Original Article

Chronic Rhinosinusitis Epidemiology Study in Those Who Need a Surgical Intervention at Saiful Anwar General Hospital Ward January 1st, 2018 – December 31th 2021

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ABSTRACT

Introduction: Chronic rhinosinusitis is a complex inflammatory disorder causing a significant health problem worldwide. Chronic rhinosinusitis remains a clinically based diagnosis collaborated with Computed Tomography-Scan and nasal endoscopy. Functional Endoscopic Sinus Surgery is one of the most common surgical techniques for chronic rhinosinusitis patients.

Objectives: To provide a better understanding of the epidemiological characteristic of chronic rhinosinusitis in those who need a surgical intervention at Saiful Anwar General Hospital Ward.

Patients and Methods: This were a cross-sectional retrospective descriptive study using medical records between January 1st 2018 and December 31th 2021 at Otorhinolaryngology-Head and Neck Surgery medical inpatient ward. Rhinology division alone admitted total 260 patients (98 patients with chronic rhinosinusitis and 162 patients without chronic rhinosinusitis). A total of 98 patients were included in this study. Computed Tomography-Scan was obtained as part of routine preparations before surgery and recorded in the medical records.

Results: Chronic rhinosinusitis with nasal polyp majority was found in the group age 16-30 years old and chronic rhinosinusitis without nasal polyp in the group age 46-60 years old. 44 males and 54 females were included in this study. A dominant chief complaint was nasal blockage, the skin prick test procedure was mostly negative, the positive result from the skin prick test were mostly house dust mite. The dominant complication was orbital complication, most Functional Endoscopic Sinus Surgery procedures and revisions been done to Chronic rhinosinusitis with nasal polyp, comorbidity mostly deviated nasal septum, and the most sinus involved were maxillary sinus.

Conclusion: Chronic rhinosinusitis remain one of most frequent disease treated as in patient of rhinology division Otorhinolaryngology-Head and Neck department. A better understanding and mapping of this disease especially in our hospital will help us in treating Chronic rhinosinusitis patients.

Key Words: Epidemiology, chronic rhinosinusitis, chronic rhinosinusitis with nasal polyp.

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INTRODUCTION

Chronic rhinosinusitis (CRS) is a complex inflammatory disorder and significant health problem that affects 5 to 12% of the general population.[1,2] It is a clinical syndrome with multiple phenotypes of the disease, which encompass different inflammatory and remodeling patterns.[2] Chronic Rhinosinusitis (CRS) is a common condition in most of the world, leading to a significant burden on society in terms of healthcare consumption and productivity loss.[3]

CRS remains a largely clinically based diagnosis initially based on symptoms and duration of symptoms and then collaborated by Computed Tomography (CT) and/or nasal endoscopy.[4] Classically CRS has been divided into two phenotypes depending on the presence or absence of nasal polyps. Cardinal symptoms of CRS include nasal congestion/blockage/obstruction, decreased or absent sense of smell, anterior or posterior nasal discharge and facial pain or pressure.[1,3,5] Computed Tomography (CT) is considered the gold standard to evaluate the paranasal sinus and nose before planning for Functional Endoscopic Sinus Surgery (FESS).[6] The primary aims of CRS treatment are to reduce symptoms and improve quality of life.[5]

Over the last three decades, Functional Endoscopic Sinus Surgery (FESS) has become one of the most common surgical techniques, with significant data supporting its efficacy in treating CRS. The principle of sinus surgery should be considered only in patients with sinus disease refractory to a trial of primary medical therapy. For adult patient with uncomplicated CRS

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endoscopic sinus surgery could be performed when there had been a minimum trial of at least eight weeks duration of a topical intranasal corticosteroid, plus a short-course of systemic corticosteroid for CRS with nasal polyp and plus short-course of a broad spectrum/culture-directed systemic antibiotic CRS without nasal polyp. The goals of FESS in the treatment of sinusitis are to enlarge sinus ostia, restore adequate aeration of sinuses, improve mucociliary transport, and provide a better route for topical therapies.[3,7,8]

Currently there was no single national epidemiological study for CRS in Indonesia, this study aimed to provide a better understanding of the epidemiological characteristic of CRS in those who need a surgical intervention at Saiful Anwar general hospital ward by recognizing the pattern in Indonesia especially in Malang can help us to dertemine the future direction of treatment based on our patient data and needs. We hope information we provide here can be used as part of data for national epidemiological study for CRS in Indonesia.

