

Profile Of Patients with Allergic Rhinitis: A Total Nasal Symptom Score and Epworth Sleepiness Scale Based Study at RSUD Dr. Soetomo Hospital, Surabaya, Indonesia

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ABSTRACT

Profile of Patients with Allergic Rhinitis: A Total Nasal Symptom Score and Epworth Sleepiness Scale Based Study at RSUD Dr. Soetomo Hospital, Surabaya, Indonesia

Allergic rhinitis (AR) is a chronic inflammatory disease mediated by immunoglobulin (Ig) E in the nasal mucosa and stimulated by allergen exposure. This retrospective study evaluated the demographic and clinical profiles of allergic rhinitis (AR) patients in an adult outpatient clinic utilizing the Total Nasal Symptom Score (TNSS) and Epworth Sleepiness Scale (ESS), which assess nasal symptoms and sleep quality, respectively. Data were collected from the Allergy-Immunology Division of the Otolaryngology outpatient clinic at RSUD Dr. Soetomo Hospital in Surabaya, from January 2019 to December 2021, including TNSS scores, ESS scores, age, gender, occupation, and education level. Among 188 patients, 116 (61.7%) met the inclusion and exclusion criteria. Of these, 71 (61.21%) were female and 45 (38.79%) males. Ages ranged from 18 to 64 years with a mean of 32.44 years. The 20-29 age group was most affected by AR (50%). The majority of subjects had a normal BMI (40.52%), were self-employed (31.03%), and had university-level education (48.28%). Combined symptoms were present in 99.14% of subjects, significantly more than those with a single symptom. Mild nasal symptoms were prevalent (44.83%), with sneezing being the most frequent. A normal ESS was observed in 63.79%, with "sitting quietly after lunch without alcohol" being the primary cause of daytime somnolence in 109 (93.97%) subjects. Sleepiness was least reported when "riding in a car as a passenger for 1 hour without rest" (53.45%). This study demonstrated that, although the largest ESS group was within the normal range, the majority of patients exhibited symptoms of excessive daytime somnolence, while the TNSS was predominantly mild. These findings suggest potential avenues for further research to analyze the effects of AR on sleep quality.

Keywords: Allergic rhinitis, Total Nasal Symptom Score, Epworth Sleepiness Scale, nasal symptom, Quality adjusted life year, Chronic respiratory disease

1. INTRODUCTION

Allergic rhinitis (AR) is a chronic inflammatory condition of the nasal mucosa precipitated by immunoglobulin E (IgE)-mediated reactions to allergens. This disorder manifests with symptoms such as sneezing, rhinorrhea, nasal congestion, and pruritus, which adversely affect the quality of life of the affected individuals. AR is also associated with diminished productivity in both pediatric and adult populations, with numerous reports of decreased work performance, reduced academic achievement, and increased absenteeism. Furthermore, severe AR symptoms may induce sleep disturbances, further compromising the patient's quality of life.

Previous studies have demonstrated that AR significantly affects health-related quality of life (HRQoL), including excessive fatigue, reduced energy expenditure, and social and sleep disturbances. One of the instruments frequently utilized to assess AR symptoms is the Total Nasal Symptom Score (TNSS), which measures the severity of nasal symptoms. TNSS is a concise and reliable questionnaire that evaluates the severity of AR symptoms based on nasal congestion, sneezing/itchy nose, and rhinorrhea. Additionally, the Epworth Sleepiness Scale (ESS) was employed to evaluate excessive daytime sleepiness, a common symptom in patients with AR experiencing sleep disorders. ESS is a straightforward yet subjective questionnaire that requires patients to rate their likelihood of "dozing" in eight different scenarios, with a minimum score of 0 indicating "would never doze" to a maximum score of 3 indicating a "high probability of dozing."

This study aims to assess the profile of AR patients at the Otolaryngology outpatient clinic at RSUD Dr. Soetomo Hospital, based on TNSS and ESS, to better understand the severity of AR symptoms and their impact on patients' sleep quality.

2. MATERIALS & METHODS

A retrospective observational analysis was conducted to evaluate the intensity of symptoms and sleep disruption in allergic rhinitis (AR) patients. The study examined medical records of individuals referred to the Allergy-Immunology section of the Otolaryngology outpatient department at RSUD Dr. Soetomo Hospital in Surabaya. The data collection period spanned from January 2019 through December 2021. The study population consisted of AR patients treated at Dr. Soetomo Hospital from January 2019 to December 2021. The study sample was drawn from this population, selecting individuals who met the inclusion and exclusion criteria. The inclusion criteria were diagnosed with AR, between 18 and 65 years old, and had complete records of weight, height, occupation, as well as filled-out TNSS and ESS questionnaires. The exclusion criteria were patients whose jobs required them to stay awake at night, those with a prior history of sleep disorders due to other factors such as depression and chronic pain, or those living in areas with extreme noise levels. The researchers collected and analyzed data using SPSS, including TNSS scores, ESS scores, age, gender, nutritional status, occupation, and educational level.

