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Profile of Patients with Primary and Secondary Chronic Rhinosinusitis Treated at a Specialized Outpatient Clinic in Brazil

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Abstract

Objective: To describe the sociodemographic profile and prevalence of different phenotypes of patients with chronic rhinosinusitis (CRS) treated at a specialized outpatient clinic of a university hospital in Brazil. **Methods**: A cross-sectional retrospective study was conducted on patients treated at a clinic in Brazil. The following were evaluated: sex, age, age at symptom onset, primary CRS phenotype, etiology of secondary CRS, and severity of symptoms. **Results**: A total of 342 patients were included, of whom 45.61% were men and 8.24% had secondary CRS. The median age of all patients with CRS was 61 years. Nasal polyps were present in 86.22% of patients. The median age at symptom onset was 41 years. The prevalence of primary CRS phenotypes was chronic eosinophilic rhinosinusitis (eCRS) (75%), anti-inflammatory drug exacerbated respiratory disease, which was considered a subgroup of eCRS (19.40%), chronic non-eosinophilic rhinosinusitis (18.66%), central compartment atopic disease (4.1%), and allergic fungal rhinosinusitis (2.24%). The most prevalent diagnoses of secondary CRS were allergic bronchopulmonary aspergillosis (ABPA) (27.59%), immunodeficiencies (20.69%), and vasculitis (13.79%). **Conclusions**: Patients diagnosed with CRS are predominantly women over 60 years of age who began experiencing nasal symptoms in their fifth decade of life. Most patients have CRS with nasal polyps, primary CRS, and a predominant eCRS phenotype. Secondary CRS accounted for 8.4% of cases, and the most prevalent diagnoses of secondary CRS were Allergic Bronchopulmonary Aspergillosis, immunodeficiencies, and vasculitis.

Keywords: chronic rhinosinusitis; phenotypes; allergic bronchopulmonary aspergillosis; immunodeficiencies; vasculitis

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1. Background

Chronic rhinosinusitis (CRS) is a heterogeneous condition characterized by inflammation of the nasal mucosa and paranasal sinuses that persists for more than 12 weeks, with symptoms such as nasal obstruction, nasal discharge, facial pain, headache, loss of smell, and cough (especially among children), significantly affecting the quality of life of

patients [1]. Differential diagnoses include other diseases such as migraine and allergic sinus headache.

CRS is classified as primary and secondary types. The latter is diagnosed when CRS is a manifestation of another disease and is classified into local causes, such as odontogenic origin; mechanical causes, such as those caused by tumors, cystic fibrosis, or primary ciliary dyskinesias; inflammatory causes, such as in patients with vasculitis; and changes in immunity, such as in the case of immunodeficiencies. When CRS is not a manifestation of another disease, it is classified as primary CRS [1].

Phenotypes are clinically observable characteristics in patients, and endotypes refer to features within an individual based on a pathophysiological mechanism [1].

Based on their phenotypes, primary CRS was classically classified as CRS with nasal polyps (CRSwNP) and without nasal polyps (CRSsNP). More recently, EPOS 2020 stated that the phenotypes of primary CRS should be classified according to anatomical distribution and endotype predominance. CRS patients were divided into localized or diffuse disease and then subdivided in type 2 (T2) or non-type 2 (non-T2) endotype predominance. Some examples of phenotypes are: allergic fungal rhinosinusitis (AFRS), chronic eosinophilic rhinosinusitis (eCRS) (including the diagnosis of anti-inflammatory drug exacerbated respiratory disease (AERD)), central compartment atopic disease (CCAD), and non-eosinophilic chronic rhinosinusitis (neCRS) [1].

The prevalence of CRS endotypes and phenotypes, as well as their association with comorbidities, varies across populations and geographic locations. For example, in the Western population, such as the USA and Europe, there is a higher prevalence of type 2 endotypes among patients with CRS than in the Eastern population, including patients from East Asia. These characteristics change when studying U.S. second-generation Asian patients [2]. A Brazilian study showed a prevalence of 78.1% of type 2 response among patients with CRS [3].

To date, in Brazil, we have not identified studies that comprehensively described the clinical characteristics of patients with CRS. There is a lack of epidemiological studies on Brazilian patients with CRS that describe the prevalence of different phenotypes and the prevalence of secondary CRS in this group. As Brazil has a mixed-race population, it is important to know the Brazilian data.

