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Research Article

Profile of Allergic Rhinitis and its Association with Chronic Suppurative Otitis Media

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ABSTRACT

Background: Allergic rhinitis is a growing global public health issue. Complications of allergic rhinitis include sinusitis, nasal polyps, bronchial asthma, and otitis media. Allergic rhinitis causes Eustachian tube dysfunction, which leads to chronic otitis media threefold more often. Chronic suppurative otitis media (CSOM) is marked by persistent tympanic membrane perforation and recurrent or persistent mucopurulent otorrhea. **Purposes:** This study is to determine the relationship between allergic rhinitis and the prevalence of chronic suppurative otitis media in Dr. M Yunus Bengkulu Hospital during 2019-2020. **Methods:** This was an observational cross-sectional study. This research is an observational analytical study with a cross-sectional approach. Thirty-three respondents were taken using a simple random sampling method. The SFAR (Score for Allergic Rhinitis) questionnaire was used in this study. Medical record data were used to collect CSOM information. **Result:** Seventy-five percent of respondents with allergic rhinitis also had chronic suppurative otitis media, while the prevalence of non-chronic suppurative otitis media was 25 percent. The p-value for the chi-square test was 0.031. **Conclusion:** For 2019-2020, there is a relationship between allergic rhinitis and the prevalence of chronic suppurative otitis media (CSOM) at Dr. M. Yunus Bengkulu Hospital.

Keywords: allergic rhinitis, chronic suppurative otitis media, SFAR questionnaire

INTRODUCTION

Allergic rhinitis (AR) is a growing global health issue (1). In Indonesia, the prevalence of allergic rhinitis is estimated to be 1.5-12.4% and tends to increase every year (2). According to several Indonesian studies, allergic rhinitis prevalence in children aged 13-14 was 16.4% in West Jakarta and 39.2% in Public Junior High School 1 Bengkulu (3). The number of allergic rhinitis patients at Dr. M. Yunus Hospital in Bengkulu was 348 in 2011, 622 in 2013, and 390 in 2015 (4,5). Allergic rhinitis affects social and quality of life at school and work. Common allergic rhinitis complications include Sinusitis, nasal polyps, bronchial asthma, and otitis media (1,6).

Chronic Suppurative Otitis Media (CSOM) is characterized by persistent tympanic membrane perforation and recurrent or persistent mucopurulent otorrhea (6). The worldwide burden of CSOM is 65–330 million people, especially in developing countries (7,8). The prevalence of CSOM worldwide is 4.76% or 31 million cases per year (9,10). In 2002, the

prevalence of CSOM in Indonesia was approximately 3.8%; however, by 2007, it had increased to 5.4% (11,12). In Bengkulu, specifically at the Dr. M Yunus Bengkulu Hospital, 144 cases of CSOM were reported in 2019, and 98 cases were reported in 2020 (4).

Previous studies have found that allergic rhinitis has a three-fold more significant impact on eustachian tube dysfunction, which persists in the chronic otitis media (13). Other studies have also shown a meaningful relationship between allergic rhinitis and chronic suppurative otitis media, with allergic rhinitis patients having a 13 times greater risk of developing CSOM than patients without allergic rhinitis, with a probability of 92.9% (14). A relationship between AR and CSOM has been hypothesized for decades. Emerging evidence indicates a shared pathophysiological mechanism between these two diseases (15). Because of the close anatomical link between the ET and the nasopharynx, allergic illnesses such as AR can cause ET dysfunction by inducing inflammation and edema in this region (16,17). According to specific investigations, an allergic challenge can result in ET obstruction. A study of inflammatory mediators reveals that the middle ear mucosa can respond to antigens like the lower respiratory tract mucosa (16). Even though a proven causal link between AR and CSOM has yet to be established, several research indicates the validity of this connection (17–20).

Despite a few studies, the relationship between AR and CSOM remains controversial (15,17–20). Additional research is required to determine the prevalence and function of allergy in the etiology of CSOM. Therefore, this study aims to determine the relationship between allergic rhinitis and the prevalence of chronic suppurative otitis media in Dr. M Yunus Bengkulu Hospital, particularly in the Ear, Nose, and Throat (ENT) Department at those hospitals.

METHODS

This study used an analytic observational cross-sectional design on 33 patients with ear complaints. The sampling technique used is probability sampling, and the method used in this study is simple random sampling. Patients with ear complaints who visited the ENT Department at M.Yunus Bengkulu Hospital constituted the sample for this study between January 2019 and September 2020, who satisfied the inclusion and exclusion criteria. The required sample size for this study was determined using the unpaired categorical analytical sample size formula in a cross-sectional design. This study's inclusion criteria were hospitalized patients at Dr. M. Yunus Bengkulu Hospital, aged over ten years, with ear complaints, and willing to be a research sample by filling out an informed consent form. Over ten years of age was selected because CSOM typically arises following acute otitis media. This is the youngest age at which COSM is diagnosed at Dr. M. Yunus Hospital.

