Original Article
DOI: https://doi.org/10.70749/ijbr.v3i4.2619

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Frequency of Proptosis in Allergic Fungal Rhinosinusitis Patients

Saira Arif[1], Taimoor Latif Malik[1], Nasir Riaz[1], Hamza Riaz[1], Fatima Riaz[1], Maryam Safdar[1]

[1]Department of ENT, Mayo Hospital; Lahore, Pakistan

ARTICLE INFO

Keywords: Allergic Fungal Rhinosinusitis (AFRS), Proptosis

Correspondence to: Prof Taimoor Latif Malik,
Department of ENT, Mayo Hospital; Lahore, Pakistan.
Email: drtlmalik@hotmail.com

Declaration

Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History

Received: 28-01-2025 Revised: 12-04-2025
Accepted: 18-04-2025 Published: 30-04-2025

ABSTRACT

Background: Allergic fungal rhinosinusitis (AFRS) is a distinct form of chronic sinus inflammation associated with nasal polyps. It typically involves a hypersensitive immune response to fungal elements, where thick mucus rich in eosinophils and fungal filaments accumulates inside the sinuses. Proptosis is an abnormal protrusion of the eyeball usually associated with AFRS. **Objective:** To determine the frequency of proptosis in patients with allergic fungal rhinosinusitis. **Methods:** This cross sectional study included 120 patients diagnosed with Allergic Fungal Rhinosinusitis (AFRS). Key information such as age, gender, and symptom duration was collected for each participant. Proptosis was assessed through clinical examination and noted accordingly. The data were analyzed using SPSS version 26. Associations were assessed using chi-square and independent t-tests, with statistical significance set at a p-value less than 0.05. **Results:** Among the 120 patients diagnosed with Allergic Fungal Rhinosinusitis (AFRS), 59 (49.2%) presented with proptosis, indicating that orbital involvement is relatively common in this condition. While slightly more females than males showed this finding (52.6% vs. 46.0%), the difference observed was not statistically significant, as indicated by a p-value of 0.470. Age-wise, the highest frequency of proptosis was observed in the 46–60 age group (54.5%), but again, no significant association was found ($p = 0.669$). When symptom duration was considered, proptosis appeared across all durations with similar frequency, and no clear relationship was established ($p = 0.986$). In addition, there was no significant difference in average age or duration of symptoms between patients with and without proptosis ($p > 0.05$). **Conclusion:** This research showed proptosis is a fairly frequent finding in AFRS, affecting nearly half of the patients studied. However, it does not appear to be strongly linked to patient age, gender, or how long symptoms have been present. These results suggest that factors beyond basic demographics—such as anatomical differences or the behavior of the disease itself—may have a greater role in determining orbital involvement. Larger-scale studies that include radiological and histological evaluation are needed to better understand what influences the risk of proptosis in AFRS.

INTRODUCTION

Allergic fungal rhinosinusitis (AFRS) is a distinct form of chronic sinus inflammation associated with nasal polyps. It typically involves a hypersensitive immune response to fungal elements, where thick mucus rich in eosinophils and fungal filaments accumulates inside the sinuses Unlike simple bacterial sinusitis, which resolves with antibiotics, or invasive fungal sinusitis, which primarily affects immunocompromised hosts, AFRS is a non-invasive but highly morbid condition that predominantly afflicts immunocompetent individuals. It is characterized by a hypersensitivity response to fungal antigens within the sinonasal cavities, leading to thick eosinophilic mucin, nasal polyposis, and raised IgE levels (1). The combination of chronic inflammation and allergic mucin imparts an expansile quality to the disease, predisposing patients to bony remodeling, orbital involvement, and, in rare cases, intracranial extension.

