeks or more, including nasal obstruction, discharge, facial pain, or diminished sense of smell.[1] It significantly impacts quality of life and poses a socioeconomic burden due to frequent medical visits and treatment costs.[2]

Anatomical variations, infections, environmental factors, and immune dysfunction contribute to CRS development, with deviations like a deviated nasal septum and concha bullosa impairing sinus drainage.[3,4]Computed tomography (CT) has improved visualization of sinus pathology and anatomical variations, aiding in evaluating CRS severity and guiding safe endoscopic sinus surgery.[5]

Despite its global prevalence, there is limited data on CRS in Nepal, especially regarding the clinical and radiological profiles of patients in different regions of the country. While studies from other countries have identified various risk factors and treatment outcomes, similar studies in Nepal are scarce. Furthermore, the role of anatomical variations like septal deviation and concha bullosa in CRS pathophysiology remains controversial, with inconsistent findings across different populations. This study aims to fill this gap by evaluating the clinical presentations and radiological profiles of CRS in patients at a tertiary care hospital in western Nepal. By providing insights into the local epidemiology, this study aims to contribute to the development of more tailored and effective management strategies for CRS in this region.

Method

A hospital-based descriptive cross-sectional study was conducted among all patients visiting the outpatient as well as inpatient department of Otorhinolaryngology at Manipal Teaching Hospital, Pokhara Nepal from 09 Apr to 08 Dec 2024, after obtaining ethical approval (Ref-MCOMS/IRC/604/GA). All patients presenting to the ENT outpatient department or admitted to the ward were clinically screened for CRS using the Task Force Criteria Table 1.[6] Patients with acute symptoms, pregnant women, traumatic cases, and malignancies were excluded from the study.

Data were collected from both outpatient and inpatient ENT department using a structured proforma. The data included demographics such as age, gender, and place of residence. Clinical features such as nasal blockage, nasal discharge, facial pain, headache, reduced sense of smell, and nasal mass. Radiological findings were obtained through computed tomography (CT) scans of the paranasal sinuses for all CRS patients. The CT scans were analysed for anatomical variations, including deviated nasal septum, concha bullosa, and agger nasi cells and extra as well as sinus involvement, such as maxillary, ethmoidal, frontal, and sphenoidal sinuses. The chi square was used to find out association between anatomical variations vs location (involvement) of sinuses and DNS vs concha was evaluated.

The collected data were entered into Microsoft Excel 2016 and analysed using IBM SPSS 26. Descriptive statistics were used to summarize the data. Association between presence of anatomical variations vs sinus involvement (location) and septal deviation (DNS) vs Conch, were analysed using chi-square test, as appropriate. A p-value<0.05 was considered statistically significant.

Result

Among the 1050 patients screened, 100 were diagnosed with Chronic Rhinosinusitis (CRS), resulting in an observed CRS prevalence of 9.52% (95% Confidence Interval: 8.94%-10.10%). The youngest patient was 10 years old, and the oldest was 74, with a mean age of 36.24±16.30 years. The majority of patients were in the 21–30 years age group 26(26.00%), followed by 41–50 years 22(22.00%), ≤20 years 19(19.00%), 31–40 years 16(16.00%), and >60 years 11(11.00%). The cohort included 51(51.00%) females and 49(49.00%) males. The most common

presenting symptoms were nasal blockage 67(67.00%), nasal discharge 54(54.00%), and miscellaneous symptoms such as epistaxis, itching, lacrimation, facial pain, and ear itching 46(46.00%). Additionally, reduced sense of smell was present in 29(29.00%), headache in 25(25.00%), and nasal mass in 7(7.00%). Patients often exhibited multiple symptoms simultaneously Table 2.