PATIENTS AND METHODS:

This was a cross-sectional retrospective descriptive study conducted at the medical ward of the department of otorhinolaryngology head and neck surgery in Dr. Saiful Anwar general hospital, Malang, Indonesia in a period between January 1st 2018 and December 31th 2021. The study was approved by the medical ethical committee of Saiful Anwar general hospital (No. 400/175/K.3/102.7/2022). The study population was all patient of rhinology division at the medical ward in Saiful Anwar general hospital in a period between January 1st 2018 and December 31th 2021.

Inclusion criteria for this study are the patient is diagnosed with chronic rhinosinusitis according to clinical criteria from European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) 2020, and available data from the medical record about the chief complaint, comorbidity, age, gender, paranasal sinus CT-scan, Skin Prick Test (SPT), complication, and undergone FESS procedure. Exclusion criteria for this study are patients with incomplete required data in the medical record.

Age, gender (Male and Female), chief complaint (nasal blockage/obstruction/congestion, nasal discharge, facial pain/pressure, reduction/loss of smell), sinus involvement (Unilateral or Bilateral); (Single, Multiple, Pansinusitis), Skin Prick Test (SPT) examination consisted of a series of allergen extracts from Airlangga University/ Dr. Soetomo General Hospital, 25G needle, 70% alcohol swab, and anaphylactic equipment. The types of allergens tested include house dust mites, dog and cat fur, chicken feathers, dandruff, kapok, flower essence, milk, chocolate, chicken meat, chicken egg, shrimp, boiled fish, orange, rice, banana, flour, mung beans, peanuts, pineapple, MSG, potato, egg yolk, tempeh, milkfish, cob, rambutan, lamb, and soya bean. Complication (orbital, intracranial, and osteomyelitis), previous FESS surgeries (Middle Meatal Antrostomy, Ethmoidectomy, Frontosinusectomy, Sphenoidcectomy) were obtained from patient medical record. The SNOT-22 score and CT-scan were obtained as part of routine preparations before surgery and recorded in the medical record. The CT-scan examination was done using Toshiba Aquillion CXL with 3-5 mm slice thickness bone setting with axial, coronal, and parasagittal sections. The Sino-Nasal Outcome Test (SNOT)-22 questionnaire used was based on the Indonesian Cross-Cultural Adaptation, Translation, and Validation of the Sino-Nasal Outcome Test (SNOT)-22 by Juanda *et al*.,[9] that had been previously validated and published. This questionnaire was printed and asked by Otorhinolaryngology-Head and Neck Surgery residents before the surgery was done.

RESULTS:

A total of 98 patients with CRS were included in this study. Based on the prescence nasal polyp, CRS can be categorized into Chronic Rhinosisnusitis with Nasal Polyp (CRSwNP) and Chronic Rhinosinusitis without Nasal Polyp (CRSsNP). In this research we have majority Chronic Rhinosinusitis with Nasal Polyp (CRSwNP) patients at the age of 16-30 years old and majority Chronic Rhinosinusitis without Nasal Polyp (CRSsNP) patients at the age of 46-60 years old. There were 44 males and 54 females included in this study. The chief complaint observed among the patients were nasal blockage, rhinorrhea, facial pain, and anosmia were 35.2%, 31.5%, 33.3%, and 0% respectively for CRSsNP and 72.1%, 9.3%, 18.6%, and 0% for CRSwNP. Skin prick test procedure results among the patient were positive, negative, and not performed were 13.3%, 12.2%, and 30.6% respectively for CRSsNP and 7.1%, 25.5%, and 11.2% for CRSwNP. Skin prick test positive result among patients were house dust mite 30% for CRSwNP and 65% for CRSsNP. Most complications occurred in the CRSsNP group were orbital (16%) and intracranial (2%). Most of the FESS procedures were Middle Meatal Antrostomy (92.9%) followed by Ethmoidectomy (71.4%) and Revisions were done to CRSwNP (5.1%). The CRSwNP and CRSsNP demographic details can be seen in (Table 1).

