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Research Article

The Relationship between Score for Allergic Rhinitis and Total Nasal Symptom Score in Individual Suspected Allergic Rhinitis

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Abstract

Background: Allergic Rhinitis is a symptom disorder that mainly occurs in the nasal, induced after exposure to allergens and causes inflammation of the nasal mucosa mediated by Immunoglobulin E. Data quoted from the American Academy of Allergy Asthma & Immunology shows that 10-30% of the world's population is affected by allergic rhinitis and still increasing in numbers. To screen and evaluate the severity of allergic rhinitis with ease, two questionnaires have been formed, namely Score For Allergic Rhinitis and Total Nasal Symptoms Score. **Objective:** To identify the relationship between Score For Allergic Rhinitis and Total Nasal Symptoms Score in individual with suspected allergic rhinitis. **Methods:** This study uses a descriptive analytic research method with a cross-sectional study approach. The sample individual was selected using a non-probability sampling technique, namely purposive sampling with a sample size of 95 people. **Results:** Using Spearman Correlation Test, a significant relationship was found ($p = 0.000$) and a correlation coefficient value shows ($p = 0.535$) there is a strong relationship between these two questionnaires. **Conclusion:** There is a strong and positive relationship between Score For Allergic Rhinitis and Total Nasal Symptoms Score questionnaire in patients with suspected allergic rhinitis.

Keywords: allergic rhinitis, relationship, score for allergic rhinitis, suspected

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1. Introduction

Allergic rhinitis (AR) is a type of inflammation that occur in the nasal due to the human immune system overreacting to airborne allergens such as mold, dust mites, pollen and animal dander. It is usually characterized by this main symptom concerning the nasal such as pruritus, sneezing, rhinorrhea and nasal congestion [1]. Another symptom such as sleeping difficulty, cephalgia, fatigue and conjunctival symptoms may also be presented in patients with AR [2]. The prevalence of AR in low- and middle-income countries in the Asia Pacific Region is between 4-45% [2]. In Indonesia alone, prevalence of AR reaches 1.5-12.4% and tends to increase every year [3]. However, prevalence of AR varies and often underdiagnosed as gold standard in diagnose AR, skin prick test, are expensive and unavailable at hospital in rural areas. To overcome these obstacles, a validated standard questionnaire which is much more affordable and easy access is formed as an alternative to assist in establishing the diagnosis of AR [4]. These validate questionnaire are Score For Allergic Rhinitis and Total nasal Symptoms Score.

Score For Allergic Rhinitis (SFAR), developed by Annesi-Maesano and her research team, is a standard screening instrument that is beneficial in collecting prevalence data and determine the cause of AR in developing countries. SFAR has 8 important components consisting of various questions related to

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symptoms, allergens and patient history with a total score ranging from 0-16. The cut-off value of 7 optimally distinguishes between individual diagnosed with allergic rhinitis (≥7) and those who are not (<7) [5].

Total Nasal Symptoms Score (TNSS) is a short questionnaire that evaluates the severity of AR symptoms. TNSS is the sum of score for each symptom of AR such as nasal symptoms which consist of nasal congestion, sneezing, rhinorrhea and itching of the nasal, and symptoms outside the nasal such as red, watery eyes, itching of the eyes, ears, palate and throat. The severity of symptoms is then measured using a scale of 4 points ranging from 0-3 points. A score of 0 indicates no symptoms, a score of 1 for mild symptoms that are easily tolerated by the patients, a score of 2 for disturbing symptoms but still tolerable and a score of 3 for severe symptoms that are difficult to tolerate and can interfere with the patient's daily activities. The score is then added for each symptom and becomes a total score of 18 with the categories of mild (<7), moderate (7- 10) and severe (>11) symptom [6].

2. Methods

This study uses descriptive analytic research method with a cross-sectional study approach. It was conducted from September 2021 to October 2021 via Google Form that was distributed among the classes of 2018, 2019 and 2020 of medical students in Universitas Sumatera Utara (USU). The sample was taken using a non-probability sampling technique, namely purposive sampling in which an individual with a SFAR value of ≥7 is included and those who got SFAR value <7 was excluded from the sample. From 224 respondent, only 95 were included in the sample as they were all fulfilled the inclusion criteria such as SFAR value that they had obtained was ≥7, is an active USU students from class 2018, 2019 and 2020 and respondent must be 17 years and above. All of the 95 respondents were then given TNSS questionnaire to be answered and was taken as data.

