PREVALENCE OF CHRONIC RHINOSITIS WITH SARS-COV-2 INFECTION IN RHINOLOGY-ALLERGY CLINIC HASAN SADIKIN GENERAL HOSPITAL

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ABSTRACT

Introduction: Chronic rhinosinusitis (CRS) defined as the inflammation of the nasal lining and sinuses, presenting with persistent symptoms such as nasal congestion or a runny nose for a duration exceeding twelve weeks. The management of CRS in COVID-19 pandemic era follows the guidelines provided by EPOS 2020. Notably, symptoms like anosmia or hyposmia and ageusia are indicative of a COVID-19 infection. **Purpose:** This research purposes is to address the prevalence of CRS patients and COVID-19 and manifestation of COVID-19 in CRS patients from March 2020 – August 2021 at the ORL-HNS Allergy Rhinology Clinic, RSHS. **Methods:** This research employs a cross-sectional design, focusing on describing and observing various aspects of the subject under investigation. This study used secondary data from telephone interviews and a questionnaire administered to CRS patients. **Results:** 160 respondents are included in the inclusion criteria, with the majority being male (92 or 57.5%) and an average age of 37.5±17.2 years. The prevalence of COVID-19 in CRS patients during the study period was 28 (19.6%), with most CRS cases being without nasal polyps (46.4%). The most prevalent manifestation of COVID-19 found in CRS patients were elevated temperature (18 or 72%), anosmia (13 or 52%), followed by nasal congestion (9 or 36%). **Conclusion:** The prevalence of COVID-19 in CRS patients during the March 2020 – August 2021 period was 28 (17.5%). The clinical picture of CRS patients who experienced COVID-19 was that the symptoms were mostly mild, and the most common were anosmia, fever, and nasal congestion.

Keywords: Chronic Rhinosinusitis, COVID-19, EPOS 2020, Anosmia

Introduction

Chronic rhinosinusitis (CRS) is a disease caused by inflammation of the nasal lining and sinuses due to interaction of host and environmental factors. CRS diagnosis is based on two obstructive symptoms and rhinorrhea with facial tenderness or smell disturbances that persist for 12 weeks.[1] The prevalence of CRS variates from 5% to 12% of the population.[2,3] A 2005 study conducted in Indonesia showed 435 individuals with rhinology problems, with 69% suffering from rhinosinusitis. The prevalence of rhinosinusitis at the Dr. Hasan Sadikin Bandung General Hospital (RSUP Dr. Hasan Sadikin (RSHS) Bandung) was 11% between 2010 and 2013.[1,3]

The initial occurrence of COVID-19, an illness with the etiology of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, was initially found in Wuhan, China towards the end of 2019.[4] The first case in Indonesia was reported on March 2, 2020, and its spread experienced a sharp increase with a total of 2,567,630 infections. The pathogenesis of SARS-CoV-2 infection is still being studied further, although it is not too different from the pathogenesis of previously known SARS variants. The SARS-CoV-2 virus infects respiratory cells.[5]

Common manifestation of SARS-CoV-2 infection include elevated body temperature, a persistent cough, muscle discomfort, breathing difficulties, and a feeling of breathlessness. Anosmia or reduced sense of smell, along with ageusia or the inability to taste, are symptoms associated with CRS that are also present in cases of COVID-19.[1] COVID-19 infections are characterized by mild symptoms resembling the flu and mild pneumonia. Nevertheless, approximately 20% of cases with mild to moderate symptoms leads to a serious condition known as acute respiratory distress syndrome (ARDS).[6]

A 2020 retrospective analysis in Wuhan found that 72 (6.1%) of 1,172 people with COVID-19 were previously diagnosed with CRS. CRS and COVID-19 have similar symptoms, such as smelling disturbances or anosmia which are accelerating in CRS and immediate in COVID-19. Eosinophilic inflammation, a pathophysiology of CRS, can provide a guarding effect against COVID-19.[7] Comorbid CRS does not added the possibility of COVID-19 infection and reduces the risk of hospitalization.[8]