Most of the comorbidity observed among the patients was deviated nasal septum for 36.7%. The comorbidity for CRS patient details can be seen in (Table 2).

Most of the sinuses involved among all patients were maxillary sinus unilateral (47.9%) and bilateral (46.9%), And the most of the sinus involved were multiple (66.2%). The sinus location affected by CRS can be seen in (Table 3).

Table 1: Chronic Rhinosinusitis With and Without Nasal Polyp Demographic

Variable (n(%))			Chronic Rhinosinusitis		Total
			With Nasal Polyp	Without Nasal Polyp	
Age		<15 years old	8 (18.6)	4 (7.3)	12 (12.2)
		16-30 years old	11 (36.7)	19 (34.5)	30 (30.6)
		31-45 years old	8 (18.6)	8 (14.5)	16 (16.3)
		46-60 years old	13 (30.2)	20 (36.4)	33 (28.5)
		>60 years old	3 (7.0)	4 (7.3)	7 (8.1)
Gender		Male	18 (18.4)	26 (26.5)	44 (44.9)
		Female	25 (25.5)	29 (29.6)	54 (55.1)
Chief Complain		Nasal Blockage	31 (72.1)	19 (35.2)	50 (51)
		Facial Pain	4 (9.3)	17 (31.5)	22 (22.4)
		Rhinorhea	8 (18.6)	18 (33.3)	26 (26.5)
		Anosmia	0 (0)	0 (0)	0 (0)
Skin Prick Test		Positive	7 (7.1)	13 (13.3)	20 (20.4)
		Negative	25 (25.5)	12 (12.2)	37 (37.8)
		Not Performed	11 (11.2)	30 (30.6)	41 (41.8)
Skin Prick Test Positive Result		House Dust Mite	6 (30)	13 (65)	19 (95)
		Cob	2 (10)	0 (0)	2 (10)
		Dog Fur	1 (5)	1 (5)	2 (10)
		Chicken Meat	0 (0)	1 (5)	1 (5)
		Chicken Egg	1 (5)	0 (0)	1 (5)
		Peanuts	0 (0)	1 (5)	1 (5)
		Shrimp	0 (0)	1 (5)	1 (5)
Complication		Orbital	0 (0)	16 (16.3)	16 (16.3)
		Intracranial	0 (0)	2 (2)	2 (2)
		Osteomyelitis	0 (0)	0 (0)	0 (0)
FESS Procedure	Middle Meatal Antrostomy	Yes	42 (42.9)	49 (50)	91 (92.9)
		No	1 (1)	6 (6.1)	7 (7.1)
	Ethmoidectomy	Yes	34 (34.7)	36 (36.7)	70 (71.4)
		No	9 (9.2)	19 (19.4)	28 (28.6)
	Frontosinusectomy	Yes	23 (23.5)	14 (14.3)	37 (37.8)
		No	20 (20.4)	41 (41.8)	61 (62.2)
	Sphenoidectomy	Yes	21 (21.4)	18 (18.4)	39 (39.8)
		No	22 (22.4)	37 (37.8)	59 (60.2)
Revision FESS		Yes	5 (5.1)	2 (3.6)	7 (7.1)
		No	38 (38.8)	53 (54.1)	91 (92.9)

Table 2: Comorbidity for Chronic Rhinosinusitis With and Without Nasal Polyp Patient

Variable (n(%))		Chronic Rhinosinusitis		Total
		With Nasal Polyp	Without Nasal Polyp	
Comorbidity	Dental Caries	2 (2)	11 (11.2)	13 (13.2)
	Deviated Nasal Septum	12 (12.2)	24 (24.4)	36 (36.7)
	Nasal Turbinate Hypertrophy	5 (5.1)	12 (12.2)	17 (17.3)
	Diabetes Mellitus	3 (3)	7 (7.1)	10 (10.2)
	Hypertension	6 (6.1)	7 (7.1)	13 (13.2)
	Asthma	3 (3)	4 (4)	7 (7.1)

