Validity and Reliability of The Indonesian Version of Patient Allergic Rhinitis Questionnaire and Allergic Rhinitis Prevalence in A Class of 2018–2019 Medical Students of Universitas Padjadjaran, Indonesia

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pISSN: 2302-1381;
eISSN: 2338-4506;
http://doi.org/10.15850/ijihs.v10n1.2711
IJIHS. 2022;10(2):94–101

Received:
March 3, 2022

Accepted:
August 30 2022

Abstract

Objective: To determine the validity and reliability of the Indonesian version of Patient Allergic Rhinitis Questionnaire as a screening tool for AR and the prevalence of AR in a class of 2018–2019 medical students of Universitas Padjadjaran, Indonesia.

Methods: A cross-sectional descriptive study was performed during the period November-December 2021 on a class of 2018–2019 medical students of Padjadjaran University. The Indonesian version of the pre-validated Patient Allergic Rhinitis Questionnaire was distributed online. Allergic rhinitis was determined from history taking by identifying a history of a previous diagnosis of AR and/or 2 or more symptoms (watery runny nose, sneezing, nasal congestion, itching, or conjunctivitis) for more than 1 hour on most days.

Results:. The validity of the Indonesian version of the Patient Allergic Rhinitis Questionnaire was good with a 0.895 Cronbach's Alpha coefficient, reflecting a reliable questionnaire. The prevalence of AR was 35.8% with most were female (69.2%). There were 59.9% of respondents who had a history of allergy in their parents. The most common symptom was nasal congestion (85.7%) and the moderate-severe persistent (49.2%) was the most common ARIA-WHO classification. Dusty places (92.1%) were the most common cause of symptoms. The most common comorbidity was rhinosinusitis (35%). The mean symptom severity score was 6.7.

Conclusions: The Indonesian version of the Patient Allergic Rhinitis Questionnaire is valid and reliable as a screening tool for AR. The prevalence of AR in this study is quite high, with moderate-severe persistent as the most prominent classification.

Keywords: Allergic rhinitis, patient allergic rhinitis questionnaire, prevalence, reliability, validity

Introduction

Allergic rhinitis (AR) is a disease of the nasal mucosa mediated by immunoglobulin E (IgE) after exposure to allergens. The classic symptoms of AR include an itchy nose, sneezing, rhinorrhea, and nasal congestion. In addition, AR can also cause allergic rhinoconjunctivitis symptoms which are characterized by the presence of watery, red itchy eyes.[1,2] Allergic rhinitis comorbidities include asthma, rhinosinusitis, nasal polyps, otitis media with effusion, adenoid hypertrophy, and gastroesophageal reflux.[1,3,4]

According to the World Allergy Organization (WAO), it is estimated that forty percent of children and about ten to thirty percent of adults are affected by AR worldwide.[3] In the Asia-Pacific region, the prevalence of AR is ranging between 4.5–

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80.3%.[5] Meanwhile, the prevalence of AR in Indonesia is not known for certain because there is no national data on this matter, but there was a study on a class of 2010 medical students of Padjadjaran University which showed that the prevalence of AR was 38.2%.[6]

Allergic rhinitis can decrease quality of life by impairing cognitive function and sleep and also causing fatigue and irritability. Allergic rhinitis is also associated with decreased productivity at work and school.[1] In addition, AR can have a direct economic impact due to the cost of medicines and consultations and an indirect impact due to decreased work productivity.[3]

The diagnosis of AR is made based on the history taking, physical examination, and supporting examination such as skin prick test or allergen-specific IgE test which is then classified based on the duration of symptoms and the severity of symptoms by referring to the Allergic Rhinitis and its Impact on Asthma (ARIA) recommendation guideline in collaboration with the World Health Organization (WHO).[1] Skin prick test is the gold standard diagnostic tool for AR. The advantages of the skin prick test are that the examination is fast, simple, and well-tolerated by patients.[1,7] Meanwhile the disadvantages are that special training is required for health workers and this examination reagent is not always available in health services in Indonesia.[7] The use of a validated questionnaire is an alternative tool to screen for AR in first-level health services which according to the ARIA-WHO recommendation is the use of the Patient Allergic Rhinitis Questionnaire.[8] However, in Indonesia there has been no study using this questionnaire yet.

