

The Correlation Between Sinonasal Outcome Test (SNOT)-22 and Modified Lund-Kennedy (MLK) in Chronic Rhinosinusitis (CRS) Patients

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Abstract

CRS is an inflammation of the sinonasal mucosa. SNOT-22 is a questionnaire that assesses the life quality of CRS patients. MLK is a scoring system that uses nasal endoscopy. This study aimed to analyze the correlation between complaints on SNOT-22 and endoscopy findings on MLK. This cross-sectional study was conducted at a tertiary hospital from January 2023 to December 2024. A total of 74 patients were included: 45 CRS with Nasal Polyps (CRSwNP) and 29 CRS without Nasal Polyps (CRSsNP). This study used Pearson's statistical analysis to identify the correlation between SNOT-22 and MLK in CRS patients, more specifically in CRSwNP and CRSsNP with Spearman's statistical analysis. There is a correlation between SNOT-22 and MLK in CRS with $r=0.408$, sig/p value $0.000<0.05$; a correlation in CRSwNP with $r=0.364$, sig/p value $0.014<0.05$; a correlation in CRSsNP with $r=0.482$, sig/p value $0.008<0.05$; a correlation between SNOT-22 nasal phase and MLK in CRSwNP with $r=0.876$, sig/p value $=0.000<0.05$; and no correlation between SNOT-22 nasal phase and MLK in CRSsNP with $r=0.345$, sig/p value $0.066>0.05$. There is a moderate correlation between SNOT-22 and MLK in CRS, a weak correlation in CRSwNP, a moderate correlation in CRSsNP, a very strong correlation between SNOT-22 nasal phase and MLK in CRSwNP, and no correlation between SNOT-22 nasal phase and MLK in CRSsNP.

Keywords: CRSwNP; CRSsNP; SNOT-22; MLK.

INTRODUCTION

CRS is a prevalent condition characterized by persistent inflammation of the nasal and paranasal sinuses lasting more than 12 weeks. It is classified into CRSwNP and CRSsNP. CRS significantly impacts patients' quality of life (QoL), causing symptoms such as nasal obstruction, facial pressure, hyposmia, and postnasal drip. Accurate assessment of disease burden is essential for optimal management and treatment decisions (Fokkens et al., 2020).

The SNOT-22 is a widely used patient-reported outcome measure (PROM) evaluating nasal, sleep, facial, and psychological symptoms with scores ranging from 0 to 110. Meanwhile, objective evaluation typically involves endoscopic and radiologic assessments (Sedaghat et al., 2024; Zhang & Zhang, 2017). The Modified Lund-Kennedy (MLK) endoscopic score quantifies mucosal findings including polyps, edema, and discharge. The European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS 2020) outlines

diagnostic criteria requiring both symptomatology and objective evidence. Although both SNOT-22 and MLK scoring are widely used, the correlation between subjective and objective measures remains variable (Agarwal et al., 2025; Lee et al., 2024; Lin et al., 2021).

Understanding this correlation is crucial for optimizing treatment strategies, particularly in resource-limited settings where advanced imaging may not be readily available for guiding management decisions. This study aimed to evaluate the correlation between subjective complaints (SNOT-22) and objective findings (MLK) in patients with CRS who underwent surgical intervention.

MATERIALS AND METHODS

Study Design and Population

This is cross-sectional study analyzed secondary data from chronic rhinosinusitis (CRS) patients who underwent Functional Endoscopic Sinus Surgery (FESS)

at the Rhinology Clinic of Dr. Saiful Anwar Hospital between January 2023 and December 2024. A total of 74 adult patients diagnosed with CRS according to the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) 2020 criteria were included in the study. Eligible participants were patients aged ≥ 18 years with a diagnosis of CRS characterized by symptoms persisting for more than 12 weeks accompanied by endoscopic and/or computed tomography findings, and who had complete preoperative Sinonasal Outcome Test (SNOT)-22 and Modified Lund-Kennedy (MLK) score data. Patients with incomplete medical records, those managed non-surgically, and patients with comorbid conditions that could significantly affect quality of life, such as malignancy or severe psychiatric disorders, were excluded from the study.

Data Collection

Data collection included assessment of patient-reported symptoms, endoscopic findings, and demographic characteristics. Quality of life was evaluated using the Sinonasal Outcome Test (SNOT)-22 questionnaire, which consists of 22 items scored on a scale of 0-5, with a total score range of 0-110; higher scores indicate poorer quality of life. Endoscopic findings were assessed using the Modified Lund-Kennedy (MLK) scoring system, which evaluates the presence of polyps, edema, and nasal discharge in each nostril, with each parameter scored from 0-2, resulting in a total score range of 0-12. Demographic and clinical data, including age, gender, and CRS phenotype (with or without nasal polyps), were also collected from the medical records (Orlando et al., 2025; Sudiro et al., 2023; Tajudeen et al., 2019).

Statistical Analysis

Data were analyzed using SPSS v26. Descriptive statistics (mean, SD, percentages) summarized demographic and clinical characteristics. Pearson's correlation test assessed the relationship between SNOT-22 and MLK scores in all CRS. Spearman's correlation test assessed the relationship between SNOT-22 and MLK in CRSwNP and CRSsNP and also specifically the relationship between nasal phase of SNOT-22 and MLK in CRSwNP and CRSsNP. A p-value < 0.05 was considered significant (Chen et al., 2018).