Understanding the profile of patients with CRS in Brazil influences clinical investigation, treatment, and prognosis in this population. Therefore, it is necessary to understand the profile of Brazilian patients with CRS.

We aimed to describe the sociodemographic profile and prevalence of CRS phenotypes among patients treated between 2013 and 2025 at a specialized rhinology and immunology outpatient clinic in a Brazilian university hospital.

2. Methods

A retrospective cross-sectional study was conducted, including patients of all ages and both sexes diagnosed with CRS according to the EPOS 2020 criteria [1], followed at a Rhinology and Immunology outpatient clinic of a tertiary university hospital in Rio de Janeiro, Brazil, between 2013 and 2025. The exclusion criteria were as follows: patients with primary CRS with localized sinusitis and non-type 2 endotype and those for whom no information could be found in their medical records. All patients underwent the institution's protocol for evaluating patients with chronic rhinosinusitis [1,4].

For each variable, patients for whom it was not possible to find data related to the variable studied in the medical records were excluded from the analysis.

The following variables were evaluated: sex (female and male), age (in years), primary diagnosis of CRS (CRSwNP or CRSsNP), whether CRS was primary or secondary, age

at symptom onset (in years), primary CRS phenotype, etiology of secondary CRS, and severity of symptoms.

The characterization of the T2 inflammation was defined as: serum eosinophilia greater than 150 cells/μL, OR total IgE > 100, OR polyp tissue eosinophilia greater than 10 eosinophils per high-power field [5].

Phenotypes of primary and secondary CRS were defined using the EPOS 2020 criteria [1]. For primary CRS, patients were subdivided into the following phenotypes: neCRS, eCRS (Anti-inflammatory Exacerbated Respiratory Disease [AERD] was considered a subtype of eCRS), AFRS, and CCAD. Patients with secondary CRS were subdivided according to etiology into: Localized, ciliary dyskinesia, immunodeficiency, cystic fibrosis, vasculitis, IgG4-related disease, allergic bronchopulmonary aspergillosis (ABPA), or odontogenic disease.

To assess severity, the Visual Analog Scale (VAS) of nasal symptoms from the last consultation was used, ranging from 0 (not at all bothersome) to 10 (intolerable). The frequencies of the categorical variables were described.

This study was approved by the Research Ethics Committee (number: 4.702.301). Informed consent was waived due to the retrospective nature of the study.

3. Results

A total of 342 patients diagnosed with CRS were included; of these, 156 (45.61%) were men. It was possible to assess the age of 335 patients, ranging from 1 to 93 years, with a median of 61 years. Considering only patients with primary CRS, 312 patients were included, 144 (46.15%) of whom were male, with ages ranging from 7 to 93 years (median age of 62 years).

The presence or absence of nasal polyps was evaluated in 341 patients with CRS. Of these, 294 (86.22%) patients had polyps. When only patients with primary CRS were analyzed, 312 patients were included, of whom 276 (88.46%) had nasal polyps.

In the evaluation of the age at symptom onset, 304 patients were included, with ages ranging from 3 to 79 years (median age, 41 years). When analyzing only patients with primary CRS, 279 patients were included, and; the age at onset of symptoms ranged from 3 to 79 years, with a median age of 41 years.

Of the 340 patients with information regarding the diagnosis of primary or secondary CRS, 312 (91.76%) had primary CRS, and 28 (8.24%) had secondary CRS.

A total of 268 patients were included for the evaluation of the primary CRS phenotype, and 29 patients for the evaluation of the secondary CRS phenotype. The prevalence of phenotypes in patients with primary CRS is described in Table 1, and the etiologies of secondary CRS are described in Table 2.

Table 1. Phenotype of patients with primary chronic rhinosinusitis treated at a specialized outpatient clinic of a university hospital in Rio de Janeiro, Brazil.

Number of Patients (%)	Phenotype of Patients with Primary CRS
201 (75.00%)	Chronic Eosinophilic Rhinosinusitis
39 (14.55%)	AERD
50 (18.66%)	Chronic Non-Eosinophilic Rhinosinusitis
11 (4.10%)	CCAD
6 (2.24%)	AFRS
268 (100%)	Total

Abbreviations: CRS: Chronic rhinosinusitis; CCAD, central compartment atopic disease; AERD, anti-inflammatory drug exacerbated respiratory disease; AFRS, allergic fungal rhinosinusitis. Note: AERD patients were considered a subgroup of eosinophilic chronic rhinosinusitis.