The occurrence of AFRS among patients with chronic rhinosinusitis varies significantly, with some studies reporting it in about 5 to 10% of cases, while others suggest it may be even more common.(2) In hot and humid regions, such as South Asia, the Middle East, and parts of Africa, studies have documented disproportionately high burdens, sometimes exceeding 15% of CRS cohorts (3). The increased prevalence in these climates is thought to reflect the greater environmental fungal load coupled with frequent allergic sensitization in the population. In contrast, colder temperate regions often report lower prevalence, though AFRS is still recognized as a clinically important subset (4). In Pakistan, reliable data are limited, but reports from tertiary centers in Lahore and Karachi suggest the disease may be more common than previously recognized, often presenting only after significant complications have developed.(5)

The immune-pathogenesis of AFRS has been a subject of intense investigation. The disease is not due to tissue invasion by fungi but rather to a vigorous type I and type III hypersensitivity response to fungal antigens. This is accompanied by marked eosinophilic infiltration, elevated serum IgE, and increased production of interleukins such as IL-4, IL-5, and IL-13, which drive a type-2 inflammatory cascade(6). Eosinophils degranulate within the sinus mucin, releasing toxic proteins that damage local tissues, impair mucociliary clearance, and perpetuate chronic inflammation. Genetic predisposition, impaired epithelial barrier function, and environmental exposure are all thought to interact in determining disease susceptibility.(7).

Despite these insights, diagnosing AFRS remains largely dependent on a combination of clinical and radiologic findings. The Bent and Kuhn criteria, introduced in 1994, are still widely used. They require evidence of type I hypersensitivity, nasal polyps, characteristic imaging features, eosinophilic mucin without tissue invasion, and positive fungal staining or culture(8). While valuable, these criteria are not perfect. Fungal cultures can sometimes be negative even in patients who otherwise meet the criteria, raising questions about whether direct histologic evidence of fungi should be mandatory(9) Imaging, especially CT scans, often reveals sinus expansion, bony remodeling, and areas of dense mucin, while MRI can help differentiate AFRS from invasive disease by showing T2-weighted hypointense allergic mucin(10).

In Pakistan, AFRS is often underdiagnosed, partly because both patients and clinicians may be unaware of its full spectrum. Many patients endure years of sinus symptoms before seeking care, presenting only when facial deformity or eye symptoms develop. Studies from Lahore and Karachi reported high recurrence rates following surgery, emphasizing the need for integrated medical and surgical management adapted to local healthcare settings. Yet, few studies have specifically investigated how often AFRS leads to proptosis in Pakistani patients, leaving a significant knowledge gap. Understanding the prevalence and predictors of orbital involvement is crucial, as it can inform early interventions, protect vision, and improve quality of life.

One of the most concerning complications of AFRS is its effect on the orbit. The disease can cause expansion of the sinuses through the thin bony walls surrounding the eye, such as the lamina papyracea, leading to proptosis, or forward displacement of the eyeball(11). Proptosis can cause functional problems, including blurred vision, restricted eye movement, and exposure-related irritation, and in severe cases may compress the optic nerve, leading to permanent vision loss (12). It is typically examined by measuring the distance from the cornea tip to the outer part of the bony eye socket, while the patient maintains a straight gaze(13). Clinically, proptosis is assessed through direct observation and measurement tools such as the Hertel exophthalmometer, which quantifies the forward displacement of the eye relative to the lateral orbital rim(14). Imaging can confirm the diagnosis and clarify the extent of disease, but careful clinical evaluation remains essential, especially because mild proptosis may go unnoticed without standardized measurement. ENT specialists must remain vigilant to ensure timely diagnosis and management

Reported rates of orbital involvement vary widely, from 8–10% in some Western studies to more than 30% in South Asia and the Middle East(15). In Saudi Arabia, nearly 40% of AFRS patients showed orbital extension, highlighting how the disease can behave differently in various populations(16).

This study aims to assess how commonly proptosis occurs in individuals diagnosed with allergic fungal rhinosinusitis (AFRS). The result of this study will generate local literature as it found missing and the study results will be helpful in assessing the burden of proptosis in allergic fungal rhinosinusitis (AFRS) patients, so that patients' compliance will be improved by proper management of AFRS for reduction of this ophthalmic compliance.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Otorhinolaryngology at Mayo Hospital, Lahore, from August 1 to September 8, 2025. Ethical approval was obtained from the Institutional Review Board of King Edward Medical University (approval number .../RC/KEMU), and all participants provided written informed consent. Consent forms and study information were available in English and Urdu to ensure comprehension. Patients were assured of confidentiality, voluntary participation, and the right to withdraw at any time.