Patients with CRS use the corticosteroid nasal spray, which has been shown to reduce the binding receptors for COVID-19. A study conducted in America in 2020 compared the amount of ACE-2 expression in patients with and without a corticosteroid nasal spray (mometasone furoate). The study showed that type 1 IFN (interferon) suppression decreased ACE-2 expression in patients using corticosteroid nasal sprays.[9] Study by Islek and Balci in 2021 revealed that topical steroids (mometasone furoate) did not prevent olfactory and taste abnormality in patients of COVID-19. However, it can decrease the degree and duration of manifestation.[10]

CRS management during the COVID-19 pandemic is stated in European Position Paper on Rhinosinusitis and Nasal

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Polyps (EPOS) 2020, an update of the 2012 EPOS guidelines. The stratification and classification of CRS based on the 2012 EPOS guidelines categorizes CRS as with or without nasal polyps. In contrast, the EPOS 2020 guidelines stratified CRS into the primary CRS and secondary CRS based on the endotype and phenotype.[2] The application of the SSR classification based on the EPOS 2020 guidelines at RSUP Dr. Hasan Sadikin was only carried out in June 2020, while this study used medical record data from March to August 2021.

This study's results are expected to serve as a reference regarding the relationship between SSR and COVID-19. Until this study, no study had been conducted on the incidence of CRS patients with COVID-19 at Dr. Hasan Sadikin Hospital in Bandung. This lack of research encouraged the authors to conduct this study.

Methods

The research's design was a observational descriptive study conducted on patients with chronic rhinosinusitis (CRS) who received outpatient treatment at the ORL-HNS Allergic Rhinology Polyclinic at RSUP dr. Hasan Sadikin (RSHS) Bandung from March 2020 to August 2021. The study employed a cross-sectional study design. Data were obtained from both secondary data in medical records and primary data collected through telephone interviews or questionnaires administered to patients.

The inclusion criteria encompassed all patients diagnosed with CRS at the ORL-HNS Allergic Rhinology Polyclinic, RSHS, between March 2020 and August 2021, who could be reached via telephone or other communication channels, and who were agreed to participate in the study. The exclusion criteria include unavailable medical record data, uncontactable patients, and declined participation patients. The sampling technique employed was total sampling, including all chronic rhinosinusitis patients who visited the allergy rhinology clinic from March 2020 to August 2021, and minimum sample size of 150 patients.

The research utilized COVID-19 questionnaires, cell phones, and stationery. Data was collected and processed using Microsoft Excel software. Numerical data variables, such as age, were measured using means, while categorical and nominal variables were presented in terms of frequency and percentage.

This study has received approval from the Study Ethics Committee of the Ministry of Health Republic of Indonesia, Directorate General of Health Services, dr. Hasan Sadikin Bandung.

Result

A total of 195 patients with CRS who went to the Rhinology-Allergy Polyclinic at RSUP Dr. Hasan Sadikin between March 2020 and August 2021 were included in this study. Five patients were excluded due to death, 25 due to missing medical records and patient telephone numbers, and five due to mismatched medical record data and diagnosis. Thus, 160 patients were included in the final analysis.

Most participants were male (57.5%). The mean age of the subjects was 37.5 ± 17.2 years, participant with the lowest age was five years old and the oldest being 83 years old. Most participants had completed high school (32.5%) and were unemployed (41.9%). Majority of the participants were middle-income, with an income range of Rp2,500,000 to Rp5,000,000 for 88 subjects (55%).

Table 1. General Characteristic of Chronic Rhinosinusitis Patients (n=160)

General Characteristics	Number (n)	%
1.Sex		
Male	92	57,5
Female	68	42,5
2.Age (in years)		
Mean ± SD	37,5 ± 17,2	
Median	34	
3.Educational Level		
No Formal Education	5	3,1
Elementary School	28	17,5
Middle School	47	29,4
High School	52	32,5
Diploma	4	2,5
Bachelor	24	15
Master	0	0

General Characteristics	Number (n)	%
4.Job		
Civil Workers	8	5
Private Employee	27	16,9
Self-Employed	26	16,2
Laborer	27	16,9
Not Working	67	41,9
Others	5	3,1
5.Economic Status		
≤ Rp2.500.000	60	37,5
Rp2.500.000 s/d Rp5.000.000	88	55
> Rp5.000.000	12	7,5

A total of 28 subjects (19.6%) experienced COVID-19. Of the 28 subjects who had COVID-19, CRSsNP was the most common type of CRS associated with COVID-19 infection (46.4%).

