

Original Article

Prevalence of allergic rhinitis and its effect on the quality of life of middle school students

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Abstract: Objective: Allergic rhinitis (AR) may significantly affect the patients' quality of life. The main purpose of this article was to investigate the prevalence of AR in high school students in Zhengzhou city of China and its effect on the quality of life. Methods: This was a cross-sectional, analytical, descriptive study, based on the SFAR scale. The Score for Allergic Rhinitis (SFAR) was used and the quality of life in the students affected by rhinitis was evaluated using the SF-12 questionnaire. Results: From 1511 students who completed the SFAR questionnaire, 291 (52.6%, girls; 47.4%, boys) had AR. Domestic dust was the most common cause of the disease. The most common symptoms of AR were rhinorrhea (76.6%), epiphora (76.3%), nasal congestion (64.3%), and itching (54.3%). According to the ARYA scale, (Allergic Rhinitis and its Impact on Asthma), 41.9% of students had moderate-to-severe rhinitis and 58.1% had mild rhinitis. A total of 43.1% of patients with moderate-to-severe rhinitis had a persistent condition and 56.9% had an intermediate condition. Results of the SF-12 questionnaire among students with AR showed a significant difference in bodily pain in comparison with healthy students. Conclusion: The results of this study show that the prevalence of AR among high school students is 19.3%. Because of the effect of this disease on the life quality of high school students in terms of bodily pain, efforts should be made to reduce allergen levels as far as possible.

Keywords: Allergic rhinitis, quality of life, SF-12, SFAR, pain

Introduction

Allergic rhinitis (AR) is one of the most common manifestations of immunoglobulin E(IgE)-mediated inflammation after allergen exposure of the nasal mucosa membrane [1]. It is clinically defined as a symptomatic disorder of the nose characterized by the association of rhinorrhea, sneezing, nose stinging, and nasal congestion, frequently associated with symptoms such as conjunctival/pharyngeal stinging and eye redness.

AR impairs quality of life, sleep and social activities [2, 3]. It is a significant cause of reduced work productivity and lost school days. Poor sleep quality may induce diurnal somnolence. Impact is correlated with the severity of symptoms. AR is frequently associated with several comorbidities, including asthma, and physicians are encouraged to ask AR patients about symptoms of asthma [4]. Symptoms of AR usu-

ally appear before the age of 20 [5], and may limit the sufferer's daily activities. Each year specialists see a high burden of symptoms of AR (including cough, itching, rhinorrhea, epiphora, and congestion) among patients, resulting in high treatment costs [6].

AR is very common in Western countries but it frequently remains under diagnosed [7]. In France, prevalence was found to be 31% in adults in a well-conducted study involving a representative random sample of more than 10,000 subjects [8]. Prevalence is higher in young people and its frequency decreases with age [9]. But there is still no completely corresponding data concerning the prevalence of AR in China. As the Zhengzhou geographical zone is surrounded by a dry climate as well as agricultural land, and because a large number of allergens have been recorded in the area, we decided to investigate the prevalence of AR in this city.

Allergic rhinitis on QOL

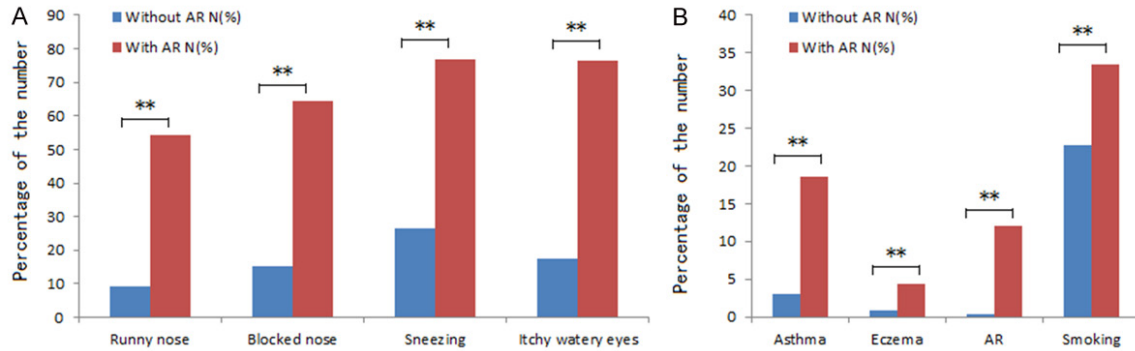


Figure 1. Comparison of Allergic Rhinitis (AR) symptoms between students with AR and without AR. A. Based on the SFAR scale, 291 students (19.3%) had AR, of whom 153 (52.6%) were girls and 138 (47.4%) were boys. Symptoms during the preceding 12 months among students with AR included nose itching (54.3%), congestion (64.3%), and rhinorrhea (76.6%). The rate of eye itching and epiphora was 76.3%. There was a significant difference in symptoms compared with healthy students ($P<0.001$). B. Of the students with AR, 176 (61.6%) were aware of their allergy, with 38 (13.1%) already having had an allergic test and 33 (87%) having received positive results. Asthma had already been diagnosed in 18.6% of cases, compared with eczema in 4.1% of cases and AR in 12% ($P<0.001$ versus healthy controls). Compared with healthy families, these diseases were more common among individuals with a family history of allergy ($P<0.001$). However, students with an allergy background had greater contact with tobacco smoke and opium compared with healthy controls ($P<0.001$).

