

RESEARCH

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Clinical, Radiological, and Histopathological Characteristics of Patients with Nasal Polyps at Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar, Bali From January 2023 to December 2024

ABSTRACT

Introduction: Chronic Rhinosinusitis with Nasal Polyps (CRSwNP) is a chronic inflammation of nasal mucosa and paranasal sinuses characterized by the presence of polypoid masses. A thorough understanding of demographic profiles, clinical manifestations, radiological extension, and histopathological characteristics is crucial for optimizing therapeutic strategies and predicting recurrence prognosis. **Objective:** To determine the clinical, radiological, and histopathological characteristics of CRSwNP patients at Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar from January 2023 to December 2024. **Material & Methods:** A retrospective descriptive study was conducted using medical record data of CRSwNP patients who met the inclusion criteria. Variables evaluated included age, sex, primary clinical complaints, number of sinus involvements on Computed Tomography (CT) scan, and the histopathological types of the polyp tissue. **Results:** A total of 28 patients were included as study subjects. The majority of patients were in the 45–65 age group (35.71%) with a male predominance (71.4%). The most frequent clinical manifestation complained of was nasal obstruction (96.4%), followed by rhinorrhea (64.3%). Based on radiological CT-scan evaluation, most subjects presented with the involvement of four paranasal sinuses (46.4%), with the maxillary sinus being the most frequently involved anatomical site (100%). Histopathological examination showed a predominance of the inflammatory/fibroinflammatory polyp type (92.9%). **Conclusion:** The characteristics of CRSwNP patients in Bali show the highest prevalence in middle-aged males with nasal obstruction, radiological multisinus involvement, and are dominated by a non-eosinophilic histopathological profile. This correlation emphasizes the importance of an oral corticosteroid-based therapeutic approach combined with endoscopic sinus surgery to minimize the risk of recurrence.

Keywords: Chronic rhinosinusitis, nasal polyps, clinical characteristics, paranasal CT-scan, histopathology.

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INTRODUCTION

Chronic Rhinosinusitis with Nasal Polyps (CRSwNP) represents one of the two main subsets of chronic rhinosinusitis. Patients with nasal polyps account for approximately 10–30% of all CRS (Chronic Rhinosinusitis) patients. This condition generally affects middle-aged and elderly individuals, with a mean age at diagnosis ranging between 40 and 60 years, and a higher prevalence in males.¹⁻⁵ Published epidemiological studies indicate that the overall prevalence of nasal polyps in adults ranges from 1% to 4%: 2.1% in France, 2.7% in Sweden, 4.3% in Finland, 1–4.2% in the United States, and 1.1–2.2% in China. Meanwhile, in Indonesia, a study from Prof. Dr. Sardjito General Hospital Yogyakarta (2018–2022) reported that out of 246 patients with CRS, 17.88% presented with CRSwNP, with the highest prevalence observed in 2019 and 2021 (26.20%), and the lowest in 2020 (11.90%).^{2,6}

Nasal polyps are the final localized manifestation of a chronic inflammatory disease affecting the nasal cavity and paranasal sinuses. According to European guidelines, the underlying inflammatory condition of NP affecting the nose and paranasal sinuses must be accompanied by two or more symptoms, at least one of which must be nasal blockage, obstruction, or congestion, alongside nasal discharge, facial pain or pressure, and a reduction or loss of smell.³ Additionally, the presence of mucopurulent discharge, as well as mucosal edema and obstruction, particularly in the middle meatus, strongly supports the diagnosis.

A common method for diagnosing nasal polyps is radiography. A CT scan of the nose and paranasal sinuses is mandatory prior to nasal and paranasal sinus surgery, and CT staging of polyps helps assess the severity of inflammation and sinus involvement.¹ Histopathological examination provides detailed information regarding epithelial and stromal changes, particularly the inflammatory cell populations involved in the pathogenesis of the disease.⁷ The most critical stromal alterations include edema and eosinophilic infiltration.

Based on the background described above, the researcher is interested in conducting a study

to evaluate the distribution of clinical, radiological, and histopathological characteristics and classifications among patients with nasal polyps at Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar from January 2023 to December 2024.

METHOD

This study is a descriptive observational study with a retrospective design. The data, comprising medical records, radiological imaging findings, and histopathological results, were subsequently analyzed in accordance with the study variables. In a retrospective study, all required variables have been previously documented in the medical records. This study was conducted at the Otorhinolaryngology-Head and Neck Surgery (ENT-HNS) Outpatient Clinic of Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar, spanning the period from January 2023 to December 2024.