Medical students are a productive age group who need a fast and accurate diagnosis of AR because of their need for a good quality of life. Meanwhile, during a pandemic, there is limited interaction between patients and doctors, which affects the initial screening for AR. This study aims to determine the validity and reliability of the Indonesian version of the Patient Allergic Rhinitis Questionnaire as a screening tool for AR when it is not possible to meet the patient in person or the skin prick test reagent is not available and to determine the prevalence of AR in a class of 2018-2019 medical students of Padjadjaran University.

Methods

This is a descriptive study with a cross-sectional design. Approval was received from the Research Ethics Committee of the Faculty of Medicine of Padjadjaran University, Indonesia with ethics letter number 850/UN6.KEP/EC/2021. The type of data used is primary data through online questionnaires obtained from November to December 2021.

The research subjects were the class of 2018–2019 medical students of Padjadjaran University with inclusion criteria aged 17–23 years, exclusion criteria were subjects who were not willing to fill out the questionnaire or had become respondents to the validity and reliability test of the questionnaire. The sampling technique used a cross-sectional formula for categorical descriptive so that the sample size in this study is a minimum of 363. The total number of class 2018-2019 medical students at Padjadjaran University is 669 students. Thirty students took the validity and reliability test of the questionnaire and there were difficulties in contacting some students such as the unavailability of contacts and no response from some students so there were only 390 students involved in this study.

The research instrument is an online questionnaire consisting of an explanation of the research and research objectives, research ethical approval, informed consent, respondent's identity and AR history, Patient Allergic Rhinitis Questionnaire, and 1 additional question. The Patient Allergic Rhinitis Questionnaire section has been translated into Indonesian and has been validated first. This questionnaire consists of 5 questions regarding AR consisting of 1 question regarding AR symptoms, 1 question regarding the causes of AR symptoms, 1 question regarding the duration of AR symptoms, and 1 question regarding the impact of AR symptoms. All questions can be answered with a choice of "yes" or "no" except for the question of how bothersome the symptoms of AR are which is answered with a choice of numbers from 0 (not bothersome at all) to 10 (very bothersome). Meanwhile, in the additional question section, there is a question regarding the presence of at least 2 AR symptoms that occur for more than 1 hour on most days with the answer choices being "yes" or "no".

The validation of the questionnaire was carried out by translating the original version of the questionnaire from English to Indonesian at the IEDUC (International Education Center) institution which was then examined by our supervisor in Otolaryngology-Head and Neck Surgery field. The translated questionnaire

was distributed to 30 class of 2018 medical students of Padjadjaran University which was then tested for validity using the Corrected Item-Total Correlation method and tested for reliability using Cronbach's Alpha method.

Results

In assessing the validity of the Indonesian version of the Patient Allergic Rhinitis Questionnaire, the point-biserial correlation is between 0.352 to 0.709 which indicates that this questionnaire is valid because the point-biserial correlation is more than 0.25 (Table 1).[9] Meanwhile, the Cronbach's Alpha coefficient is 0.895 which indicates that this questionnaire is reliable because a questionnaire is considered reliable if the Cronbach's Alpha coefficient is at least 0.7.[10]

After obtaining a valid and reliable questionnaire, the questionnaire was distributed to research subjects to assess the prevalence of AR. From the 390 subjects, the prevalence of AR was 140 people (35.8%) with females (69.2%) higher than males (30.7%). Meanwhile, there were more subjects with a history of allergy in their parents (59.9%) than those without a history of allergy in their parents (40%) (Table 2).

