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Nasal Symptoms of Chronic Rhinosinusitis were Related to Its Nasoendoscopic Findings: A Retrospective Cohort Study at Dr. Soetomo General Academic Hospital, Surabaya

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ABSTRACT

Introduction: Chronic rhinosinusitis (CRS) is often encountered in Indonesia. Nasal endoscopy, or nasendoscopy, is considered the gold standard for assessing the severity of CRS. However, as nasendoscopy is unavailable in Indonesia, only symptom assessments can be conducted at primary healthcare facilities. This study aimed to elucidate the relationship between nasoendoscopic findings based on the Lund-Kennedy score (LKS) and symptoms in CRS patients based on the visual analogue scale (VAS) score.

Methods: This retrospective analytic study evaluated CRS cases identified in the Ear, Nose, and Throat (ENT) Outpatient Clinic of Dr. Soetomo General Academic Hospital, Surabaya, from July 2021 to July 2022. Statistical analysis was conducted using Spearman's rank correlation test to identify the correlation (R-value) between LKS and the VAS score. Statistical significance was achieved if p-value <0.05. All statistical tests were conducted using the International Business Machines Corporation (IBM) Statistical Package for the Social Sciences (SPSS) version 26.0 for Windows.

Results: A total of 57 CRS patients were included in this study, mostly females (64.9%) and those aged 50–59 years old (26.9%). Nasal congestion was the dominant nasal symptom (80.7%), with mostly moderate symptom severity (VAS 4-7) reported. Across both nasal cavities, the most frequent nasoendoscopic finding among CRS patients was nasal edema (82.4% and 93%). A positive and weak correlation existed between the total VAS score of all symptoms and the total LKS of both nasal cavities ($r = 0.387$, $p < 0.05$).

Conclusion: The nasal symptoms of CRS patients were significantly associated with its nasoendoscopic findings.

Highlights:

1. Nasal congestion was the most common symptom presented in CRS patients.
2. Nasal symptoms of CRS were positively associated with nasoendoscopic findings.

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Introduction

Chronic rhinosinusitis (CRS) is prevalent worldwide, particularly in Indonesia. According to the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) 2020, CRS is defined as inflammation of the nose and paranasal sinuses lasting more than 12 weeks.[1] Diagnosis efforts based on EPOS 2020 begin with symptom assessment and physical examinations, including anterior rhinoscopy at primary healthcare facilities and nasoendoscopy and other ancillary tests at secondary healthcare facilities.[1] Symptom assessment using the visual analogue scale (VAS) is considered a valuable method for assessing the severity of CRS, while nasoendoscopy is the gold standard for evaluating CRS severity.[1]

CRS has a high prevalence rate. According to the Centers for Disease Control and Prevention (CDC), in 2022, in the United States (US), approximately 28.9 million adults, or 11.6% of the adult population, were diagnosed with CRS.[2] The exact prevalence of CRS in Indonesia is currently unknown. The Indonesian Ministry of Health, in 2003, reported that nasal and sinus diseases ranked 25th among the top 50 major diseases. A study conducted at Dr. Mohammad Hoesin General Hospital, Palembang, found 73 cases of CRS out of 140 cases of rhinosinusitis.[3] Similarly, an investigation at the Ear, Nose, and Throat (ENT) Clinic of Dr. M. Djamil General Hospital, Padang, identified 63 cases of CRS.[4] At the ENT Clinic of Dr. Soetomo General Academic Hospital, Surabaya, the average proportion of patients with rhinosinusitis over three years was 65.5%, with 43 cases of CRS identified from March 2018 to February 2019.[5,6]

At primary healthcare facilities, healthcare providers can only conduct symptom history assessments and physical examinations, such as anterior rhinoscopy for CRS patients. This limitation arises because nasal endoscopy examinations cannot be performed at primary healthcare facilities due to several constraints, including the lack of nasendoscopy equipment. Moreover, nasal endoscopy can only be performed by ENT specialists.[7] This limitation challenges the competency level of general practitioners at primary healthcare facilities in conducting nasal endoscopy examinations.[8,9]