The study included patients aged 19–60 years diagnosed with Allergic Fungal Rhinosinusitis (AFRS) using Bent and Kuhn's criteria, which require type I hypersensitivity, nasal polyps, characteristic radiologic features, eosinophilic mucin without tissue invasion, and evidence of fungal elements. All patients underwent nasal endoscopy and CT of the paranasal sinuses, with histopathology confirming eosinophilic mucin containing fungal hyphae when available. A non-probability consecutive sampling method was used.

Exclusion criteria included previous sinus surgery or recurrent AFRS, invasive fungal sinusitis, skull base or orbital complications other than proptosis, systemic illnesses (e.g., uncontrolled diabetes, immunosuppression, endocrine disorders), acute bacterial sinusitis, and pregnancy due to radiation risk.

Demographic data (age, sex, symptom duration) and clinical findings were collected using a structured proforma. Proptosis was assessed clinically and, when available, confirmed by CT imaging. It was defined as an anterior globe displacement >21 mm from the orbital rim or an asymmetry >2 mm between eyes.

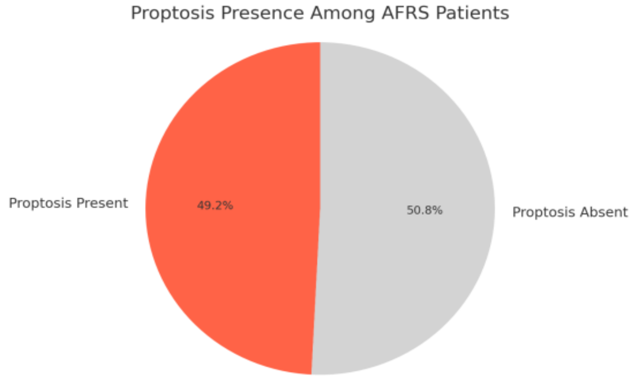
Data were analyzed using SPSS v26. Continuous variables (age, symptom duration) are presented as mean ± SD, while categorical variables (gender, presence of proptosis) are reported as frequencies and percentages. Stratification was performed by age group (18–30, 31–45, 46–60 years), gender, and symptom duration (<13, 13–24, >24 weeks). Comparisons were made using chi-square tests for categorical variables and independent t-tests for continuous variables, with $p<0.05$ considered significant

The study design was chosen for its feasibility and ability to provide a snapshot of disease characteristics within a limited time frame. While not designed to establish causal relationships, the cross-sectional approach allowed for estimation of proptosis frequency among AFRS patients in a busy tertiary care setting. This methodological choice was intended to generate local evidence that could guide larger, multicenter, and potentially longitudinal studies in the future.

RESULTS

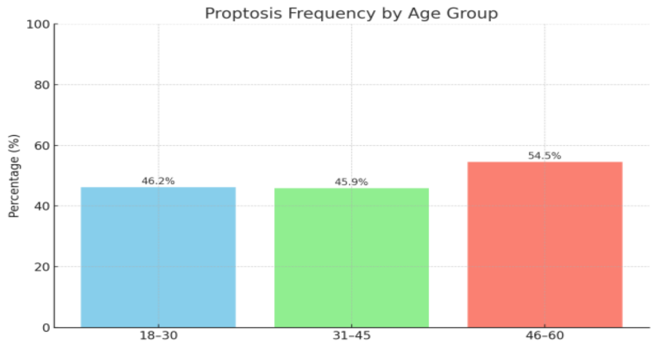
A total of 120 patients meeting the diagnostic criteria for Allergic Fungal Rhinosinusitis (AFRS) were included in the study. The mean age of participants was 38.7 years (±12.8), with a range from 19 to 60 years. Males made up a slight majority (52.5%, n=63), while females constituted 47.5% (n=57). The mean duration of symptoms prior to presentation was 27.1 weeks (±15.9), highlighting the chronic nature of disease progression in this cohort.
Out of the 120 patients, 59 individuals (49.2%) were found to have clinically detectable proptosis. This observation demonstrates that nearly half of AFRS patients in this series exhibited orbital extension at the time of diagnosis. Although proptosis is traditionally associated with more advanced disease, our findings suggest it may be a relatively common presentation even in immunocompetent individuals.