Table 2. Description CRS patients with COVID-19

CRS n/%	Location	Endotype	Phenotype	COVID-19 positive (n=28)
Primary 130 (18,75)	Localized	Type 2	AFRS	0
			CRSsNP	0
	Localized	Non-Type 2	Isolated Sinusitis	
			Sfenoid	1 (3,6)
			frontalis	1 (3,6)
	Diffuse	Type 2	CRSwNP/eCRS	6 (21,4)
			CRSsNP	13 (46,4)
			AFRS	0
			CCAD	0
	Diffuse	Non-Type 2	Non- eCRS	0
Secondary 30 (20,6%)	Localized	Local Pathology	Odontogenik	2 (7,2)
			Fungal Ball	1 (3,6)
			Tumor	4 (14,4)
	Diffuse	Mechanical	PCD	0
			CF	0
	Diffuse	Inflammation	GPA	0
			EGPA	0
	Diffuse	Immunology Factors	Selective Immunodeficiency	0

Subjects with CRS with COVID-19 infection mainly suffered from mild COVID (78.57%).

Table 3. Description of COVID-19 Stage on CRS Patients

Stages of COVID-19	CRS (n=28)	
	N	%
Asymptomatic	0	0
Mild	22	78.57
Moderate	6	21.42

Severe	0	0
Critical	0	0

The most prevalent symptom of COVID-19 in primary CRS was fever (92.86%), followed by nasal congestion (60.71%) and anosmia (60.71%).

Tabel 4. Symptoms of COVID-19 in CRS patients

Symptoms	CRS (n=28)	
	N	%
Fever	26	92.86
Severe Headache	8	28.57
Nasal Congestion	17	60.71
Cough	9	32.14
Hard to Breath	0	0
Sore Throat	4	14.29
Nausea and Vomiting	5	17.86
Diarrhea	9	32.14
Ageusia/ disgeusia	4	14.29
Anosmia	17	60.71
Dyspnea	9	32.14
Severe Breathing Distress	0	0
Saturation <90% at room air	0	0
Hospitalized	1	

Discussion

Characteristics of the subjects in this study showed that most participants were male (57.5%). The result follows a study by Benjamin et al., who found that as many as 63% of patients with chronic rhinosinusitis without polyps were male. Males were found to have milder symptoms of rhinosinusitis than females.[11] Another study in Germany demonstrated a higher prevalence of CRSwNP in men (approximately 7,200 individual per million) than women (approximately 4,700 individual per million) over five years.[12]

Exposure to tobacco smoke plays an active role in increasing chronic rhinosinusitis because it can trigger mucosal changes and damage to nasal cilia and paranasal sinuses.[13] However, an epidemiological study by Ference et al. in 2015 stated that the incidence of CRS in women was elevated two times than in men because of hormonal factors.[14]

The mean age of the subjects was 37.5 ± 17.2 years (5-83). The prevalence of CRS is related to the age of the patient. These results are per a study conducted at Sanglah General Hospital in Denpasar, which found the highest proportion of ages in the range of 46-60 years and the lowest proportion aged <15 years with an average age of 41.2 ± 15.8 years. The incidence of CRS is higher in the productive adult age group. The result is that adults are more active outside the home and are more often exposed to allergens or pollutants accompanied by changes in diet and daily lifestyle.[13] The incidence of CRS with nasal polyps rises with age, with the most prevalent in the age group of 40 to 69 years, with a relatively small number in children and patients aged >80 years. The patients with the age of >60 years old have twice the risk of CRS than the younger population. The subject of 2.9 million individuals is 45 years.[15]