RESULTS

Demographic and Clinical Characteristics

The study included 74 patients. CRS with nasal polyps (CRSwNP) was present in 60.81% of patients. The

average age of CRS patients who received from January 2023 to December 2024 was 40 years old, with the youngest being 23 years old and the oldest being 53 years old. Based on the Sturges formula grouping, the 42-49 age group was the group with the highest proportion (21.6%). The demographic and clinical characteristics of the study population are presented in Table 1.

Table 1. Demographic and Clinical Characteristics.

Age	Number	Percentage
<18 years	2	2.70%
18–25 years	10	13.51%
26–33 years	13	17.56%
34–41 years	7	9.45%
42–49 years	16	21.62%
50–57 years	15	20.27%
58–65 years	5	6.75%
66–73 years	6	8.10%
Total	74	100%

As shown in Table 2, female patients constituted the majority of the study population, accounting for 39 patients (54.05%), while 35 patients (45.95%) were male. The mean SNOT-22 score was slightly higher among female patients than male patients (32.67 vs. 32.22), indicating a marginally greater symptom burden. In contrast, the mean Modified Lund-Kennedy (MLK) score was slightly higher in males than females (5.08 vs. 4.92), suggesting comparable endoscopic disease severity between sexes. The distribution of CRS phenotypes is presented in Table 3. CRS with nasal polyps (CRSwNP) was more prevalent, comprising 45 patients (60.81%), whereas CRS without nasal polyps (CRSsNP) accounted for 29 patients (39.19%). The most severe symptom domains according to the SNOT-22 questionnaire are shown in Table 4. Nasal obstruction was the most frequently reported severe symptom, with 45.7% of patients assigning the maximum score of 5, followed by rhinorrhea (22.2%) and the need to blow the nose (11.1%). Severity classification based on SNOT-22 scores is summarized in Table 5. Most patients exhibited moderate symptom severity. Among patients with CRSwNP, 42 patients (93.33%) were classified as having moderate symptoms and 3 patients (6.67%) as having severe symptoms. In contrast, all patients with CRSsNP (100%) were classified within the moderate severity category.

Table 2. Distribution by Gender.

Gender	Number	Percentage	Mean SNOT-22	Mean Modified Lund-Kennedy
Male	35	45.95%	32.22	5.08
Female	39	54.05%	32.67	4.923
Total	74	100%		

Table 3. Diagnosis of Chronic Rhinosinusitis Based on Gender.

Diagnosis	Number	Percentage
CRS with Nasal Polyps	45	60.81%
CRS without Nasal Polyps	29	39.19%
Total	74	100%

Table 4. Most Severe SNOT-22 Items (Score = 5/5).

Symptom	Frequency (n=81*)	Percentage (%)
Nasal obstruction	37	45.7%
Rhinorrhea	18	22.2%
Need to blow nose	9	11.1%
Sneezing	5	6.2%
Postnasal discharge	4	4.9%

Table 5. Severity Level Based on SNOT-22.

CRS Type	Mild	Moderate	Severe
With Polyp	0	42	3
Without Polyp	0	29	0

DISCUSSION

This study demonstrates a moderate positive correlation between SNOT-22 and MLK scores in CRS patients. This indicates that patient-reported symptom severity correlates with objective endoscopic inflammation. These findings are consistent with previous research, including (Deksa, 2018; Psaltis et al., 2014; Zhang & Zhang, 2017), who reported significant associations between subjective outcomes and endoscopic assessments. The slightly higher SNOT-22 scores among females may reflect increased symptom perception or comorbidities.

This study found a moderate and statistically significant correlation between SNOT-22 and MLK scores in CRS patients undergoing FESS ($r = 0.408$), consistent with prior research. These previous studies indicated a meaningful link between symptom perception and endoscopic findings. Females reported worse QoL despite similar endoscopic severity, possibly due to comorbid conditions (e.g., asthma, allergies) or psychosocial factors (Taheri et al., 2024).

The data underscore the importance of combining subjective and objective tools to guide CRS diagnosis and treatment. This study demonstrated a moderate correlation between SNOT-22 and MLK scores CRSwNP patients had higher MLK scores, reflecting more severe endoscopic findings, while SNOT-22 scores were comparable between phenotypes. These results support the use of both SNOT-22 and MLK scoring in routine clinical evaluation and follow-up. Their combined

application provides a more holistic understanding of patient burden and mucosal disease activity. Nevertheless, this study has several limitations, including its retrospective cross-sectional design, single-center setting, and the absence of radiological comparison using CT-based Lund-Mackay scoring, which may limit the generalizability and comprehensiveness of the findings (Tham et al., 2024).

CONCLUSIONS

A statistically significant moderate correlation exists between SNOT-22 and MLK scores in patients with CRS undergoing surgery. Integrating both subjective and objective measures is recommended for comprehensive CRS assessment, enhances clinical decision-making, particularly in surgical planning.

There is a statistically significant moderate correlation between subjective SNOT-22 scores and objective MLK endoscopic scores in CRS patients undergoing FESS. Use of both instruments is recommended for comprehensive clinical assessment and patient monitoring.

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