Patients who visited the ENT department at the DR M. Yunus Bengkulu Hospital were used to collect CSOM-related data from their medical records between January 2019 and September 2020. The allergic rhinitis diagnostic questionnaire sheet is the Score for Allergic Rhinitis (SFAR) questionnaire, which consists of eight questions based on symptoms, clinical manifestations, and the respondent's history of allergic rhinitis. The SFAR Questionnaire is a simple, validated questionnaire widely used to detect allergic rhinitis in various populations. The SFAR questionnaire has been validated via physician diagnosis, psychometric methods, and random samples from the population. The SFAR questionnaire has better sensitivity,

specificity, and positive predictive value than the ISAAC questionnaire due to its use of the quantitative scoring method. The total SFAR score is 16, with individual question scores varying. Sensitivity and specificity are satisfactory for diagnosing allergic rhinitis when the score is 7. This score also possesses a high Likelihood Ratio of Positive (LR+) and a low likelihood of Negative (LR-). The researcher will guide the subjects through the questionnaire completion process to ensure that the subjects understand the purpose of each question. Due to the COVID-19 pandemic, this study was conducted online by directly contacting potential subjects via cellphone and using the Google Form to help fill out the SFAR questionnaire and subject data, where the subject's contact number was obtained from DR. M. Yunus Hospital's Medical Records.

The patients' characteristics were analyzed using frequency and percentage for qualitative variables and mean and standard deviation for quantitative ones. We used a Shapiro-Wilk test for the normality of distribution in our data. Bivariant analyses were carried out using Chi-Square. Data codification, processing, and analysis were completed using the statistical software Statistical Package for the Social Science (SPSS version 22 for MacBook, IBM Corp., Chicago, IL, USA), accepting a significance level of $p < 0.05$. This study was reviewed and approved by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, University of Bengkulu (No.135/UN30.14.9/LT/2021; June 25, 2021) this investigation. We confirm that all national and international standards for ethical research with human subjects were respected and adhered to.

RESULTS

This study (Table 1) showed that many of the subjects who experienced allergic rhinitis were female, with as many as 15 people (45.5%), and the most age distribution was in the 30-39 years, with as many as eight people (24.2%). As many as eight subjects (24.2%) are self-employed.

Table 1. The characteristics of subjects with allergic rhinitis

	Allergic rhinitis					
	Yes		No		Total	
	N	%	N	%	N	%
Sex						
Male	5	15.2	4	12.1	9	27.3
Female	15	45.5	9	27.3	24	72.7
Age						
10-19	3	9.1	2	6.1	5	15.2
20-29	6	18.2	3	9.1	9	27.3
30-39	8	24.2	5	15.1	13	39.4
40-49	2	6.1	2	6.1	4	12.1
50-59	1	3.0	1	3.0	2	6.1
Occupation						
Student	1	3.0	3	9.1	4	12.1
Housewife	5	15.2	2	6.1	7	21.2
Employee	4	12.1	5	15.2	9	27.3
Self-employed	8	24.2	3	9.1	11	33.3
Jobless	2	6.1	0	0	2	6.1

This study (Table 2) revealed that many subjects with allergic rhinitis complained of clinical symptoms such as sneezing, namely 16 people (33.3%). This study (Table 3) showed that many subjects who experienced CSOM were 12 women (36.4%), with the most age distribution being in the age ranges 20-29 and 30-39 years, six people respectively (18,2). As many as six people (18.2%) of the subjects are self-employed.

Table 2. Distribution of Patients with Allergic Rhinitis Based on Clinical Symptoms

Clinical Symptoms	**n**	**%**
Sneezing	16	33.3
Rhinorrhea	11	22.9
Nasal congestion	12	25
Itchy and watery eyes	9	18.8

Table 3. The Characteristics of Subjects with Chronic Suppurative Otitis Media

	CSOM					
	Yes		No		Total	
	N	%	N	%	N	%
Sex						
Male	7	21.2	2	6.1	9	27.3
Female	12	36.4	12	36.4	24	72.7
Age						
10-19	4	12.1	1	3.0	5	15.2
20-29	6	18.2	3	9.1	9	27.3
30-39	6	18.2	7	21.2	13	39.4
40-49	1	3.0	3	9.1	4	12.1
50-59	2	6.1	0	0	2	6.1
Occupation						
Student	3	9.1	1	3.0	4	12.1
Housewife	5	15.2	2	6.1	7	21.2
Employee	3	9.1	6	18.2	9	27.3
Self-employed	6	18.2	5	15.2	11	33.3
Jobless	2	6.1	0	0	2	6.1

The study (Table 4) showed that 15 patients (75.0%) had chronic suppurative otitis media with allergic rhinitis, while four patients (30.8%) had chronic suppurative otitis media but did not have allergic rhinitis. Five patients (25.0%) did not have chronic suppurative otitis media and allergic rhinitis, while nine (69.2%) did not have chronic suppurative otitis media. The Chi-Square test was significant (p=0.031). The calculated prevalence ratio was PR = 2.438 or PR > 1.

