Differences in the Prevalence of Adults with Allergic Rhinitis by Gender

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Abstract. In many countries in the world, the prevalence of allergic rhinitis (AR) in adults varies greatly between and within countries. Although it does not cause fatal effects, AR can affect the quality of life both socially and financially. Aims of this research was to determine the differences in the prevalence of adults with AR by gender. This study uses a cross-sectional observational analysis design. The participants were medical students from the University of Muhammadiyah Yogyakarta's college of medicine that selected by proportionate stratified random sampling, divided into two groups based on male and female sex. Data were collected using Score For Allergic Rhinitis (SFAR) questionnaire which distributed to respondents via google form. Shappiro-Wilk is analysis method used for normality test and contingency coefficient test is used to determine the relationship between variables. The prevalence of allergic rhinitis in female was 23.9% and in male was 8.7%. There was a significant differences in the prevalence of adults with AR between male and female and the p value = 0.028. The highest prevalence of allergic rhinitis was found in the 21 year age group. The most common symptom of allergic rhinitis in male is nasal congestion, but in female is runny nose.

Keywords: Allergic rhinitis · gender · prevalence · clinical manifestation

1 Introduction

Allergic rhinitis (AR) is a world-wide health problem all over the countries and is characterized by many main symptoms, including repeated sneezing, itching of the nose, nasal obstruction, rhinorrhea and ocular symptoms caused by aero-allergen trigger, involving inflammation of nasal mucosa [1]. AR affects 10–25% of the global population worldwide [2], but in Indonesia the prevalence was higher (34.7%) [3] and last decades the prevalence of AR increased as a common airways disorder, with many variations in different geographic areas [4].

The development of AR was complex mechanisms as interaction between genetic predisposition and environmental factors [5], it have been widely studied but many aspect need further investigation for better management. Identify the key genes for atopic

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phenotypes and the interaction with environmental factors in AR will help us to grasp the underlying mechanism of disease and more effective of prevention and intervention [6, 7].

The prevalence of AR peaks around adulthood and declines in the subsequent year up to the age of 65–70. Men and women showed a similar downward trend in the prevalence of AR. The prevalence of AR differed significantly from that of non-AR, with non-AR prevalence in women declining in relation to lower estrogen levels and associations with pregnancy, menstruation, menarche, and oral contraceptives. NAR is also connected to smoking and pollutants [7].

In AR, males were more likely to experience sensitization, nasal obstruction symptoms were more common in men, and females were more likely to experience rhinorrhea and itching [8]. Prevalence of AR in childhood is higher among boys than girls, but shift toward a female dominance in adolescents, then there no difference when they reach adulthood [9]. The study about sex or gender specific analysis are needed to support better prevention, screening, diagnosis and management of AR [10, 11]. Recent study report the prevalence of AR increases steadily in the first 18-years of life in both sexes, decreased in female but continuous in male after puberty [12]. The aim of this study is to determine the influence of gender on the prevalence of AR in adults.

2 Material and Method

This was an observational study with cross sectional design which aimed to assess the prevalence of AR in both sexes. Participants were 46 of medical students at Faculty of medicine Universitas Muhammadiyah Yogyakarta Indonesia by randomised sampling. Inclusion criteria were students possessing electronic communication device at WhatsApp group 2017 generation, and exclusion criteria were students with systemic illness. Sample size was calculated according to formula by Lemeshow.

The research was conducted online via WhatsApp communication by sharing the information about participant for the study. The respondence who agree by informed consent and completed a questionnaire identity data by google form were enrolled, divided into two groups based on gender. We use a questionnaire as instrument to measure the diagnosis of AR, the questionnaire was Score For Allergic Rhinitis (SFAR) that has been validated into Bahasa Indonesia [13]. This study was reviewed and approved by ethics committee Universitas Muhammadiyah Yogyakarta no. 287/EC-KEPK UMY/XI/2020.

The dependent variable of this study was AR diagnosis while the independent variable was gender. The results were analyzed using the Shappiro-wilk normality test for normality distributed. The bivariate analysis done with the contingency coefficient test, to determine the effect of gender on the epidemiology of allergic rhinitis.