Table 1. Task force criteria for the diagnosis of rhinosinusitis

Major Criteria	Minor Criteria
Facial pain/pressure	Headache
Facial congestion/fullness	Fever (all nonacute)
Nasal obstruction	Halitosis
Purulent discharge	Fatigue
Hyposmia/Anosmia	Dental pain
Purulence on examination	Cough
Fever (acute only)	Otalgia/aural fullness

* Diagnosis requires: ≥2 or major criteria 1 major and ≥2 minor criteria

Table 2. Sociodemographic of patients with rhinosinusitis, n=100

Variable	n(%)
Age y [mean ± SD]	36.24±16.30
≤20	19(19.00)
21-30	26(26.00)
31-40	16(16.00)
41-50	22(22.00)
51-60	6(6.00)
≥61	11(11.00)
Sex	
Male	49(49.00)
Female	51(51.00)
Most common CRS symptoms	
Nasal blockage	67(67.00)
Nasal discharge	54(54.00)
Headache	25(25.00)
Hyposmia/Anosmia	29(29.00)
Nasal mass	7(7.00)
Miscellaneous*	46(46.00)

*(epistaxis, itching, lacrimation, facial pain, and ear itching)

Key findings from anterior rhinoscopy included nasal discharge in 43(43.00%) of patients and septal deviation in 74(74.00%) of cases. CT scans revealed that anterior ethmoidal sinusitis was the most common type 95(95.00%), followed by maxillary 74(74.00%) and posterior ethmoidal 47(47.00%) involvement. Anatomical variations were identified in 92(92.00%) of CRS patients, with the most common being deviated nasal septum 78(78.00%), concha bullosa 41(41.00%), and Agger Nasi pneumatization 38(38.00%), Figures 1 and 2, Table 3.

A statistically significant association was observed between the presence of agger nasi cells and posterior ethmoidal sinusitis (p=0.04), and between deviated nasal septum (DNS) and the presence of contralateral concha bullosa (p=0.01).

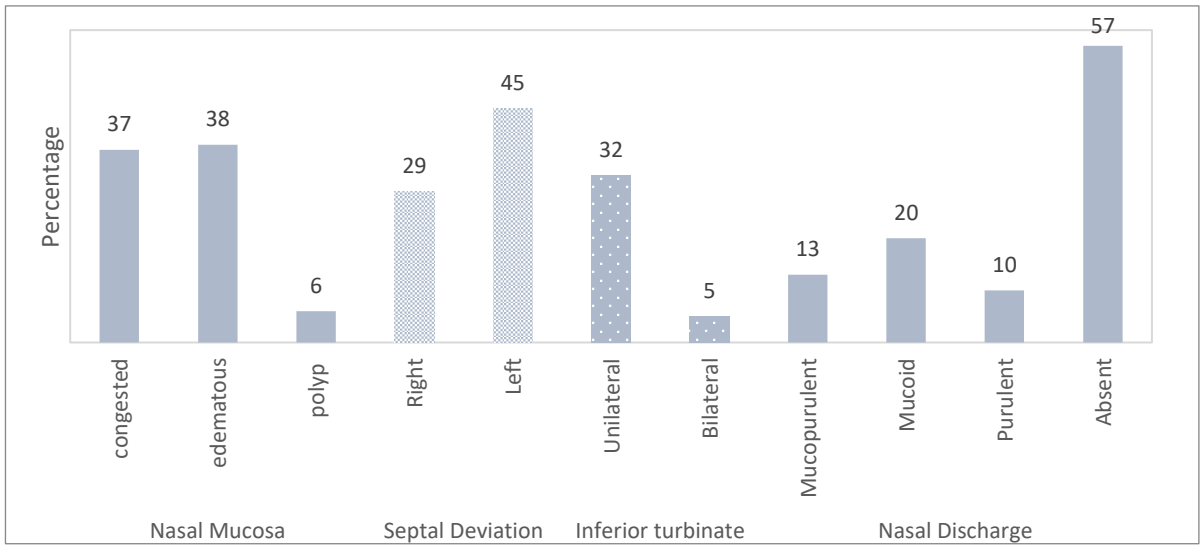

Figure 1. Distribution of anterior rhinoscopy findings in patients with rhinosinusitis, n=100