According to the cause of AR symptoms that the subjects suffered, the most common cause was dusty places (92.1%) followed by

Table 1 Validity Test Result of the Indonesian Version of Patient Allergic Rhinitis Questionnaire

Questions	Point Bi-serial Correlation	Result
1. Apakah Anda sedang mengalami gejala berikut ini atau pernah menderita gejala tersebut?		
Hidung berair	0.695	Valid
Bersin-bersin (terutama dengan keras dan terus-menerus)	0.515	Valid
Hidung tersumbat (perasaan sulit bernafas melalui hidung)	0.669	Valid
Hidung gatal	0.703	Valid
Mata merah, gatal dan berair	0.709	Valid
2. Apa yang menyebabkan gejala yang Anda derita?		
Serbuk sari dari pohon, bunga dan rerumputan	0.410	Valid
Jamur (baik di dalam maupun di luar ruangan)	0.496	Valid
Hewan berbulu (terutama kucing, anjing dan tikus)	0.352	Valid
Tempat berdebu	0.433	Valid
3. Berapa lama Anda menderita gejala tersebut?		
Lebih dari empat hari dalam seminggu	0.489	Valid
Lebih dari empat minggu berturut-turut	0.496	Valid
4. Bagaimana gejala tersebut memengaruhi Anda?		
Gejala itu mengganggu tidur Anda	0.668	Valid
Gejala itu menghambat kegiatan harian Anda (olahraga, rekreasi, dll.)	0.695	Valid
Gejala itu menghambat partisipasi Anda di sekolah atau tempat kerja	0.572	Valid
Gejala itu merepotkan Anda	0.642	Valid

Table 2 Characteristics of Respondents

Characteristics	Allergic Rhinitis (n=140)		Non-Allergic Rhinitis (n=250)	
	n	%	n	%
Sex				
Male	43	30.7	67	26.8
Female	97	69.2	183	73.2
Parental allergy history				
Mother or father	62	44.2	78	31,2
Both parents	22	15.7	14	5.6
No history	56	40	158	63.2

furred animals (31.4%) and pollen (11.4%). Mould (8.5%) was the least common cause of AR symptoms (Table 3).

Allergic rhinitis subjects were then classified based on the history of symptoms they had or were experiencing. Subjects can choose one or more symptoms. The most common symptom of AR was nasal congestion (85.7%) followed by a watery runny nose (84.2%), sneezing (83.5%), itchy nose (82.8%), and then red, itchy, and watery eyes (67.8%) (Table 3).

The most common AR comorbidity was rhinosinusitis (35%). After rhinosinusitis, the most comorbidities were asthma (21.4%) and gastroesophageal reflux (13.5%). Otitis media with effusion (4.2%), adenoid hypertrophy (2.8%), and nasal polyps (0.7%) were relatively few comorbidities (Table 3).

Table 3 Frequency of the Cause of Symptoms, Symptoms, and Allergic Rhinitis Comorbidity

	Number of respondents	
	n	%
Cause of symptoms		
Pollen from trees, flowers, and grasses	16	11.4
Mould (both indoors and outdoors)	12	8.5
Furred animals (especially cats, dogs, and mice)	44	31.4
Dusty places	129	92.1
Symptoms		
Nasal obstruction	120	85.7
Itchy nose	116	82.8
Watery runny nose	118	84.2
Sneezing	117	83.5
Watery, red itchy eyes	95	67.8
Allergic rhinitis comorbidity		
Asthma	30	21.4
Rhinosinusitis	49	35
Nasal polyps	1	0.7
Adenoid hypertrophy	4	2.8
Otitis media with effusion	6	4.2
Gastroesophageal reflux	19	13.5

Table 4 Prevalence of Allergic Rhinitis based on ARIA-WHO Classification

Classification	Number of Cases	
	n=140	%
Mild intermittent	14	10
Moderate-severe intermittent	54	38.5
Mild persistent	3	2.1
Moderate-severe persistent	69	49.2

Then the AR subjects were classified using the ARIA-WHO classification based on the duration of symptoms and the severity of the symptoms into mild intermittent, moderate-severe intermittent, mild persistent, and moderate-severe persistent. From the results of this study, it was found that the classification of AR from the highest to the lowest was moderate-severe persistent (49.2%), moderate-severe intermittent (38.5%), mild intermittent (10%), and mild persistent (2.1%) (Table 4).