The instrument is a questionnaire which is divided into three parts, namely: demographic data, Score For Allergic Rhinitis and Total Nasal Symptoms Score. Part A consists of questions about the respondent's personal data. Part B is a screening tool in diagnosing AR, SFAR, which consist of 8 components such as (1) nasal symptoms such as sneezing, rhinorrhea and nasal congestion in the past year, (2) nasal symptoms accompanied by rhinoconjunctivitis, (3) seasons when nasal symptoms appear, (4) allergic rhinitis trigger such as pollen and house dust mites, (5) perceived allergic status, (6) previous medical history, (7) history of positive allergy tests and (8) family history of allergies. Part C is TNSS that evaluate the severity of AR symptoms which include nasal symptoms and symptoms outside the nasal.

The data was processed and analyzed using SPSS version 26 and Google Spreadsheet. Bivariate analysis was used to analyze the relationship between SFAR and TNSS in individual with suspected AR. The results of bivariate analysis in the form of frequency distributions are displayed in the form of tables or diagrams using numbers and percentages.

3. Results

A total of 95 respondent were included in the study who had fulfilled all the inclusion criteria. The age distribution of respondent was 17-20 and 21-24 years. Majority of the patients who was suspected with AR was the age group of 17-20 years which is 64 respondent (67,4%) and the least age group was 21-24 years which is 31 respondent (32.6%) (Table 1).

Table 1. Frequency Distribution of Individual with Suspected Allergic Rhinitis Based on Age

	Frequency	Percentage (%)		Valid Percentage (%)
Valid	17-20	64	67.4	67.4
	21-24	31	32.6	32.6
	Total	95	100.0	100.0

This study also shows that out of the total 95 respondent, 33 were males (34.7%) and the remaining 62 respondent were females (65.3%) (Table 2).

Table 2. Frequency Distribution of Individual with Suspected Allergic Rhinitis Based on Gender

	Gender	Frequency	Percentage (%)	Valid Percentage (%)
Valid	Male	33	34.7	34.7
	Female	62	65.3	65.3
	Total	95	100.0	100.0

SFAR results in individual suspected AR shows that the minimum value of SFAR is 7 that consists of 12 respondents whereas the maximum value of SFAR is 15 which consist of 2 respondents (Fig. 1) with the mean, median and standard deviation value is 9.84, 10.00 and 2.095 respectively (Table 3).

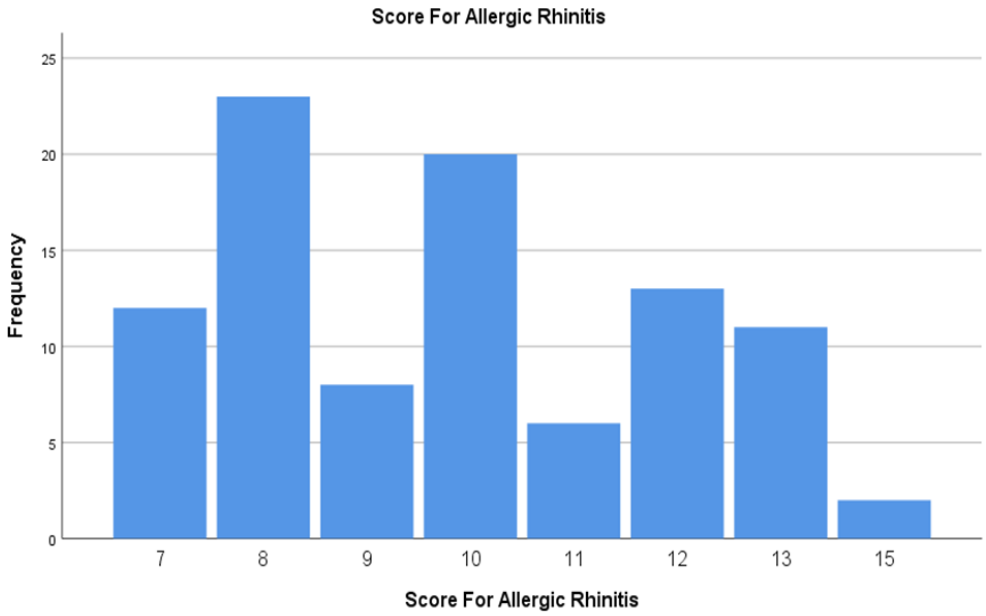

Figure 1. SFAR Frequency Bar Chart

For TNSS, the minimum value obtained was 1 and maximum value was 18 with the same number of respondents that is 1 respondent. The mode of this questionnaire is 7 with the total of 12 respondents, mean value is 8.00, median value is 7.00 and standard deviation value of 3.716 (Table 4).