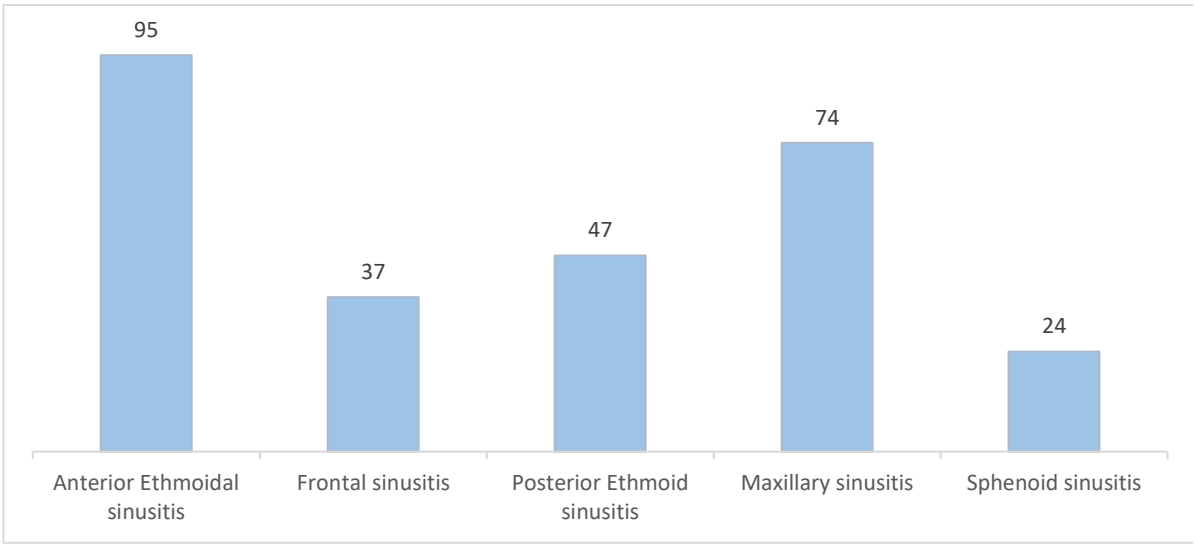

Figure 2. Distribution of sinus involvement in patients with rhinosinusitis based on CT scan findings, n=100

Table 3. Distribution of sinus findings in patients with rhinosinusitis based on CT scan, n=100

Anatomical Variations on CT scan			n(%)
Septal Deviation	Left	47	
	Right	31	
	Total		78(78)
Concha Bullosa	Left	17	
	Right	21	
	Bilateral	3	
	Total		41(41)
Frontal Cells	Type 1	0	
	Type 2	5	
	Type 3	1	
	Type 4	1	
	Total		7(7)
Haller Cells			23(23)
Onodi Cells			18(18)
Paradoxical Turbinates			8(8)
Supraorbital Cells			3(3)
Pneumatisation of Rostrum of Sphneniod			4(4)
Agger Nasi Cells			38(38)

Discussion

The study showed the prevalence of CRS to be 9.52% which is higher compared to the other studies which have shown 3.00 % to 6.40%.[8] This discrepancy could be attributed to factors such as differences in study populations, environmental exposures, or diagnostic methods. Our study may have captured a larger proportion of symptomatic individuals or used more sensitive imaging techniques, leading to higher detection rates. The mean age of patients in this study was 36.24 years, with the highest prevalence observed in the 21–30 years age group. This finding is consistent with previous studies reporting that CRS is more common among young adults, likely due to greater exposure to environmental pollutants and occupational hazards.[4] The nearly equal gender distribution (51.00% female, 49.00% male) observed in this study aligns with reports from other regions, suggesting that CRS affects both sexes almost equally.[9] However, some studies have noted a higher prevalence of CRS in females,[4,10] while others have reported a male predominance.[11] These variations may reflect differences in study populations, environmental factors, or healthcare-seeking behaviour across different regions. Such factors could influence the prevalence and diagnosis of CRS, highlighting the importance of considering local context when interpreting results and designing targeted public health strategies. The near-equal gender distribution in this study is significant as it suggests that CRS is a condition that impacts both males and females similarly, potentially indicating that universal factors such as environmental exposures or lifestyle may play a role, rather than gender-specific influences.

Nasal blockage 67(67.00%) emerged as the most common symptom, followed by nasal discharge 54(54.00%) and miscellaneous symptoms such as epistaxis, itching, and facial pain 46(46.00%). These findings align with the diagnostic criteria for CRS, emphasizing its chronic and diverse clinical presentation.[1] However, our results differ from other studies reporting nasal congestion in up to 98.00% of cases.[4] This discrepancy could be due to differences in study populations,

diagnostic criteria, or regional factors, such as environmental exposures and healthcare access. Broadening the comparison to multiple studies would provide a clearer understanding of the consistency or variations in CRS symptoms. Reduced sense of smell 29(29.00%) and headache 25(25.00%) were also notable, highlighting the significant functional impairments and impact on quality of life associated with CRS. Other studies report up to 50%–70% of CRS patients with olfactory dysfunction,[2,4] and 15% with headaches.[2] These symptoms emphasize the multifactorial impact of CRS on daily life, affecting both safety (e.g., inability to detect smoke) and social functioning. The presence of a nasal mass in 7.00% of patients underscores the importance of thorough evaluations to identify underlying polyps or other pathological conditions, which can contribute to chronic symptoms and complications such as persistent nasal obstruction and infections.