This study aimed to elucidate the relationship between nasoendoscopy findings based on the Lund-Kennedy score (LKS), an objective examination and the gold standard for assessing CRS severity, which can only be conducted at secondary healthcare facilities, and the nasal complaints of CRS patients, which can be quantitatively evaluated using symptom assessments with the VAS score, an initial examination and a method for assessing CRS severity that can be performed at primary healthcare facilities.[10,11] This study might establish novel suggestions for future guidelines in the early diagnosis and assessment of CRS severity at primary healthcare facilities, enabling faster diagnosis and severity assessment based on symptom history and simple physical examinations.[12,13]

Methods

This retrospective cross-sectional study analyzed CRS patients admitted to the ENT Outpatient Clinic of Dr. Soetomo General Academic Hospital, Surabaya, from July 2021 to July 2022. Electronic medical records (EMR) were retrieved under the ICD-10 Code J32 “chronic sinusitis” in the EMR system of Dr. Soetomo General Academic Hospital, Surabaya. A consecutive sampling frame was then applied to eligible patient data for the analysis. The inclusion criteria comprised of the following: 1) Patients with the clinical diagnosis of CRS under the ICD-10 Code J32, and 2) Patients aged ≥18 years old. Patients were excluded from the analysis if they met at least one of the following criteria: 1) Patients who had already undergone functional endoscopic sinus surgery (FESS), or 2) Incomplete medical record data.

Patient symptoms were defined as nasal complaints attributed to CRS, which encompasses the feeling of fullness in the nose (nasal congestion), runny nose (nasal discharge), facial pain/pressure, and loss of smell (hyposmia and anosmia). VAS was utilized to quantitatively assess the severity of nasal symptoms among the CRS patients using a scale ranging from 0 to 10.[14]

Nasoendoscopic findings were quantitatively assessed using LKS. This clinical scoring was used to evaluate the severity of CRS by assessing various aspects of nasoendoscopy, including the presence and severity of nasal polyps, discharge, edema, scarring, and crusting in each nasal cavity. Each parameter was assigned a score ranging from 0 to 2. The total score was then calculated by summing the scores of all individual parameters, with higher scores indicating more severe disease.[15]

The data was statistically analyzed using the International Business Machines Corporation (IBM) Statistical Package for the Social Sciences (SPSS) version 26.0 for Windows.[16] Descriptive statistics were presented in tables. Spearman’s rank correlation was utilized to identify the correlation between the VAS score of patients’ nasal symptoms and LKS from the nasoendoscopic findings. A p-value of <0.05 was considered statistically significant.

Results

A total of 139 patients were clinically diagnosed with CRS in the ENT Outpatient Clinic of Dr. Soetomo General Academic Hospital, Surabaya, from July 2021 to July 2022. After excluding patients based on the predetermined eligibility criteria, 57 patients were included in the study. The majority of patients were female (64.9%) and aged 50–59 years old (26.9%) at diagnosis (Table 1). The main nasal symptoms presented among CRS patients were nasal congestion (80.7%), followed by facial pain (78.9%), nasal discharge (75.4%), and anosmia/hyposmia (38.6%) (Table 2). The distribution of VAS scores for these symptoms varied between left and right nasal cavities.

Table 1. Demographic characteristics (n = 57)

Variable	n (%)
Sex	
Male	20 (35.1%)
Female	37 (64.9%)
Age	
18–29 years old	13 (22.8%)
30–39 years old	5 (8.8%)
40–49 years old	14 (24.6%)
50–59 years old	17 (29.8%)
60–69 years old	6 (10.5%)
70–79 years old	2 (3.5%)

Source: Research data, processed

The most common VAS severity degree for nasal congestion in the left nasal cavity was moderate symptoms (VAS 4-7), accounting for 27 cases (47.7%). Most cases were mild (VAS 0-3) and moderate for nasal discharge, totaling 23 cases (40.4%). The highest frequency of mild symptoms was observed for anosmia/hyposmia, with 42 cases (73.7%).