Table 4. Association of Allergic Rhinitis with Chronic Suppurative Otitis Media

Variable		**COSM**				**Total (%)**	***Prevalence Ratio***	***P***	***CI 95%***
		Yes		No					
		N	%	N	%				
Allergic Rhinitis	Yes	15	75.0	5	25.0	20 (100)	2.438	0.031	1.038- 5.724
	No	4	30.8	9	69.2	13 (100)			

DISCUSSION

In this study, the age group of 30-39 years experienced the most allergic rhinitis. These findings are nearly identical to those of Rambe (2013) and Moeis (2014), who found that the age groups with the highest rates of allergic rhinitis were 21-30 years and 18-34 years, respectively (13,21). Allergic rhinitis can occur at any age, but nearly 80% of cases develop between the ages of 20 and 30, when people are more likely to be exposed to aeroallergens due to changes in temperature and humidity (22). Most of the occupations in this study are self-employed, which can be attributed to the working environment, such as a dusty workplace, poor room temperature and humidity.

According to the findings, many subjects who experienced allergic rhinitis were female, with as many as 15 women and five men. These findings are consistent with Rambe's (2013) that women are more likely than men to suffer from allergic rhinitis (13). This can be due to estrogen, which stimulates antibody production, whereas androgen hormones in men are generally immunosuppressive (5,23). The effect of estrogen on immune cells plays a role in allergic processes by supporting IgE production and triggering mast cell and basophil degranulation (24).

The findings revealed that most of the subjects who experienced CSOM were 12 women and 7 men. This finding is consistent with Diana's (2017) that more women than men suffer from CSOM (14). These findings contradict Sesarini's (2019) that men experience the majority of CSOM (25). According to Adhikari's (2009), there was no significant difference in the sex who suffered the most from CSOM (26). Because no factors influencing sex differences in CSOM have been identified, it is possible that the population in a community can be associated with the dominance of a particular sex on the prevalence of CSOM who visited ENT Department, Dr. M. Yunus Hospital.

According to the study, the age groups that experienced the most CSOM were 20-29 years and 30-39 years, each with six people. This is because the patients who go to the ENT Department to check themselves are mostly over the age of 20, and it is possible that some subjects have a history of ear discharge (otorrhea) since childhood and were diagnosed with CSOM as they grew up, which is a continuation of the complaint that occurred as a child. This study's findings were nearly identical to Krisna's (2019), which found that the 31–40-year age group had the highest number of CSOM patients (27). CSOM frequently begins with recurrent otitis media in children. This is due to the location and size of the eustachian tube, which is shorter and flatter, making middle ear infections more common. Furthermore, weakened immune systems in children contribute to the emergence of recurrent otitis media (12,27). According to the study, the jobs with the most CSOM were self-employed. Several previous studies could not determine whether there was a significant relationship between work and the occurrence of CSOM but believed that low socioeconomic factors were a risk factor for CSOM (28).

The Chi-Square test results showed a relationship between allergic rhinitis and chronic suppurative otitis media that occurred in the DR. M. Yunus hospital Bengkulu with an asymp.sig value (p) = 0.031 ($p<0.05$) for the 2019-2020. The prevalence ratio was calculated to be RP = 2.438 or RP > 1. It can be concluded that people who suffer from allergic rhinitis have a 2-fold increased risk of developing CSOM. The findings of this study are consistent

with Diana's (2017) report that allergic rhinitis patients have a 13-fold increased risk of CSOM compared to patients without allergic rhinitis (p= 0.001 (p<0.05, OR= 13.322; 95% confidence interval [CI] = 4,400–39,732 (14). This is similar with Basyir's (2014), which found a significant relationship between allergic rhinitis and CSOM with a p value of 0.032 (29). The findings of this study contradict those of Heo (2018), who found no relationship between allergic rhinitis and the occurrence of CSOM (30). This is due to differences in the characteristics of the samples studied, as well as differences in the sampling techniques used.

Indoor allergens and respiratory allergies, such as allergic rhinitis, exacerbate CSOM. Allergies are a cause of eustachian tube obstruction. CSOM is more common in people with allergic or atopic conditions (31). According to Rambe (2013), allergic rhinitis has a threefold more significant impact on eustachian tube dysfunction, which persists in chronic otitis media (13). The nasal mucosa connects to the middle ear mucosa, allowing changes in the nasal mucosa to be transmitted to the ear. The middle ear mucosa is derived from the same ectoderm layer as the upper respiratory tract epithelium and responds to allergen stimuli in the same way as the nasal passages, sinuses, and bronchi (14).

CONCLUSION

A relationship between allergic rhinitis and chronic suppurative otitis media occurred at Dr. M. Yunus Hospital Bengkulu in 2019-2020. Fifteen people with allergic rhinitis also had CSOM. People with allergic rhinitis have a 2-fold increased risk of developing CSOM.

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CONFLICT OF INTEREST

There is no conflict of interest in this research.

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