Table 3: Sinus Location Affected by Chronic Rhinosinusitis

Variable (n (%))			Chronic Rhinosinusitis		Total
			With Nasal Polyp	Without Nasal Poylp	
Sinus Location	Maxillary Sinus	Unilateral	15 (15.6)	31 (32.3)	46 (47.9)
		Bilateral	27 (28.1)	18 (18.8)	45 (46.9)
		Uninvolved	1 (1)	4 (4.2)	5 (5.2)
	Ethmoidal Sinus	Unilateral	18 (18.8)	21 (21.9)	39 (40.6)
		Bilateral	16 (16.7)	14 (14.6)	30 (31.3)
		Uninvolved	9 (9.4)	18 (18.8)	27 (28.1)
	Frontal Sinus	Unilateral	13 (13.5)	11 (11.5)	24 (25)
		Bilateral	10 (10.4)	4 (4.2)	14 (14.6)
		Uninvolved	20 (20.8)	38 (39.6)	58 (60.4)
	Sphenoid Sinus	Unilateral	12 (12.5)	13 (13.5)	25 (26)
		Bilateral	9 (9.4)	5 (5.2)	14 (14.6)
		Uninvolved	22 (22.9)	35 (36.5)	57 (59.4)
Sinus Involved		Single	6 (6.1)	15 (15.3)	21 (21.4)
		Multiple	29 (29.5)	36 (36.7)	65 (66.2)
		Pansinusitis	7 (7.1)	1 (1)	8 (8.1)

DISCUSSION

The study found that CRS was affecting patient in their productive age range between 18 to 65 years old.[3] Our research found that majority patient with CRSwNP at 16-30 years of age and CRSsNP at 46-60 years of age which was similar mean of age from the previous study. The other survey in Canada and Europe showed an increased prevalence of CRS with the increase in age and the prevalence flattened after the age of 69 years.[10] The mucosal defense, chronic inflammation, and microbiomes disturbances were known to be the major factors involved in CRS pathogenesis. With the increase in age, the production of the S100 family protein was decreased which caused the cell proliferation, repair, and epithelial defense to be impaired and lead to the increased risk of abnormal microbial colonization following the chronic inflammation. Hence, these changes may potentially reform the CRS pathophysiology in elder adults.[11]

The subjects were dominated by female (55.1%) compared to male (44.9%) in this study. This was similar to the study conducted by Hirsch *et al*.,[12] which found a higher prevalence of CRS in female (66.7%) than male (33.3%) in American population. In the other study conducted by Hoehle *et al*.,[10] found that the patient 52.2% were female and 47.7% were male. This discrepancy might be explained by the difference in the perception and lifestyle of CRS associated with the sex difference.

Majority of chief complaints from patients in this study were nasal blockage (51%). Few studies in Indonesia found that the chief complaint in CRS was nasal blockage.[13,14] the 'cardinal' symptoms are nasal obstruction or congestion, nasal discharge (which can be anterior or posterior), alteration in sense of smell, facial pain, and pressure. Nasal obstruction and alteration of smell and taste are both the most severe and prevalent symptoms in CRSwNP, while in CRSsNP, nasal obstruction is again the most severe, with facial pain and nasal discharge reported as equally severe as altered smell and taste.[3] Epidemiologic study in China by Shi *et al*.,[15] found that the prevalence of nasal blockage, nasal discharge, facial pain/pressure, and reductions in the sense of smell in CRS were 90.8%, 77.9%, 48.2%, and 57.6%, respectively.

SPT has been done to 58% CRS patients with 20,4% positive result and 37.8% negative result. A study by Chern *et al*.,[15] found that high eosinophil level is an important risk factor for nasal polyp and a correlation between eosinophil level and negative SPT or non-allergic rhinitis with higher nasal polyp incidence.[15] EPOS 2020 found a fact that different phenotypes/endotypes of CRS may have variable associations with allergy, for example allergy has a stronger association with Allergic Fungal Rhinosinusitis (AFRS) while different phenotypes/ endotypes are not so different with the general population.[3] From the SPT positive result mostly were house dust mite to CRSwNP 30% and CRSsNP 65%. EPOS 2020 concluded that the role of allergy in CRSwNP and CRSsNP continues to be controversial, with level of evidence is poor. The recommendation is that allergic testing and treatment are an option in CRSwNP and CRSsNP.[16]