Table 2. Diagnoses of patients with secondary chronic rhinosinusitis treated at a specialized outpatient clinic of a university hospital in Rio de Janeiro, Brazil.

Number of Patients (%)	Diagnoses of Secondary CRS
8 (27.59%)	ABPA
6 (20.69%)	Immunodeficiency
4 (13.79%)	Ciliary dyskinesia
4 (13.79%)	Vasculitis
3 (10.34%)	Localized
2 (6.90%)	Odontogenic disease
1 (3.45%)	IgG4-related disease
1 (3.45%)	Cystic fibrosis
29 (100.00%)	Total

Abbreviations: CRS, chronic rhinosinusitis; ABPA: Allergic bronchopulmonary aspergillosis; IgG4: Immunoglobulin G4.

When the global VAS of nasal symptoms was assessed at the last consultation of patients with CRS, 305 patients were included, with a median of 3 (ranging from 0 to 10), of which 235 (77%) had a VAS less than or equal to 5. When only patients with primary CRS were analyzed, 281 patients were included, with a median of 3 (range, 0–10). Of these, 215 (76.51%) patients had a VAS less of or equal to 5.

4. Discussion

It was found that CRS is more prevalent among women over 60 years of age, and most patients are diagnosed with primary CRS, and the most prevalent phenotype being the eCRS. Secondary CRS accounted for 8.24% of patients with CRS.

In this study, we identified a higher prevalence of female patients with CRS and in patients with primary CRS. This finding contradicts the data in the literature, which show a higher prevalence of CRS in men. Hirsch et al. showed that when analyzing the Lund-Mackay tomographic score and symptoms compatible with CRS, the prevalence of this disease in men was 1.7%, 1.6% and 0.45% among women and 8.8%, 7.5%, and 3.6% among men when evaluating LM scores greater than or equal to 3, 4, or 6, respectively [6]. A Brazilian study found a higher prevalence of CRS in women, which is in accordance with our study [7] and may be and it may be a characteristic of the Brazilian population.

CRS has been reported as the sixth most prevalent chronic disease in the population over 60 years old, affecting 4.7% of these patients [8]. We found a median age of 61 and 62 years in patients with CRS and primary CRS, respectively, showing the high prevalence of CRS in older patients. A study conducted in São Paulo, Brazil, found a younger median age of patients with CRS of 39.8 $\pm$ 21 years. This may be explained by the fact that our study was conducted in a tertiary hospital with more severe cases while the study of São Paulo was a survey. There is evidence that polyp recurrence after nasal surgery in patients over 60 years of age is lower than in younger patients, demonstrating the importance of conducting specific studies in older patients with CRS [9].

The median age at onset of symptoms of CRS and primary CRS was 41 years, consistent with the literature. Typically, CRS symptoms begin in the fifth decade of life. In Denmark, the incidence of nasal polyposis increases with age, reaching a peak between 40 and 69 years of age, with a lower incidence among children and patients over 80 years of age [10].

The median overall VAS of symptoms for both CRS and primary CRS patients was 3, considered to be of mild severity according to EPOS 2020 [1]. When categorizing the global VAS of symptoms, 22.70% of patients with CRS and 23.49% of patients with primary CRS had a VAS score greater than 5. A VAS score greater than 5 affects the patient's quality of life; therefore, in this population, quality of life was not impaired by CRS. In the study

by Van der Veen et al., only patients with uncontrolled CRS had VAS scores greater than 5. In this same study, the mean VAS of controlled patients, corresponding to 19.5% of the patients, was 0.8 (±1.1); for partially controlled patients, corresponding to 36.8% of this group, it was 2.4 (±2.1); and for uncontrolled patients, corresponding to 43.7% of the patients studied, it was 5.5 (±2.8); only patients with uncontrolled disease had a VAS greater than 5 [11].

The prevalence of CRSwNP was higher than that of CRSsNP in both patients with CRS (86.22%) and patients with primary CRS (88.46%). In the literature, the prevalence of nasal polyposis in patients with CRS varies from 20 to 30% [12]. This discrepancy can be explained by the fact that the study was conducted in a tertiary university hospital, which treats patients with more severe disease, a greater number of comorbidities, or who require more complex surgical interventions; therefore, there is a higher prevalence of nasal polyposis.