3. RESULTS

The medical records of 188 individuals who visited the Allergy-Immunology section of the Otolaryngology outpatient department at RSUD Dr. Soetomo Hospital in Surabaya between January 2019 and December 2021 were examined. Of these, 116 cases (61.7%) met the established inclusion and exclusion criteria for the study.

In the study population, females constituted 71 (61.21%) participants, while males accounted for 45 (38.79%). The age range spanned from 18 to 64 years, with a mean age of 32.44 years. The 20-29 age bracket represented the largest group (50%) among those with AR. A majority of participants had a normal BMI (40.52%), were entrepreneurs (31.03%), and possessed a university or equivalent education (48.28%). Individuals experiencing multiple symptoms (99.14%) far outnumbered those with a single symptom. Mild nasal symptoms were prevalent (44.83%), with sneezing being the most frequent. The majority exhibited normal ESS scores (63.79%), with "sitting quietly after lunch without alcohol consumption" being the primary manifestation of excessive daytime somnolence in 109 (93.97%) subjects. Conversely, only a small proportion reported sleepiness when "riding in a car as a passenger for 1 hour without rest" (53.45%).

Table 1

AR patients' characteristics	n (%)
Gender	
Male	45(38,79)
Female	71(61,21)
Age	
< 20	6(5,17)
20-29	58(50)
30-39	18(15,52)
40-49	24(20,69)
50-59	7(6,03)
≥ 60	3(2,59)
Nutritional status	
Underweight	2(1,72)
Normal	47(40,52)
Overweight	44(37,93)
Obesity	23(19,83)
Education	

Elementary school	6(5,17)
Junior high school	4(3,45)
Senior High school	50(43,1)
College	56(48,28)
Occupation	
Entrepreneur	36(31,03)
College student	27(23,28)
Student	18(15,52)
Housewife	12(10,34)
Private employee	9(7,76)
Teacher	7(6,03)
Employee	4(3,46)
Retiree	1(0,86)
Government worker	1(0,86)
Hospital employee	1(0,86)
Nasal symptom	
Sneezing	115(99,14)
Rhinorrhea	110(94,83)
Nasal congestion	108(93,1)
Nasal itching	111(95,69)
TNSS	
Normal	2(1,72)
Mild	52(44,83)
Moderate	42(36,21)
Severe	20(17,24)
AR patients' characteristics	n (%)
Excessive daytime somnolence	
Sitting and reading	82(70,69)
Watching TV	82(70,69)
Sitting, inactive in a public place	74(63,79)
As a passenger in a car for an hour without a break	62(53,45)
Lying down to rest in the afternoon when circumstances permit	106(91,38)
Sitting and talking to someone	38(32,76)
Sitting quietly after lunch without alcohol consumption	109(93,97)
In a car, while stopped for a few minutes in traffic	72(62,07)
ESS	

Normal	74(63,79)
Mild	13(11,21)
Moderate	17(14,66)
Severe	12(10,34)

4. DISCUSSION

This study provided insights into the demographic and clinical characteristics of allergic rhinitis (AR) patients treated at the outpatient clinic of the ENT Department, RSUD Dr. Soetomo, Surabaya, between January 2019 and December 2021. A total of 116 patients met the inclusion and exclusion criteria, offering a valuable sample for understanding the profile of AR in this population.

This study revealed that AR is more prevalent in females, with 71 female patients (61.2%) compared to 45 male patients (28,8%), resulting in a female-to-male ratio of approximately 1.5:1. This finding aligns with previous research by Tanaka & Amaliah (2020), who reported similar gender differences, with females making up 57.3% of AR patients. The predominance of females in adult AR cases could be attributed to hormonal differences that may influence immune responses, as supported by Frohlich et al. (Fröhlich et al., 2017; Tanaka and Amaliah, 2020)

The highest prevalence of AR was observed in patients aged 20-29 years (50%), with a mean age of 32.4 years. This distribution is consistent with studies by Muhamad et al. (2022) and Wong et al. (2022), which found that AR symptoms peak¹ between the ages of 20 and 40 and decline thereafter. The younger age group is often more exposed to urban environmental allergens, which may explain the higher prevalence in this age range. Furthermore, this age group is typically more likely to seek medical treatment, which might have contributed to their representation in the study (Muhamad et al., 2022; Wong et al., 2022).