The inclusion criteria for this study consisted of patients with a clinical diagnosis of chronic rhinosinusitis with nasal polyps recorded in the medical records at Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar, patients who underwent radiological examination via paranasal sinus CT scan, patients with available histopathological examination results of the nasal polyps, and patients who underwent medical treatment or surgical intervention at Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar during the period of January 2023 to December 2024. Conversely, the exclusion criteria applied to patients with incomplete medical records and those whose histopathological results indicated malignancy.

RESULT

The distribution of the study subjects based on age group and sex is presented in Table 1. Characteristics based on sex demonstrated that male patients had a higher prevalence compared to females. Out of a total of 28 subjects, 20 patients (71.4%) were male, while female patients accounted for 8 individuals (28.6%). Furthermore, the distribution of study subjects according to age group revealed that the highest incidence of nasal polyps occurred within the 45–65 age range, comprising 10 individuals (35.71%). Conversely, the youngest age group

was 0–5 years, which exhibited the lowest frequency among all age groups, consisting of only 1 individual (3.5%).

Table 1. Characteristics of Nasal Polyp Patients Based on Age and Sex

Variable	n (%)
Sex	
Male	20 (71,4%)
Female	8 (28,6%)
Age groups (years)	
0-5	1 (3,5%)
5-14	2 (7,1%)
15-24	5 (17,9%)
25-44	8 (28,6%)
45-65	10 (35,71%)
>65	2 (7,1%)

As shown in Table 2, out of a total of 28 patients, the most dominant complaint was nasal obstruction, which was experienced by 27 individuals (96.4%).

Table 2. Frequency Distribution of Clinical Complaints in Nasal Polyp Patients

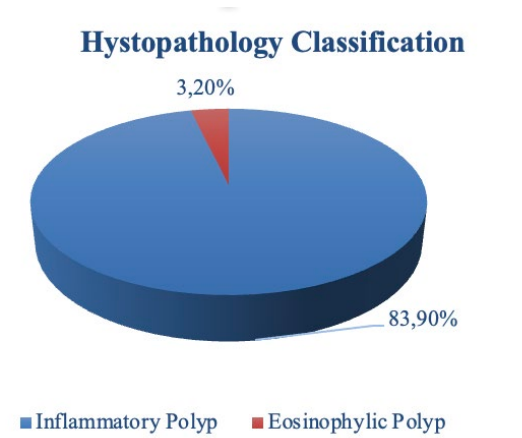
Variable	n (%)
Nasal Congestion	27 (96,4%)
Nasal Discharge (Rinorrhea)	18 (64,3%)
Hyposmia/ Anosmia	9 (32,1%)
Sneezing	8 (28,6%)
Facial Pain	3 (10,7%)

The radiological characteristics of the study subjects were evaluated based on the results of paranasal sinus Computed Tomography (CT) scans. As shown in Table 3, it was found that nearly the majority of the total study subjects presented with the involvement of all four paranasal sinuses (pansinusitis), accounting for 13 patients (46.4%).

Table 3. Frequency Distribution Based on the Number of Involved Paranasal Sinuses in Radiological Examination

Variable	n (%)
One Sinus	3 (10,7%)
Two Sinuses	5 (17,9%)
Three Sinuses	7 (25,0%)
Four Sinuses	13 (46,4%)

Based on the pathological laboratory findings, the most dominant histopathological type was inflammatory polyps, accounting for 26 patients (92.9%) shown in Picture 1.