Figure 1



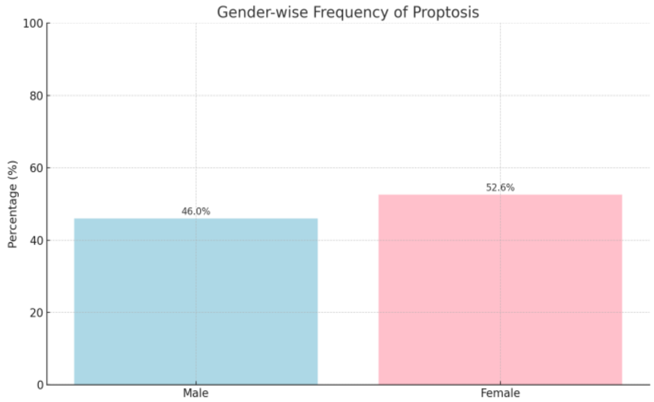
Among male patients, 29 of 63 (46.0%) presented with proptosis, while among females, 30 of 57 (52.6%) had the condition. Although the percentage appeared slightly higher in females, this difference was not statistically significant ($\chi^2 = 0.52$, $p = 0.47$). Thus, the gender of the patient did not emerge as a determinant of orbital involvement. Both men and women were equally likely to exhibit proptosis once AFRS was established.

Figure 2



Furthermore, when stratified by age, proptosis was present in 12 of 26 patients (46.2%) in the 18–30 years group, 17 of 37 patients (45.9%) in the 31–45 years group, and 30 of 55 patients (54.5%) in the 46–60 years group. Although the prevalence was slightly higher in the older group, this difference did not achieve statistical significance ($\chi^2 = 0.80$, $p = 0.67$). The finding suggests that orbital involvement is not limited to older individuals and can be observed across all adult age groups.

Figure 3



Analysis of symptom duration revealed no meaningful correlation with the presence of proptosis. Among patients with symptoms lasting less than 13 weeks, 12 of 24 (50.0%) developed proptosis. A similar proportion was observed in those with symptoms between 13 and 24 weeks (18 of 36, 50.0%). Among patients with a duration longer than 24 weeks, 29 of 60 (48.4%) had proptosis. These values did not differ significantly across groups (χ^2=0.03, p = 0.99). This suggests that orbital involvement can occur even in patients with relatively short symptom histories and is not necessarily dependent on prolonged disease duration.
Further statistical testing revealed no significant difference in mean age between patients with proptosis (39.3 ± 13.1 years) and those without (38.1 ± 12.6 years; p=0.64). Similarly, the mean duration of symptoms did not differ significantly between the two groups (28.0 ± 16.1 weeks vs. 26.3 ± 15.8 weeks; p = 0.49). These results reinforce the impression that neither age nor symptom chronicity is predictive of orbital extension.

DISCUSSION

The goal of this research was to assess the frequency of proptosis. Nearly half of our patients (49.2%) demonstrated clinical proptosis at diagnosis, a finding that not only exceeds several earlier reports but also raises important considerations regarding disease aggressiveness, regional variability, and clinical management strategies. By carefully examining these findings in light of existing literature, both local and international, several important themes emerge.
Our analysis revealed no significant correlation between proptosis and patient gender, age, or symptom duration. While female patients demonstrated slightly higher rates of proptosis than males, the difference was statistically insignificant. This finding resonates with earlier observations that orbital involvement in AFRS is not influenced by gender (17). Although proptosis appeared to

occur a bit more often in patients aged 46 to 60, the difference wasn't statistically meaningful. Research into age-related orbital conditions shows that while certain diseases—like thyroid eye disease or lymphoproliferative disorders—tend to be more common in specific age groups, many inflammatory and tumor-related causes can affect individuals across a wide age spectrum.(18)

The absence of association with symptom duration is particularly notable. Intuitively, one might expect patients with longer disease courses to have higher chances of orbital involvement, but our results demonstrated nearly identical proptosis frequencies across short, intermediate, and long symptom durations. This finding implies that proptosis can occur early in the disease trajectory, depending more on host factors and anatomical vulnerability than on simple chronicity. Similar conclusions have been drawn in other South Asian studies, where orbital spread was documented even in patients with relatively short symptom histories (19, 20).