Orbital (16.3%) and intracranial (2%) complication only occur in the CRSsNP group. In adult patient orbital and intracranial complication are the most serious sequelae of CRS but the case are extremely rare, usually arising in patients with untreated chronic rhinosinusitis on acute bacterial exacerbation. Orbital complication are the most common complication of chronic rhinosinusitis involving ethmoid, maxillary or frontal sinuses and intracranial complication on chronic rhinosinusitis are most often secondary to frontal, ethmoid or sphenoid sinusitis. Infection can proceed from the paranasal cavities to the intracranial structures by two different routes: (a) haematologically – pathogens can pass through the diploic veins to reach the brain; (b) tissue continuity spread – pathogens can reach the intracranial structures by eroding the thin osseous walls of the sinuses.[3,17]

FESS procedure in this study mostly were middle meatal antrostomy (92.9%) performed to CRSwNP (42.9%) and CRSsNP (50%) followed by ethmoidectomy (71.4%) performed to CRSwNP (34.7%) and CRSsNP (36.7%) and revision FESS mostly has been done to CRSwNP (5.1%). This result is similar to the study conducted by Abbasi *et al*., in which revision surgeries were performed for those who did FESS (8%) and the majority patient who undergone FESS procedures only need one operation, and only 10-19% needed revision surgery.[18,19] Study conducted by Mohnsenh *et al*.,[20] found that patient undergoing revision FESS procecure (14.79%), variation of prevalence and incidence between a few studies could be related to different genetic and environment.[20] Failure of FESS procedure including inadequate selection and patient preparation, severe mucocal disease, sinus disease stadium, lack of surgery skills or anatomical variation not properly assessed, and bad post-operation treatment.[7] Histopathologic examination result for specimens coming out of the surgery were confirmed nasal polyp, but currently there are no consensus between otorhinolaryngology head and neck surgery and histopathologic department regarding the cut off point of number of cells on terminology of eosinophil and neutrophil dominant.

The most common comorbidity in this study was deviated nasal septum (36.7%), followed by nasal turbinate hypertrophy (17.3%) and dental caries (13.3%). In other study conducted by Krisna *et al*.,[21] found that the most common comorbidity were deviated nasal septum (45.2%). This result was different with the study conducted by Lubis *et al*.,[21] the most common comorbidity was allergy (29.2%), and a study conducted by Husni *et al*.,[21] the most common comorbidity was nasal turbinate hypertrophy. Deviated nasal septum can cause asymmetry bowing that will push the middle turbinate to lateral causing a narrow middle meatus. Nasal turbinate hypertrophy is a condition that can be caused by many factors including recurrent infection of the nose, and chronic irritation to nasal mucosa caused by industrial irritants and cigarette smoke. Prolonged use of nasal spray, vasomotor and allergic rhinitis also can cause nasal turbinate hypertrophy. The varied result from the different studies can be caused by the different samples in every study.[21]

From the CT-scan result in this study majority of the sinus involved were maxillary sinus unilateral (47.9%) and bilateral (46.9%) and followed by ethmoidal sinus unilateral (40.6%) and bilateral (31.3%) and frontal sinus unilateral (25%) and bilateral (14.6%). Sinus involved in this study were mostly multipe sinus (66.2%). The previous study showed that the most common sinus involved were maxillary sinus followed by ethmoidal, frontal, and sphenoidal sinus.[3,22] Maxillary sinus is a sinus located between the nose, mouth, and orbital space. This location makes the maxillary sinus vulnerable to pathogens from the nose and mouth. Another factor is maxillary sinus has a small ostium located at the medial which its function to drainage and ventilation. This ostium is an orifice to the ethmoid infundibulum and the position is much higher from the base of the sinus. This condition complicates the drainage and ventilation from the maxillary sinus when inflamed. The maxillary, ethmoidal, and frontal sinus are connected to the nasal cavity through the osteomeatal complex. If this complex is obstructed causing a disturbance in drainage and ventilation from the sinus, the other sinus involved will have a secondary infection. This becomes a reason why the mucosal abnormality is often seen at the maxillary, ethmoidal, and frontal sinus.[21]

CONCLUSION

CRS remain one of most frequent disease treated as in patient of rhinology division Otolaryngology-Head and Neck Surgery department. A better understanding and mapping of this disease especially in our hospital will help us in treating CRS patients.

CONFLICT OF INTEREST

There are no conflicts of interest.

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