Picture 1. Distribution of Histopathological Types in Nasal Polyp Patients

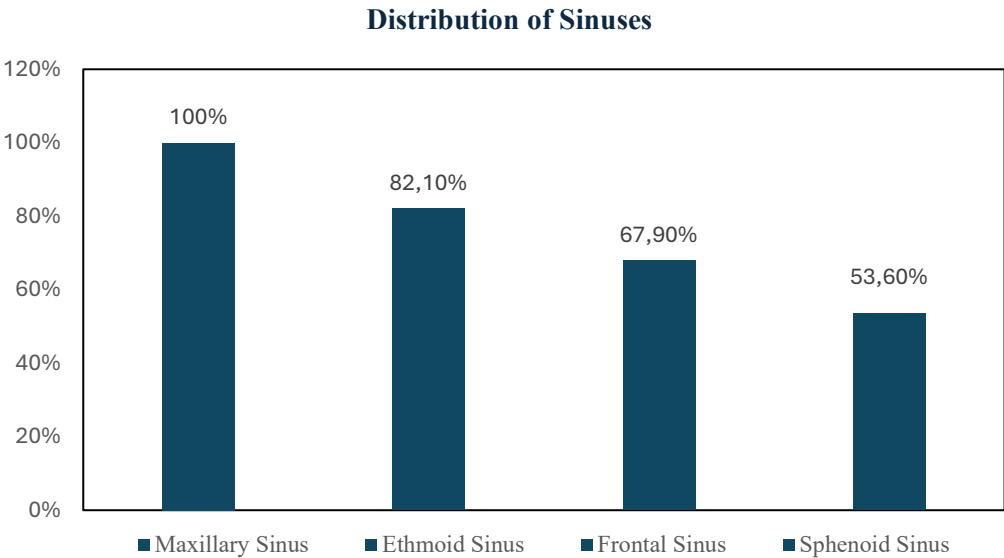
The maxillary sinus was the most frequently involved site, accounting for all study subjects (100%). The involvement of other sinus locations, in descending order, included the ethmoid sinus in 23 patients (82.1%), the frontal sinus in 19 patients (67.9%), and the sphenoid sinus in 15 patients (53.6%) shown in Picture 2.

DISCUSSION

Demographic Characteristics of Research Subjects

Epidemiologically, the peak incidence is generally reported in the fourth to sixth decades of life. This is closely related to the degenerative mechanism of the epithelial barrier function in the nasal mucosa. The mucosal epithelium serves as the first-line defense system in preventing the invasion of pathogens and irritants. Along with the aging process, a decline in epithelial integrity occurs, which triggers a chronic inflammatory response..

aging process impairs the integrity of the



Picture 2. Distribution of Involved Paranasal Sinus Locations on Radiological Examination

This condition is characterized by eosinophilic infiltration and the release of cytokine mediators that ultimately trigger the cascade of polyp formation.

The results of this study demonstrate a similar pattern to several previous literatures. A study by Arif et al. at the Laboratory of Anatomical Pathology, Faculty of Medicine, Universitas Brawijaya reported that out of 20 samples, the highest frequency was within the age ranges of 20–40 years and 40–60 years, with a proportion of 35% each. Additionally, a study by Mourina et al. also noted a prevalence of 27.1% in the 45–54 age range.⁸ Although there are slight variations in the dominant age ranges across various studies, collectively these data reinforce the hypothesis that productive to late adulthood age groups carry a higher risk. This is likely influenced by the accumulation of chronic pollutant exposure, mucosal degenerative factors, and a longer duration of inflammation, which significantly contribute to the pathogenesis of nasal polyps in this population.

Elderly patients with Chronic Rhinosinusitis with Nasal Polyps (CRSwNP) tend to experience a higher degree of tissue remodeling and more severe interstitial edema. Advancing age has also been proven to increase nasal volume and intranasal resistance, which is hypothesized to occur due to a decrease in the elasticity and compliance of nasal tissues. Furthermore, the

epithelial barrier function in the sinonasal mucosa, characterized by decreased mucociliary clearance, alterations in innate immunity, and an imbalance of the local microbiome.⁹ This functional degeneration causes elderly individuals to become more susceptible to exposure from environmental factors, such as pathogens and allergens.

Meanwhile, based on sex, it was found that males tend to suffer from nasal polyps more frequently than females. Engaging actively in outdoor activities is a causative factor for the high prevalence in males. The risk of exposure to air pollution, chemical substances, occupational pollutants, secondhand smoke, and smoking habits, which have historically been more dominant in this group, serve as triggering factors for the development of nasal polyps.⁸ This study aligns with the research conducted by Riko Janukadri, which suggested that a higher prevalence occurs in males with a male-to-female ratio of 1.4:1. The pattern of male dominance was also found in other clinical studies across various health centers in Indonesia. A study at Prof. Dr. I.G.N.G. Ngoerah General Hospital Denpasar spanning the period from January 2014 to December 2015 recorded that males constituted the majority group with a percentage of 53.8%. Directly proportional to this, data from Dr. Hasan Sadikin General Hospital Bandung also reported that 56% of nasal polyp cases occurred in the male population.⁸

Clinical Presentation

The primary complaint occurring in nasal polyp sufferers is nasal obstruction (55.6%). The results of this study are consistent with the research by Mourina, which obtained nasal obstruction as the most frequent primary complaint (98.3%). Gevaert in 2005 and Spafford also stated that the frequently reported complaint was nasal obstruction.¹⁰ Our findings are similar to those studies, where nasal obstruction and rhinorrhea were the most common complaints, while olfactory dysfunction and facial pain were also found as the third and fourth most frequently encountered complaints in patients with nasal polyps.