The high prevalence of anatomical variations (92%) among CRS patients reinforces the hypothesis that such variations significantly contribute to sinonasal obstruction and impaired drainage—key factors in CRS pathogenesis, which remains incompletely understood.[4,12,13] Deviated nasal septum (78%), concha bullosa (41%), and agger nasi cells (38%) were the most frequent findings in our study. However, the prevalence of agger nasi observed here is lower than reported in other studies, which range from 70% to 90%.[4,14] This may be due to differences in study populations, diagnostic methods, or imaging techniques. Variations in demographics or patient selection could also explain this discrepancy. The statistically significant correlation between deviated nasal septum and the presence of an opposite concha bullosa ($r=0.34$, $p<0.01$) is noteworthy and aligns with findings from similar research.[15] This relationship underscores the role of structural abnormalities in exacerbating sinus obstruction. Radiologists must focus on identifying anatomical variations during preoperative evaluations, and it is crucial for surgeons to be aware of these variants to ensure safe and effective surgical outcomes.[15]

In contrast to previous studies,[4,10] where maxillary sinusitis is reported as the most common type, our study identified anterior ethmoidal sinusitis as the predominant form (95%), followed by maxillary sinusitis (74%). This variation could be attributed to our detailed classification of ethmoidal involvement into anterior and posterior subtypes. Additionally, the use of advanced CT imaging may have enhanced the detection of anterior ethmoidal involvement, which might be underrepresented in studies employing different diagnostic methods. Geographic or environmental factors and variations in study populations may also contribute to these discrepancies. The involvement of posterior ethmoid (47%), frontal (37%), and sphenoid (24%) sinuses further underscores the multifocal nature of CRS. The predominance of anterior ethmoidal and maxillary involvement aligns with the concept that these areas are anatomically predisposed to obstruction and inflammation, emphasizing their pivotal role in CRS pathogenesis.

CT imaging has proven invaluable in delineating sinonasal anatomy and identifying anatomical variations that may contribute to CRS.[16] This study reinforces the critical role of preoperative CT scans in planning endoscopic sinus surgery, particularly in cases with significant anatomical variations or extensive disease. The high prevalence of anatomical variations underscores the importance of meticulous surgical planning to avoid complications and optimize outcomes.

While global studies on CRS have highlighted similar trends in clinical and radiological findings, this study provides important insights specific to Nepal. Factors such as environmental pollution, limited healthcare access, and cultural practices may influence the prevalence and presentation of CRS in this region. The lack of significant associations between individual anatomical variations and sinus involvement highlights the multifactorial nature of CRS and suggests the need for a comprehensive approach to management.

There are few limitations of study such as anatomical variation might be missed due to large slice of the CT cuts. Also, on extensive

diseases, anatomical variation may not be well appreciated. This study was conducted in a single tertiary care centre, which may limit the generalizability of findings to other regions of Nepal. Additionally, the use of convenience sampling and the relatively small sample size may have introduced selection bias. Future studies with larger, multicentred cohorts and longitudinal designs are needed to validate these findings and explore causal relationships.

Conclusion

The prevalence of chronic rhino-sinusitis was high in one-tenth of patients. Nasal blockage and anterior ethmoidal sinusitis were common findings. Deviated nasal septum was present in three-fourths and was associated with contralateral concha bullosa. The CT imaging played a crucial role in diagnosing and guiding interventions.

Author contribution

Concept, design, planning: All; Data collection: BG, SG, SS; Data analysis: All; Draft manuscript: BG, KCR, KPK, NS, MT; Revision, final manuscript, accountability: All.

Acknowledgment

None

Conflict of interest

None

Funding

None

Supplementary material

The data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request

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