Regarding the phenotypes of primary CRS, 75% of the patients had eosinophilic CRS. This finding may be explained by the fact that Brazil has a mixed-race population, but in Rio de Janeiro, there are few Asian descendants. Several studies have shown a high prevalence of type 2 response in patients with CRSwNP, with eosinophils being the predominant inflammatory cells in patients from Europe or the USA. Studies conducted in countries in East Asia have shown a higher prevalence of non-T2 inflammatory response and neutrophils as the predominant inflammatory cells in these patients [13]. Our finding is consistent with another Brazilian study that reported a prevalence of 78.1% of type 2 inflammatory response in patients with CRS [3]. Another study with Brazilian patients showed that most patients with CRSwNP had a mixed inflammatory profile [7].

AERD was diagnosed in 14.55% of patients with primary CRS and 19.40% of patients with eCRS. Globally, the prevalence of this disease can vary from 4.8% to 22.6% [14]. A 2024 Finnish study showed a prevalence of AERD of 8.77% in patients with CRS, being higher among patients with CRSwNP (16.88%) and lower in patients with CRSsNP (3.42%) [15]. A Brazilian study reported a prevalence of 17.5% of AERD in patients with CRSwNP [3].

CCAD was diagnosed in 4.1% of patients with primary CRS. A study conducted in 2023 in the USA found a CCAD prevalence of 9.5% in patients with CRSwNP who underwent endoscopic sinus surgery, which was higher than that found in our study; however, in the USA study, only patients with nasal polyposis were evaluated [16], which can explain this difference in prevalence.

AFRS was rarely diagnosed in patients with CRS in the present study. The prevalence of AFRS varies greatly in different locations studied, with some locations having a high prevalence, such as the Mississippi River Bay in the USA or India. In 2005, a prevalence of 26.7% of AFRS was reported in patients with CRSwNP, while other studies found a prevalence of only 7% of AFRS in patients with CRSwNP. We did non't find any Brazilian studies on the prevalence of AFRS in patients with CRS [17].

Of the patients with CRS, 8.24% had secondary CRS, indicating that diseases that manifest as CRS should be investigated. The most prevalent diagnoses of secondary CRS were ABPA, immunodeficiencies, and vasculitis. We did not identify any studies evaluating the prevalence of these diagnoses in patients with CRS in Brazil.

An advantage of this study is that it describes the clinical, phenotypic, and endotypic characteristics of a large sample of patients with CRS treated in Brazil.

5. Study Limitations

This study has several limitations that must be acknowledged. First, its retrospective and cross-sectional design precludes establishing causal relationships between identified clinical features and disease progression. The reliance on medical record review may

have introduced information bias or incomplete data capture, particularly for laboratory variables and imaging findings.

Second, the study population was drawn from a tertiary referral center, which likely overrepresents more severe or treatment-refractory cases, potentially overestimating the prevalence of CRSwNP and eosinophilic inflammation compared with the general Brazilian CRS population.

Third, immunologic and molecular biomarkers of endotypic classification were assessed only by surrogate laboratory parameters (blood eosinophilia, IgE, or tissue eosinophilia), rather than by cytokine profiling or transcriptomic analysis, which would enable more precise characterization of CRS endotypes.

Finally, the study represents a single-center experience; thus, its findings may not fully reflect the diverse regional and ethnic composition across Brazil.

6. Conclusions

Finally, our data showed that patients with CRS were mostly women over 60 years of age, who started presenting with nasal symptoms around the fifth decade of life. Most patients have primary CRSwNP with an eosinophilic phenotype. AERD accounted for 14.55% of primary CRS cases. Secondary CRS corresponded to 8.4% of cases and cannot be ignored in the clinical investigation of patients with CRS. ABPA and immunodeficiency were the most common causes of secondary CRS. This study represents the first comprehensive characterization of the clinical, phenotypic, and endotypic features of a large Brazilian CRS population. Although limited by its retrospective design, these findings provide a foundational understanding of CRS epidemiology in Brazil, underscoring the need for prospective multicenter studies to further define this heterogeneous disease. However it was conducted in a tertiary university hospital, which can affect the patient profile.

Future prospective, multicenter studies with standardized biomarker assessment and long-term follow-up are warranted to validate these observations and to better elucidate the natural history of CRS in Brazilian populations.

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