Radiological Findings and Anatomical Distribution

Based on anatomical distribution, the maxillary sinus was the most frequently involved site (100%), followed by the anterior ethmoid sinus (82.1%). The sphenoid sinus was found to be the location with the lowest frequency of involvement (53.6%). This distribution pattern falls within a similar range to the report by Maru, which reported maxillary sinus involvement at 70.4%, anterior ethmoid sinus at 73.7%, posterior ethmoid sinus at 52.4%, frontal sinus at 48.3%, and sphenoid sinus at 40.8%.¹⁵ Intraoperative findings in this study also showed a strong correlation with the estimated disease extension on preoperative CT scans.

Pathophysiologically, the ostiomeatal complex plays a crucial role as the primary drainage pathway for the maxillary, anterior ethmoid, and frontal sinuses. In accordance with the theory by Mackay and Lund, mucosal contact areas in narrow channels such as the middle meatus and the ethmoidal infundibulum are the most vulnerable sites to experience impaired mucociliary clearance.¹¹ Retention of secretions at these locations increases the risk of secondary infection even without total ostial occlusion. This condition is frequently exacerbated by anatomical variations such as nasal septal deviation and turbinate hypertrophy, which mechanically obstruct the ostiomeatal unit, thereby triggering chronic sinusitis.

Interestingly, there is a difference in the pattern of the number of involved sinuses when compared to the study by Ramin et al. in Iran. In that study, single sinus involvement was reported at 39%, which was greater than the findings in two or more sinuses, whereas in this study, it represented a minority finding among the number of involved sinuses, at only 10.7%. This difference is most likely influenced by the patients' delay in seeking medical treatment (delay of treatment) as well as the limited accessibility to subspecialist healthcare facilities in this region, causing patients to present with a more massive extension of the disease.^{11,12}

Histopathological Profiles

Based on the classical literature by Davidson and Hellquist, nasal polyps are classified into four main categories that serve as global reference standards. The first is edematous or eosinophilic polyps, characterized by severe stromal edema, massive infiltration of eosinophils and mast cells, and thickening of the basement membrane. This finding aligns with 7.1% of the cases in our study. This low percentage contrasts with the study by Davidson and Hellquist, which recorded a rate of 86.3%, as well as other studies reporting a prevalence of 60%.¹ This difference is suspected to be related to geographic and ethnic variations, where Asian populations frequently demonstrate an inflammatory profile that is not dominated by the eosinophilic pathway (non-eosinophilic).

The second category, namely fibroinflammatory polyps (chronic inflammatory polyps), possesses characteristics identical to the majority findings in our study (92.9%). As explained by Hellquist, this type is characterized by the absence of dominant stromal edema, the presence of an inflammatory infiltrate intensely dominated by lymphocytes, and the finding of numerous fibroblasts with fibrosis in the stroma. Metaplastic findings in the squamous or cuboidal epithelium are also frequently found in this type. The dominance of the fibroinflammatory type in our study (92.9%) is much higher than the report by Davidson and Hellquist (7.3%) or the study by Kakoi and Hiraide.¹ This high rate of

fibroinflammatory polyps indicates that most patients at Prof. Dr. I.G.N.G. Ngoerah General Hospital present during a chronic inflammatory phase that has undergone significant tissue remodeling and fibrosis.

Regarding the absence of polyp types with stromal atypia and glandular seromucinous types in this study, it was not only influenced by the limited sample size and its low natural prevalence in the general population—as polyps with stromal atypia are an extremely rare type (1.1% in Davidson's study) and pose their own diagnostic challenges due to their reactive fibroblast cells that are pleomorphic and hyperchromatic, resembling a neoplasm. There is a possibility that this phenomenon is also influenced by variations in nomenclature and standardization of histopathological reporting between healthcare institutions. Overall, although the histopathological classification in this study focused on two main categories, namely the inflammatory and eosinophilic types, this classification still comprehensively represents the pathophysiological spectrum explained by experts. This grouping is based on the most prominent dominance of inflammatory cell infiltration, where the inflammatory type polyps in this study represent a fibroinflammatory appearance, while the eosinophilic type polyps represent the edematous type.¹

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