The underlying mechanism of proptosis in AFRS involves the accumulation of thick, expansile eosinophilic mucin within the paranasal sinuses. This exerts pressure on adjacent bony structures, particularly the lamina papyracea, resulting in thinning or erosion and anterior displacement of the globe(21). Our results are consistent with this model, as CT scans of representative cases confirmed sinus expansion with bony remodeling. However, the lack of correlation with demographic variables underscores the possibility that subtle anatomical differences, such as naturally thinner orbital walls or variations in sinus pneumatization, may dictate whether orbital involvement occurs. Additionally, immunological heterogeneity—such as heightened type I hypersensitivity responses—could accelerate the inflammatory cascade and increase the risk of proptosis in some individuals

The fact that there was no meaningful difference in average age or symptom duration between participants with and without proptosis suggests that other elements—like individual anatomical differences, the aggressiveness of the infection, or where a tumor is located—might have a greater influence on whether proptosis develops, rather than age or symptom length alone.

The high rate of proptosis observed in our study carries important clinical implications. First, it reinforces the necessity of thorough orbital evaluation in all AFRS patients at presentation. Simple bedside inspection may be insufficient, and ENT specialists should incorporate routine exophthalmometry or orbital imaging in suspected cases. Second, early surgical referral should be prioritized in patients with orbital displacement, even in the absence of visual impairment, as disease progression can be unpredictable. Third, multidisciplinary collaboration between otolaryngologists and ophthalmologists is crucial to prevent sight-threatening complications such as optic neuropathy or exposure keratopathy. Finally, patient counseling should emphasize that orbital involvement is not rare in AFRS and may recur despite optimal surgery and medical therapy.

The findings of this study should be interpreted in light of its limitations. As a single-center cross-sectional study, it provides a snapshot of proptosis prevalence without longitudinal follow-up. The sample size, although reasonable, may limit the detection of subtle demographic associations. Furthermore, reliance on clinical detection of proptosis without routine use of exophthalmometry or radiologic measurement may have introduced variability. Imaging findings, while supportive, were not systematically analyzed. Future multicenter studies incorporating radiological staging systems and standardized ophthalmologic evaluation will provide more definitive insights.

CONCLUSION

This study shows that proptosis is a common finding in patients with Allergic Fungal Rhinosinusitis (AFRS) in our population, affecting nearly half of the cases. This prevalence is higher than reports from Western cohorts and aligns more closely with data from South Asia and the Middle East, suggesting that environmental, climatic, and healthcare factors may influence disease presentation. Notably, age, gender, and symptom duration were not significant predictors, highlighting that orbital involvement can occur in any AFRS patient regardless of these factors.

From a clinical perspective, these findings emphasize the importance of routine orbital evaluation for all AFRS patients. Early imaging is recommended when proptosis is suspected, and timely surgical intervention combined with corticosteroid therapy remains the standard of care. Collaboration between otolaryngology and ophthalmology teams is essential to prevent vision-threatening complications. Patient counseling should reinforce the risk of orbital involvement, even in early disease, to improve compliance with follow-up and long-term management.

While emerging therapies, including biologics, may reduce recurrence and steroid dependence in the future, their availability is limited in resource-constrained settings. Therefore, early recognition and proactive management remain crucial to prevent complications. This study adds valuable local data to a field where regional literature is sparse and underscores the need for multicenter, longitudinal studies with radiologic correlation to better identify high-risk patients and develop standardized management protocols tailored to South Asian populations.

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