Table 2. Patient nasal symptoms

Symptoms	n (%)
Nasal Congestion	
Yes	46 (80.7%)
No	11 (19.3%)
Nasal Discharge	
Yes	43 (75.4%)
No	14 (24.6%)
Facial Pain	
Yes	45 (78.9%)
No	12 (21.1%)
Anosmia/Hyposmia	
Yes	22 (38.6%)
No	35 (61.4%)

Source: Research data, processed

Regarding facial pain, mild and moderate symptoms were most prevalent, with 25 cases (43.9%). The most common severity degree in the right nasal cavity based on the VAS score was moderate symptoms, with 25 cases (43.9%). For nasal discharge, the predominant degree was moderate symptoms, accounting for 26 cases (45.6%). The highest frequency of mild symptoms was observed for anosmia/hyposmia, with 43 cases (75.4%). Regarding facial pain, mild symptoms were most prevalent, with 22 cases (38.6%).

Table 3. VAS score for severity of nasal symptoms

Symptoms	VAS Severity	Left Nasal Cavity	Right Nasal Cavity
Nasal Congestion	Mild (0-3)	20 (35.1%)	18 (31.6%)
	Moderate (4-7)	27 (47.4%)	25 (43.9%)
	Severe (8-10	10 (17.5%)	14 (24.0%)
Nasal Discharge	Mild (0-3)	23 (40.4%)	21 (26.8%)
	Moderate (4-7)	23 (40.4%)	26 (45.6%)
	Severe (8-10)	11 (19.3%)	10 (17.5%)
Facial Pain	Mild (0-3)	25 (43.9%)	22 (38.6%)
	Moderate (4-7)	25 (43.9%)	20 (35.1%)
	Severe (8-10)	7 (12.3%)	15 (26.3%)
Anosmia/ Hyposmia	Mild (0-3)	42 (73.7%)	43 (75.4%)
	Moderate (4-7)	8 (14.0%)	7 (12.3%)
	Severe (8-10)	7 (12.3%)	7 (12.3%)

Source: Research data, processed

Table 4 presents the results of the nasoendoscopic examination based on LKS in CRS patients at Dr. Soetomo General Academic Hospital, Surabaya. Polyps were found in only 17 patients (29.8%) in the left nasal cavity and 13 patients (22.8%) in the right nasal cavity. Furthermore, nasal edema was observed in 47 patients (82.4%) in the left nasal cavity and 53 patients (93%) in the right nasal cavity. Additionally, nasal secretions were found in 43 patients (76.4%) in the left nostril and 44 patients (77.2%) in the right nostril.

Table 4. Nasoendoscopic findings based on LKS

Nasoendoscopic Findings	LKS	Left Nasal Cavity	Right Nasal Cavity
Polyp	0	40 (70.2%)	44 (77.2%)
	1	6 (10.5%)	2 (3.5%)
	2	11 (19.3%)	11 (19.3%)
Edema	0	10 (17.5%)	4 (7.0%)
	1	13 (22.8%)	20 (35.1%)
	2	34 (59.6%)	33 (57.9%)
Secretions	0	14 (24.6%)	13 (22.8%)
	1	20 (36.0%)	21 (36.8%)
	2	23 (40.4%)	23 (40.4%)

Source: Research data, processed

Table 5 reveals that the total VAS score for all symptoms and the LKS (left and right nasal cavity) had a p-value of 0.003, indicating a significant correlation ($p < 0.05$). Furthermore, the correlation coefficient value indicated an R-value of 0.387, indicating a weak correlation, and a positive correlation coefficient value indicated a direct relationship between the two variables. These results mean that if the total VAS score for all symptoms in both nasal cavities increases, the total LKS will also increase. Conversely, if the total VAS score for all symptoms in both nasal cavities decreases, the total LKS will decrease.

Table 5. Correlation between nasal symptoms (VAS) and nasoendoscopic findings (LKS)

	Total LKS (left + right)	
	Correlation Coefficient (r)	p-value
Total VAS of all Symptoms	0.387	0.003

Source: Research data, processed

Discussion

In this study, the most commonly reported nasal symptom by CRS patients in the ENT Outpatient Clinic of Dr. Soetomo General Academic Hospital, Surabaya, was nasal congestion, with 46 patients (80.7%) experiencing this symptom. These findings are consistent with a prior study conducted by Sedaghat (2018), where the most frequently encountered complaints of CRS were nasal congestion (81-95%), followed by headache (70-85%), nasal discharge with secretion (51-83%), and hyposmia (61-69%).[17] These findings were also in line with other studies by Fokkens, *et al.* (2020) in the European Position Paper on Rhinosinusitis (EPOS) and Caliaperoumal, *et al*.