On a Visual Analogue Scale (VAS) symptom score of 0-10, subjects chose the extent to which AR symptoms bothered them. Overall, there were variations in the symptom severity scores chosen by the subjects, starting from the lowest score of 0 to the highest score of 10. The mean symptom severity score was 6.7 with a standard deviation of 1.9 (Table 5).

Discussion

The prevalence of AR in this study was slightly higher than the prevalence of AR proposed by WAO, which ranged from 10–30% globally.[8] In addition, the prevalence of AR in this study was also higher than the prevalence of AR studied in Korea (17.1%) and Nigeria. (22.8%).[11,12] The difference in the prevalence of this study with other studies can be caused by the large and the age range differences of the population used. The population study conducted in Korea is a population that represents Korean citizens as a whole with a total sample of 85,006 subjects aged less than 2 years to more than 60 years.[11] Meanwhile, in a study conducted in Nigeria, the population represents 5 geo-political zones in Nigeria with a total sample of 20,063 subjects aged 6 years to more than 18 years.[12] In addition, the variations in risk factors between regions such as risk factors of environmental conditions and the presence of a family history of allergy can also be the cause of the different prevalence of AR in this study with other studies.[1] However, the prevalence of AR in this study was slightly lower than in the previous study in a class of 2010 medical students of Padjadjaran University which was 38.2%.[6]

The result of this study showed that the prevalence of AR was higher in females than in males. The research conducted by Fauzi and Ha also showed that AR in females was higher than in males.[6,11] In this study, the research subjects involved are higher in females than males so it can cause female AR subjects to be higher than males. This is also supported by the absence of differences in the early pathogenesis of AR in both females and males so females should not be more likely to have AR than males.[13] However, some studies stated that the prevalence of AR is higher in males and there are fundamental differences between females and males in the inflammatory pathway towards allergen, causing AR to occur more often in males than females.[14]

Allergic disorders involve important gene-environmental interactions.[3] One of the AR risk factors is a family history of allergy. The genetic contribution to allergic disease is estimated to be greater than 50%.[14] The inheritance of risk alleles in many genes has increased the susceptibility to allergic disease.[3] In this study, AR subjects who had a history of allergy in their parents were higher than those who did not have any history of allergy in their parents. This study also showed that the history of allergy in their mother or father was higher than those who had a history of allergy

Table 5 Central Tendency and Dispersion of Symptoms Severity Score

	Lowest score	Highest score	Mean	Deviation standard
Sex				
Male	1	10	6.6	1.9
Female	0	10	6.7	2
All Subjects	0	10	6.7	1.9

in both parents. These results are similar to a study conducted by Fauzi.[14]

The result of this study showed that the highest cause of AR symptoms was dusty places with house dust mite allergen present in it. The most common dust mite species in tropical areas such as Indonesia are *Dermatophagoides pteronyssinus* (Der p) and *Dermatophagoides farinae*. These species are abundant in mattresses, bedding, pillows, carpets, upholstered furniture, or furry toys and grow optimally in hot conditions with temperatures above 20°C and high humidity.[1] In a study conducted by Sudiro, dust mites were also the highest allergen.[15]

The ARIA-WHO classification is the current classification of AR used. The classification was made by WHO because the conventional classification that divides AR based on the time of allergen exposure into chronic, seasonal, and occupational AR is not suitable for the patient's clinical symptom status. Currently, the ARIA-WHO classification divides AR based on the duration of symptoms into intermittent or persistent and based on the severity of symptoms into mild or moderate-severe.[1] In this study, the highest classification was moderate-severe persistent. The result of this study is similar to research conducted by Basyir and Sudiro at Dr. Hasan Sadikin General Hospital Bandung which stated that the most frequent classification was moderate-severe persistent.[15,16] Most of the patients who present to the physician have had moderate-severe AR disease for more than 4 days per week and more than 4 weeks. [17]

The existence of geographical variations around the world can cause a difference in the distribution of aeroallergens, such as dust mites, in different regions. Due to environmental factors such as temperature and humidity, dust mite allergen levels vary across regions.[15] The location of this study is Indonesia, which is an area with hot and humid temperatures. This can lead to dust mites as the highest cause of allergy in this study. The high intensity and frequency of exposure to dust mites can cause many AR subjects in this study to experience AR with moderate-severe persistent classification.