The majority of AR patients 01201 exhibited a normal BMI (40.5%), followed closely by those categorized as overweight (37.9%). In contrast to certain reports that associate obesity with increased AR risk due to elevated IgE levels and pro-inflammatory cytokines, this study observed that only 19.8% of patients were obese. These findings suggest that while obesity may contribute to AR, the relationship between BMI and AR severity remains inconclusive, as noted in previous research such as that conducted by Zheng et al. (Drazdauskait et al., 2021; Zheng et al., 2018)

In comparing the educational levels of allergic rhinitis (AR) patients from this study with those from the research by Zhang et al. (2023), we observe some noteworthy similarities and differences. In this study, the highest proportion of patients had completed undergraduate studies (48.28%), followed by those with a high school education (43.10%). Both studies suggest that education is a significant factor in AR prevalence, with the potential connection being higher exposure to allergens in urban environments, lifestyle changes such as smoking and stress, and better access to healthcare, which may increase awareness and diagnosis rates. The relationship between education and AR prevalence might also be linked to the socioeconomic and occupational factors that higher education brings, leading to increased stress and reduced sleep, both of which can exacerbate allergic responses. Further research could explore the exact mechanisms behind the correlation between education level and AR, considering other contributing factors such as environmental exposures and lifestyle. (Zhang et al., 2023)

In comparing the occupations of allergic rhinitis (AR) patients in this study with those in the references by Sandbhor et al. and the ARIA guidelines, several patterns emerge. In the current study, the largest occupational group was office workers, making up 33.6% of the sample. This finding highlights the potential role of indoor environments, particularly exposure to dust, air conditioning, and indoor allergens such as mites, which are commonly found in office settings. (Bousquet et al., 2008; Sandbhor et al., 2023; Yuwono et al., 2022)

Similarly, the study by Sandbhor et al. found that certain occupations, such as farmers and medical students, were associated with moderate to severe allergic rhinitis. Farmers, in particular, showed a higher prevalence of persistent AR (70%) and were more likely to be sensitive to outdoor allergens like pollen. Medical professionals, on the other hand, were predominantly exposed to indoor allergens, with 52% reporting moderate to severe AR due to mite exposure. These findings are consistent with the indoor allergen profile observed in office workers from this study. The ARIA guidelines further support this association between occupation and AR severity, noting that work environments significantly impact AR symptom control and severity. Patients in indoor occupational settings often face continuous exposure to allergens such as dust mites, while outdoor workers like farmers may experience seasonal fluctuations in symptoms due to pollen exposure. Thus, both this study and the referenced literature emphasize the critical role of occupation in influencing AR patterns and severity. Indoor workers, such as those in offices or medical settings, are more likely to encounter persistent indoor allergen exposure,

whereas outdoor occupations like farming present a higher risk of seasonal AR. These occupational factors should be considered when devising personalized treatment plans for AR patients.(Moelamsyah et al., 2024; Sandbhor et al., 2023; Soegiarto et al., 2017)

The majority of patients exhibited mild AR symptoms, as reflected by their TNSS scores (44.8% with TNSS scores between 3-6). This differs from some studies that reported a higher proportion of patients with moderate to severe AR symptoms, such as Gera et al. (2021), who found that 46% of AR patients had moderate TNSS scores.(Gera et al., 2021; Tamasauskiene et al., 2021; Irawati et al., 2023)

Daytime sleepiness, assessed via the Epworth Sleepiness Scale (ESS), was normal for most patients (63.8%), indicating that excessive daytime sleepiness (EDS) is not a significant issue in this population. However, some patients (14.7%) reported moderate EDS, which could be linked to AR-related sleep disturbances, such as nasal obstruction and breathing difficulties during sleep.

5. CONCLUSION

This study showed that although the biggest ESS group is normal, most patients have symptoms of excessive daytime somnolence, while the TNSS is mostly mild. Hence, it opens up possibilities for further studies in analyzing the effects of AR on sleep quality.