(2021) that indicated nasal congestion as a very common symptom in CRS patients.[1,18]

The VAS score assessment among CRS patients revealed that the severity of most nasal symptoms across both nasal cavities was either mild or moderate. No prior study has assessed the degree of each CRS symptom with VAS scores on each nasal cavity. However, a study conducted by Samara, *et al*. (2020) at Dr. Soetomo General Academic Hospital, Surabaya, reported that the most common degree of nasal congestion on the VAS score was moderate, while the most common degree of nasal discharge was mild, anosmia/hyposmia was mild, and facial pain was mild.[6] Another study from South India also demonstrated that 51.4% of CRS patients experienced moderate nasal symptom severity, 42.9% experienced severe symptoms, and 5.7% experienced mild symptoms, indicating that moderate symptom severity was predominant among most CRS patients.[19]

The nasoendoscopic examination results based on LKS in CRS patients at Dr. Soetomo General Academic Hospital, Surabaya, revealed that polypoid findings were only found in 22.8% to 29.8% of patients, indicating that more patients did not exhibit polypoid findings. Furthermore, nasal edema was observed in 82.4% to 93% of patients, while secretion was found in 76.4% to 77.2% of patients. These findings differ from those of Caliaperoumal, *et al*. (2021), where the most common findings were nasal cavity secretion in both nostrils, followed by nasal edema in both nostrils as the second most common, and polypoid findings in both nostrils as the least common.[18] The scarcity of polypoid findings might be due to many patients seeking treatment without a diagnosis of CRS with nasal polyps. Additionally, previous studies also found that the presence of nasal polyps was significantly associated with older age and males, which could also contribute to the lower prevalence of polypoid findings in this study.[20,21]

There was a weak and positive significant correlation between the total VAS score for all symptoms and the total LKS in CRS patients at Dr. Soetomo General Academic Hospital, Surabaya. Current evidence also indicated a positive correlation between the severity of subjective symptoms in CRS patients and findings on nasoendoscopy examination.[20,22] However, these findings slightly differ from those of Caliaperoumal, *et al*. (2021), whose study reported a moderate positive correlation between symptom scores based on VAS and nasoendoscopy based on LKS.[18]

Strength and Limitations

In discussing the limitations of this study, it is essential to acknowledge several factors that may have impacted the research outcomes. These included incomplete medical record data retrieval and time constraints faced by the authors during the study. Additionally, another weakness of this study was the lack of differentiation between unilateral and bilateral criteria in assessing the affected side of the nasal cavity and the absence of an analysis of the relationship between the VAS scores for each CRS symptom and LKS of the patients.

Conclusion

The nasoendoscopic findings assessed on LKS exhibited a statistically significant, linear, and weak correlation with patients' nasal symptoms based on VAS. Further investigation is warranted to explore the relationship between additional diagnostic investigations, such as computed tomography (CT) scans utilizing the Lund-Mackay score, and the nasal symptoms of CRS patients. It is essential to assess whether there is a stronger correlation between CT scan findings and the symptoms perceived by CRS patients, thereby determining the optimal modality for diagnosing CRS based on symptoms and complaints. Due to the prevalence of incomplete medical record data, it is also advisable to ensure comprehensive documentation, particularly regarding patients' rhinology status. This measure would minimize the exclusion of data in subsequent research and enhance the representativeness of results.

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Conflict of Interest

The authors declared there is no conflict of interest.

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Ethical Clearance

The research protocol of this study was approved by the Health Research Ethics Committee of Dr. Soetomo General Academic Hospital, Surabaya, on 25-08-2023, with a reference number of 0756/KEPK/VIII/2023.

Authors' Contributions

Designed the study: CMC, IK, GS, and PSN. Collected data, performed background literature review, and designed the manuscript: CMC, IK. Performed statistical analysis: CMC. Supervised results and discussion: IK, GS, and PSN. All authors reviewed and approved the final version of the manuscript.

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