Table 3. SFAR in Patients with Suspected Allergic Rhinitis

Statistics Score For Allergic Rhinitis	
Mean	9.84
Median	10.00
Std. Deviation	2.095
Minimum	7
Maximum	15

The result of the study also shows that a total of 38 respondent had mild symptoms, 31 respondents had moderate symptoms and 26 respondent had severe symptoms (Fig. 2).

Table 4. TNSS in Patients with Suspected Allergic Rhinitis

Nasal	Symptoms Score
Mean	8.00
Median	7.00
Std. Deviation	3.716
Minimum	1
Maximum	18

Spearman correlation test between SFAR and TNSS shows that the p value is lower than 0.05 and can be concluded that both variables are correlated (p = 0.000) (Table 5).

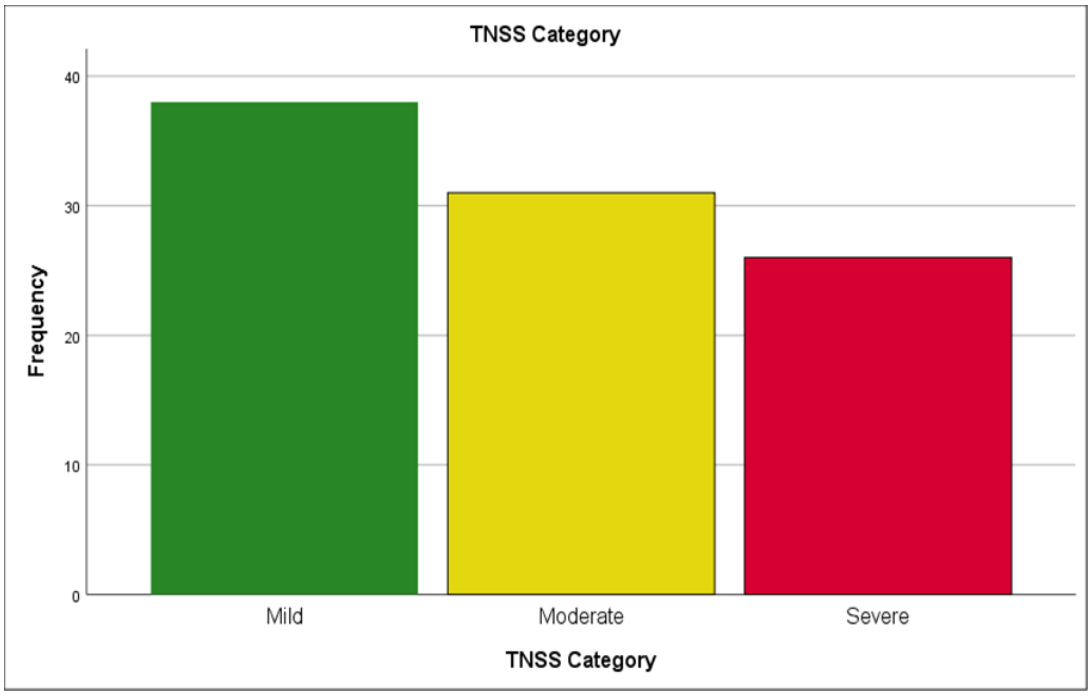

Figure 2. TNSS Frequency Bar Chart Based on TNSS Category

In correlation coefficient, both variable shows a strong and positive relationship (p = +0.535) (Table 5) in which if SFAR value increased, TNSS value also increased and vice versa as can be seen in Figure 3.

Table 5. Spearman Correlation Test

Score For Allergic Rhinitis		Total Nasal		Symptoms Score
Spearman's rho	Score For Allergic Rhinitis	Correlation Coefficient	1.000	.535**
		Sig. (2-tailed)	.	.000
		N	95	95
	Total Nasal Symptoms Score	Correlation Coefficient	.535**	1.000
		Sig. (2-tailed)	.000	.
		N	95	95