REFERENCES

- [1] Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, et al. Allergic rhinitis and its impact on asthma (ARIA) 2008. *Allergy* 2008;63:8–160.
- [2] Drazdauskait G, Layhadi JA, Shamji MH. Mechanisms of allergen immunotherapy in allergic rhinitis. *Curr Allergy Asthma Rep* 2021;21:1–17.
- [3] Fröhlich M, Pinart M, Keller T, Reich A, Cabieses B, Hohmann C, et al. Is there a sex-shift in prevalence of allergic rhinitis and comorbid asthma from childhood to adulthood? A meta-analysis. *Clin Transl Allergy* 2017;7:1–9. <https://doi.org/10.1186/s13601-017-0176-5>.
- [4] Gera NMMS, Yudanto D, Sahidu MG, Hunaifi I. Korelasi total nasal symptom score (TNSS) dengan kualitas tidur penderita rhinitis alergi mahasiswa fakultas kedokteran universitas mataram. *Intisari Sains Medis* 2021;12:83–7. <https://doi.org/10.15562/ism.v12i1.877>.
- [5] Irawati N, Wardani RS, Poerbonegoro NL, Rahmawati I. Sleep Disturbance in Chronic Rhinitis: Evaluation of Nasal Symptoms, Sleep Disorder Questionnaires, and Sleep Architecture in Allergic and Non-allergic Rhinitis in Dr. Cipto Mangunkusumo Hospital Indian Journal of Otolaryngology and Head & Neck Surgery n.d. <https://doi.org/https://doi.org/10.1007/s12070-023-03783-5>.
- [6] Moelamsyah YN, Yunus F, Nurwidya F, Amien BR. Late-Onset Asthma: A Review. *Jurnal Respirasi* 2024;10:272–9. <https://doi.org/10.20473/jr.v10-I.3.2024.272-279>.
- [7] Muhamad S, Husna N, Tan HT, Shukri N, Suryani N, Ashari M, et al. Allergic rhinitis : a clinical and pathophysiological overview. *Front Med (Lausanne)* 2022;9:1–10. <https://doi.org/10.3389/fmed.2022.874114>.
- [8] Sandbhor A, Murali M, Deshmukh P, Jain S, Hande V, Dash M, et al. Pattern and Severity of Allergic Rhinitis Correlated with Patient Characteristics: A Rural Hospital-Based Cross-Sectional Study. *Indian J Otolaryngol Head Neck Surg* 2023;76. <https://doi.org/10.1007/s12070-023-04198-y>.
- [9] Soegiarto G, Agustina Damayanti L, Effendi C. Genetic and Environmental Factors as Strong Determinants Of Atopic Allergic Disease Clinical Manifestations In Surabaya’s School Children. vol. 53. Surabaya: 2017. <https://doi.org/https://doi.org/10.20473/fmi.v53i3.6459>.
- [10] Tamasauskiene L, Gasiuniene E, Sitkauskiene B. Translation , adaption and validation of the total nasal symptom score (TNSS) for Lithuanian population. *Health Qual Life Outcomes* 2021;19:1–5. <https://doi.org/10.1186/s12955-020-01659-8>.
- [11] Tanaka W, Amaliah M. Prevalensi rinitis alergi berdasarkan gejala klinis pada mahasiswa Fakultas Kedokteran Universitas Tarumanagara angkatan 2015. *Tarumanagara Medical Journal* 2020;2:173–6. <https://doi.org/10.24912/tmj.v2i2.7858>.
- [12] Wong QYA, Lim JJ, Ng JY, Malipeddi P, Teo WY, Lim YYY, et al. Allergic rhinitis in Chinese young adults from the Singapore/Malaysia cross-sectional genetics epidemiology study (SMCGES) cohort: Prevalence, patterns, and epidemiology of allergic rhinitis. *World Allergy Organization Journal* 2022;15:100704. <https://doi.org/10.1016/j.waojou.2022.100704>.
- [13] Yuwono AS, Hadi W, Angelina Z. correlation between total nasal symptom score and classification of rhinitis allergy based on ARIA-WHO with asthma comorbidity at PHC hospital in surabaya. *Journal of Widya Medika*

Junior 2022;4:142–6.

- [14] Zhang X, Zhang M, Sui H, Li C, Huang Z, Liu B, et al. Prevalence and risk factors of allergic rhinitis among Chinese adults: A nationwide representative cross-sectional study. *World Allergy Organization Journal* 2023;191:1–12. <https://doi.org/10.1016/j.waojou.2023.100744>.
 - [15] Zheng M, Wang X, Zhang L. Association between allergic and nonallergic rhinitis and obstructive sleep apnea. *Curr Opin Allergy Clin Immunol* 2018;18:16–25. <https://doi.org/10.1097/ACI.0000000000000414>.
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