3 Results

Inhalant allergies play a major role in the Indonesian population, its caused the burden of AR disease. Understanding of natural history and associated risk factors how they influenced would improve the management in clinical practice. The prevalence of AR is

Table 1. Score For Allergic Rhinitis Results

	SFAR ≥ 7	SFAR < 7
Male	4 (8.7%)	19 (41,3%)
Female	11 (23.9%)	12 (26.1%)

Table 2. Subject Characteristics Symptoms by Gender

Symptoms	Male	Female	Total	Percentage
Nasal obstruction				
Yes	16	14	30	65.2%
No	7	9	16	34.8%
Rhinorrhoe				
Yes	6	10	16	34.7%
No	17	13	30	65.3%
Sneezing				
Yes	5	8	13	28.2%
No	18	15	33	71.8%

higher among boys than girls in childhood, changes female display a higher prevalence during adolescence and there is no difference in prevalence when they reach adulthood.

All 46 respondents participated in this study, by completed the SFAR questionnaire and identity. The prevalence of AR higher in female than male with percentage of male with diagnosed AR (SFAR score more than 7) was 23,9% and male was 8.7%, as showed in Table 1.

AR is an inflammatory disease in nasal mucosa with main symptoms including sneezing, nasal obstruction and rhinorrhea. In this study the most common complaints of respondents with AR is nasal obstruction reaching 65.2% as showed at Table 2.

It can be seen from the results at Table 3, the Chi-Square test using the contingency coefficient `test,` obtained a p-value of 0.028, (p-value < 0.05). This shows the differences of gender on the epidemiology of allergic rhinitis. A correlation value of 0.230 was also obtained and was within the 95% confidence interval (0.059–0.889). Based on the value of the confidence interval that does not include the number 1, it can be concluded that the sex variable is a risk factor for allergic rhinitis.

4 Discussion

AR is nasal mucosa inflammation caused by Immunoglobulin E mediated reaction after re-exposure to aero-allergen. It is the common chronic disease that often co-occur with asthma and conjunctivitis and is a global health problem and disability worldwide [14].

Table 3. Differences of Prevalence AR by Gender

	AR	Non-AR	Total	P value	OR IC
Gender				0.028	
Male	4	19	23		0.059–0.889
Female	11	12	23		
Total	15	31			

The trend of AR prevalence increases recent years with industrialization and has had a significant effect on the quality of life and socio-economic burden [15]. In this study the prevalence of AR according to SFAR questionnaire was 32.6%, it is consistent with previous study of another country in Asia that showed the reported agreement prevalence 15%–25% by most of the participants, and it was stated to be "surely increasing" by 69.23% of the ENT specialists participants [4].

Several studies observed risk factors associated with AR presentation, among these were family income, family size, daily personal computer usage time, personal and parental education attainment, and stress [16]. These findings are beneficial as they may provide insights into modifiable factors that may influence AR presentations. Our study confirmed that AR prevalence is higher in females than in males in adults, this is similar with a recent meta-analysis that concluded childhood AR was more prevalent in males than in females; however, this changed in adolescence (with the prevalence increasing in females), and the sex specificity disappeared by adulthood [9, 17]. This finding also consistent with the statement that inhalant allergies play a role until old age, food allergies mainly a disease of infancy and contact allergies predominantly affect adult women [18]. These findings were not confirmed by studies in Asia, which indicate that the prevalence is higher in males than in females across all age groups.

The most common nasal symptom among patients, according to our findings, was nasal obstruction. When comparing the prevalence of AR symptoms in males and females, we found that males experienced nasal obstruction more frequently than females did, while females experienced rhinorrhea and itching more frequently. Age and gender play key roles in defining a disease's characteristics. For prevention, screening, diagnosis, and treatment, the disparities in biological sex, gender identity, relationships, and roles, as well as their effects on health and diseases, may have significant significance [8].

From Previous data literature showed the prevalence of diseases related to atopic were different in both sexes and changed over the circle of life. Disparities among female and male affected by genes, hormones, immunology and environtment and influenced to the allergic process development. The knowledge about the role of sex and gender improved the indispensable gender perspective that represent a significant turning point in research and clinic [18]. The production of Ig E antibodies by B cells through antigen presentation cell (APC) by dendritic cell, differentiation of CD4 + Th2 cell and class switching in B cells differently between males and females, resulting a significant higher prevalence in males in early age. Otherwise after reaching puberty stage females have an increasing experience in many allergic symptoms. Recent mechanism studies showed the hight

expression of sex hormones during menarche, menses, pregnancy or using hormonal contraceptive may influence the innate and adaptive immune system on nasal mucosal surfaces and involved in translating IgE sensitisation into clinical manifestations [19].

5 Conclusion

There was a difference in the prevalence of AR in adults, by gender according to SFAR score.

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Conflict of Interest. The authors declare no potential conflicts of interest' here.

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