** Correlation is significant at the 0.01 level (2-tailed)

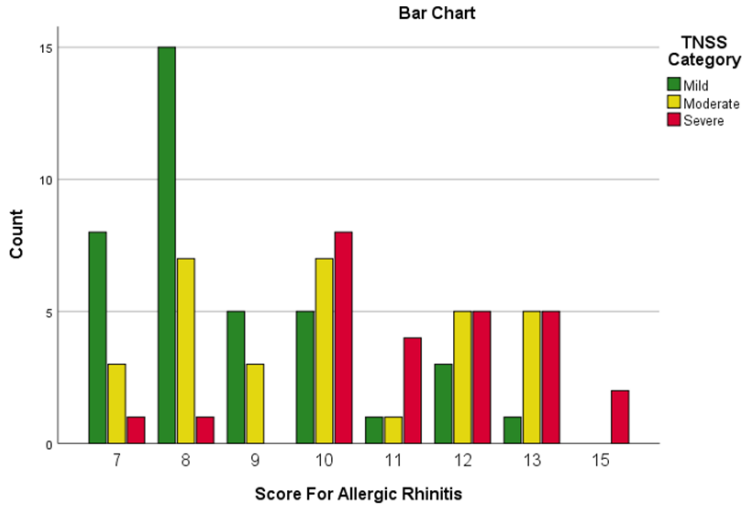

Figure 3. SFAR and TNSS Cross Tabulation Bar Chart

4. Discussion

From the results obtained, the predominant age group of respondents suspected with AR is the age group of 17-20 years with a total of 64 respondents (67.4%) while the age group of 21-24 years is 31 people (32.6%). These results are in accordance with the research that were conducted by Greiner et al., in 2011 that shows 80% of individuals diagnosed with AR developed symptoms before the age of 20 years [1]. This is due to the fact that younger classes are more exposed to dusty school or study areas with poor ventilation and are easily exposed to aeroallergens [7]. This study also shows that majority of the respondents are female which is 62 respondents (65.3%) compared to male respondents with the total of only 33 respondents (34.7%). Similar to the results of Gera et al., it was found that most of the respondents are female (56%) [6]. Simultaneously, Susanti, Pawarti and Soeprijadi study's shows that out of 49 patients, 37 patients (75.5%) were female and 12 patients (24.5%) were male [8]. This can be explained by the hormones produced by each gender. The estrogen and progesterone hormones have a pro-inflammatory effect thus will increase the effect of inflammation, hence, can result in increase atopic tendencies in females. In males, testosterone hormone predominates which contains anti-inflammatory effect which will reduce the effect of inflammation [9].

The data collected on SFAR questionnaire shows that mean obtained was 9.84, minimum value was 7 with 2 respondents and the maximal value was 15. Minimum value obtained for SFAR is 7 because only respondents who obtained SFAR ≥7 were taken and those who obtained SFAR value <7 were excluded from the sample population. The results of this study are similar to the results conducted by Alharethy et al where the scores obtained are in the range of 0-16 with the mean obtained was 10.31 [10]. As for TNSS, the mean result is 8.00, minimum value was 1 and maximum value was 18 with both consists of 1 respondent. In addition, the highest frequency value of TNSS was 7 with a total of 12 respondents. This results not differ greatly from the research conducted by Lena where the mean TNSS value obtained is 9.19, the minimum value is 4 and the maximum value is 14 [11]. Variation in SFAR and TNSS results obtained were due to differences in number of exposures, time of onset of symptoms and the gender of patients with suspected AR.

From the normality test that had been done using SPSS version 26, it can be concluded that the sample is a non-normal distribution thus Spearman Correlation Test was used to identify the relationship between these two questionnaires. From Spearman Correlation Test, a significant relationship was found ($p = 0.000$) which means that there is a correlation between SFAR and TNSS questionnaire. The relationship strength and magnitude for both questionnaires can be seen in the correlation coefficient value, which is +0.535 between values of 0.510-0.750 which can be conclude that there is a strong relationship between SFAR and TNSS. It also shows that the relationship moves in a positive manner in which if SFAR value increase, TNSS value also increase and vice versa. It can be seen in Figure 3 that mild symptoms (TNSS < 7) were the dominant group with a total of 8 respondents compared to the moderate (TNS 7-10) and severe (>11) groups at the SFAR value of 7 with 3 respondents and 1 respondent respectively. At SFAR value of 15, severe symptoms were the most common group with a total of 2 respondents compared to mild and moderate symptoms who had no respondent at all. Similar to Di et al., study which showed there were significant differences in symptoms in students who obtained SFAR ≥ 7 and those who obtained SFAR <7 where the

ones who obtained SFAR ≥ 7 more likely to develop symptoms [12].

5. Conclusion

According to the study conducted, several conclusions can be drawn which is the highest age group of respondents with suspected AR is 17-20 years and females is the most predominant gender who were suspected with AR. Majority of the respondent which is 38 respondents had a mild symptom of AR and the least group was severe symptoms with a total of 26 respondent. From this study, it can be concluded that there is a strong and positive relationship between SFAR and TNSS questionnaire in individual with suspected AR.

6. Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical considerations but are available from the corresponding author upon reasonable request.

7. Ethical Statement

This study was approved by the Research Ethics Committee of Universitas Sumatera Utara.

8. Author Contributions

All authors contributed to the design and implementation of the research, data analysis, and finalizing the manuscript.

9. Funding

No funding.

10. Conflict of Interest

Authors declares no conflict of interest.

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