Most participants were senior high school graduates (32.5%) and junior high school graduates (29.4%), with the most common occupation being unemployed (41.9%). The study is consistent with a study conducted in Korea, which found that 34.17% of subjects had 9-12 years of education.[16] Study conducted by Multazar et al. found that housewives (IRT) had the highest proportion, as much as 28.7%.[17] In this study, IRT was classified as not working. The discrepancy of results in this research with the previous ones can be caused by differences in the number of samples studied in each study. Most subjects in this study were middle-income earners with an income range of Rp2,500,000 to Rp5,000,000 for 88 subjects (55%). Studies reveal the relationship between patients' knowledge level and their tendency to seek better treatment.[18]

Based on the results of the interviews, it was found that 28 subjects had COVID-19; the primary type 2 diffuse primary CRS was the most experienced with COVID-19 (59.4%). The result is similar to other studies, which found that the prevalence of 12.1% in patients with COVID-19 CRS. Epidemiological studies in Iran report that the prevalence of COVID-19 is 14.2%. By looking at the same level of COVID-19 infection in the generic population and data obtained on CRS patients, CRS was not a predisposing factor for COVID-19.[19]

We evaluated the effect of CRS and COVID-19 co-infection on patients' symptom severity and quality of life by

utilizing the Sino-Nasal Outcome Test-22 (SNOT-22) questionnaire. Our findings revealed no disparities across the four domains of the SNOT-22 questionnaire (nasal symptoms, otology, sleep, emotional) when comparing CRS patients with and without COVID-19. Therefore, it can be inferred that COVID-19 does not worsen sinonasal symptoms, including the sense of smell, in individuals with CRS.[7]

Unlike previous research findings, it has been suggested that individuals with chronic rhinosinusitis (CRS) have a greater vulnerability to contracting COVID-19 and experiencing more severe forms of the disease compared to those without CRS. Specifically, individuals with CRS without nasal polyp, CRS managed with intranasal corticosteroids, and non-atopic CRS face a heightened risk of acquiring COVID-19. Moreover, CRS can serve as a breeding ground for bacteria or viruses, while diminished production of nitric oxide in the sinuses indicates compromised local immune defenses and heightened susceptibility to secondary infections. CRS is also linked with immune dysfunctions, such as impaired nasal epithelial defenses and deficiencies in specific antibodies.[20]

The most prevalent manifestation of COVID-19 found in CRS were elevated body temperature, nasal congestion, and anosmia. In several studies, olfactory disturbances are a symptom of COVID-19 with a frequency that varies from 5 to 85%. Olfactory abnormality occurs in 56% to 78% of people with CRS. Olfactory abnormality is associated with type 2 inflammatory CRS. Patients who have chronic rhinosinusitis (CRS) accompanied by nasal polyps experience more pronounced symptoms of anosmia. An abrupt loss of the olfactory sense, without any indications of nasal congestion, is a common initial sign of COVID-19. While anosmia typically improves within the first few weeks after contracting the virus, it may remain for several months or even become persistent in individuals with long COVID.[21]

Other studies have also found fever to be a symptom in typical COVID-19 patients. The most common symptoms reported by people with COVID-19 infection are cough, fever, and fatigue. Nearly half of the respondents complained of anosmia. A COVID-19- positive CRS subject is known to have more significant manifestation of cough, fever, fatigue, loss of appetite, dysgeusia, hyposmia, and diarrhea. Among patients positive for COVID-19, the most reported manifestation are cough, fever, fatigue, and shortness of breath.[22]

The study design of cross-sectional is one of the limitations of this study. Since we wanted to see the big picture of patients with CRS infected by COVID-19, we used this design. However, with a wider time frame, the patients can be followed up and the study can become a cohort study, which is valued more than cross-sectional study. Another limitation is data availability. The number of patients included in this study is relatively low, a bigger time frame will be more appropriate for this study to have more patients with more data available. Recall bias can be happening in this study, since not all patients can clearly remember their experiences.

In conclusion, 17.5% of CRS patients were infected with COVID-19 from March 2020 – August 2021; in this case, most patients experienced mild degrees of COVID-19. Fever, anosmia, and nasal congestion are these patients' most frequent clinical features. Practical education is needed for patients by medical personnel so that the management of this disease must be controlled. Based on the existing variants, we suggest conducting a continuum research on the relationship between CRS and COVID-19.

Acknowledgment

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