Nasal congestion was the most common symptom in this study, followed by a watery runny nose, sneezing, an itchy nose, and then red, itchy, and watery eyes. Research conducted by Fauzi and Basyir stated that nasal congestion was also the most common symptom experienced by AR subjects with a percentage of 90% and 83.1%.[6,16] However, in Fauzi's study, in addition to nasal congestion, an itchy nose was also the most frequent symptom (90%).[6] Nasal congestion can occur due to the presence of mediators such as histamine and leukotriene which increase vascular permeability and then edema formation.[17] Nasal congestion is the most disturbing symptom in AR patients and can interfere with the patient's quality of life such as decreased work productivity.[1] One of the main symptoms found in AR with moderate-severe classification is nasal congestion.[18] This corresponds with the result of this study that showed the highest AR symptom and the highest ARIA-WHO classification based on the symptom severity are nasal congestion and moderate-severe consecutively.

In this study, the most common AR comorbidity was rhinosinusitis. This can occur due to an allergic reaction in the nasal mucosa that can cause swelling so can obstruct the ostium of the sinuses and there is more inflammation in the maxillary sinus of allergic patients.[19] The result of this study is higher than the study conducted by Moeis at Dr. Hasan Sadikin General Hospital Bandung which stated that patients with rhinosinusitis comorbidity were only 9.6%.[20]

According to ARIA-WHO, more than 80% of asthmatic patients have rhinitis and 10–40% of rhinitis patients have asthma. This represents the concept of one airway one disease.[1] Because of their pathophysiology and histology similarity, AR and Asthma are considered to be similar allergic airway diseases in different locations.[4] In this study, asthma comorbidity was the highest comorbidity after rhinosinusitis. This result is slightly lower than the result of research conducted by Moeis which stated that asthma comorbidity was 24.6%.[20]

The highest comorbidity in this study after rhinosinusitis and asthma was gastroesophageal reflux disease (GERD). Feng's research showed that AR patients are at greater risk for developing GERD than non-AR patients. Due to itching in the throat and nasal discharge that drips into the posterior nose, there is an increase in the frequency of swallowing in AR patients. This high frequency of swallowing can exacerbate gastric acid backflow by increasing transient lower esophageal sphincter relaxation (TLESR). In addition, the presence of eosinophilic inflammation in AR may exacerbate the inflammatory response in GERD. This is because the allergic impact of AR on the nasal mucosa can have the same impact on the

laryngeal mucosa such as edema and excess mucus secretion, causing the symptom of laryngopharyngeal reflux which is a subgroup of GERD.[4]

Allergic rhinitis can decrease quality of life and productivity.[1] In this study, the standard deviation is smaller than the mean, which indicates that the data distribution is mostly close to the mean so the mean score is a good representation of the overall data. This study shows that AR has quite an impact on the quality of life of the subject.

In conclusion, the Indonesian version of the Patient Allergic Rhinitis Questionnaire is a valid and reliable questionnaire so it can be used as a screening tool for AR. The use of a validated questionnaire is very important to screen for AR if it is not possible to meet the patient in person or the skin prick test reagent is not available. This questionnaire can be easily used by health workers to screen for AR. However, the questionnaire should be added with 1 additional question regarding the presence or absence of at least 2 AR symptoms that occur for more than 1 hour on most days to be able to determine whether the patient has AR or not according to the ARIA-WHO guideline. The study shows a quite high prevalence of AR with the highest classification being moderate-severe persistent, which means there is an importance to holding socialization about AR so that AR patients can detect and treat AR early to have a good quality of life. In addition, it is advisable to conduct research both online and offline and also provide incentives for subjects who are willing to participate so it will yield a greater quantity of involved research subjects and then can produce more accurate data.

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