Materials and methods

Study design

This was a descriptive, analytical, cross-sectional study. The population of this study was high school students in the city of Zhengzhou. The survey was carried out in two phases. In the first phase, the prevalence of AR was investigated; while in the second phase, the quality of life of students with AR was compared with that of healthy students. In the first phase, 1840 students selected through cluster sampling were investigated. Sixteen schools were chosen at random among Zhengzhou high schools, and all students from one class at each level of study were chosen at random and questioned. All students in the study were given the project questionnaire. In the second phase of the research, and in order to study the quality of life of students with AR, the SF-12 questionnaire was used. This questionnaire investigates quality of life in eight domains, including physical functioning, role limitation due to physical problems, general health, vitality, social functioning, mental health, role limitation due to mental problems, and bodily pain. The Farsi equivalent of this questionnaire was available and its validity and reliability were approved [8]. Students with AR were selected for the questionnaire using simple sampling by referring to the available samples, while healthy classmates were used as controls.

Short-form questionnaire on health-related QOL (SF-12)

The 12-item Short Form Health Survey (SF-12) is a shorter alternative of the SF-36 instrument that includes 12 questions and 8 scales: physical functioning (PF-2 items on limitations doing moderate activities and climbing several flights of stairs), role limitations due to physical problems (RP-2 items on less accomplishment than one would like to achieve and limitation in kind of work or other activities), bodily pain (BP-1 item on pain interference with one's normal work), general health (GH-1 item on general health perception), vitality (VT-1 item on having energy), social functioning (SF-1 item on interference of physical health or emotional problems with one's social activities), role limitations due to emotional problems (RE-2 items on less accomplishment than one would like to achieve and not being careful in doing activities as usual) and perceived mental health (MH-2 items on feeling calm or peaceful and feeling sad or blue). Response categories for items vary from 2- to 6-point scales and raw scores for items are ranging from 1 to 6. After recoding raw scores for some items (that are BP, GH, VT, and one item from MH); then the raw scores could be transformed in order to provide eight scale scores each ranging from 0 (the worst) to 100 (the best). This method of scoring (summed ratings) assumes that item or items belonging to each scale can be transformed or

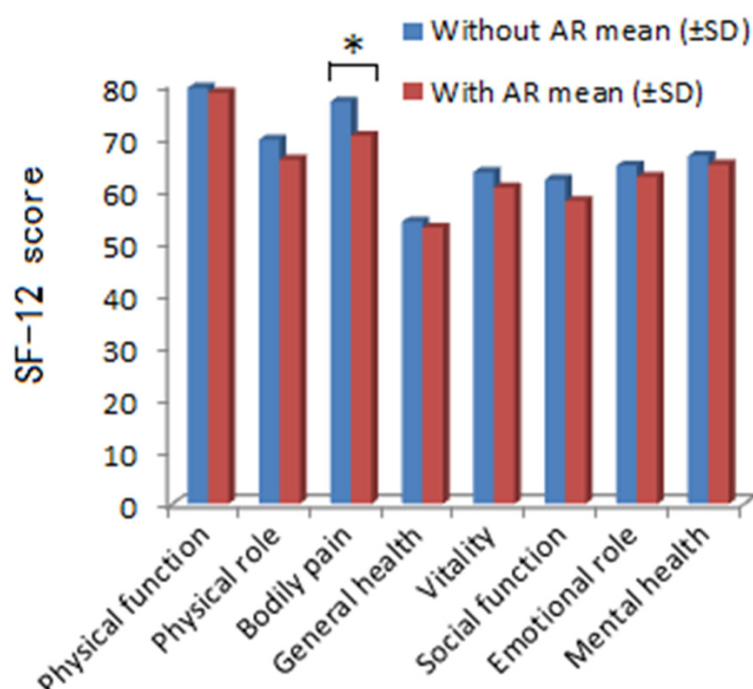


Figure 2. Comparison of quality of life between students with and without AR. The quality of life of the 126 students with AR as well as 133 healthy students was investigated using the SF-12 questionnaire. After calculating the scores, quality of life was studied across the eight domains, and it was determined that the lowest scores were related to general health then social functioning, while the highest score was related to physical functioning. The only significant differences between the two groups relates to physical functioning and body pain. This comparison shows that the quality of life of the students with AR was worse than that of the healthy students ($P<0.05$).

summed without standardization of scores or item weighting.

Short-form of McGill pain questionnaire (SF-MPQ)

A short form of the McGill Pain Questionnaire (SF-MPQ) has been developed. The main component of the SF-MPQ consists of 15 descriptors (11 sensory; 4 affective) which are rated on an intensity scale as 0 = none, 1 = mild, 2 = moderate or 3 = severe. Three pain scores are derived from the sum of the intensity rank values of the words chosen for sensory, affective and total descriptors. The SF-MPQ also includes the Present Pain Intensity (PPI) index of the standard MPQ and a visual analogue scale (VAS). The SF-MPQ scores obtained from patients in post-surgical and obstetrical wards and physiotherapy and dental departments were compared to the scores obtained with the standard MPQ. The correlations were consistently high and significant. The SF-MPQ was also shown to be sufficiently sensitive to dem-

onstrate differences due to treatment at statistical levels comparable to those obtained with the standard form.

Statistical analysis

All data were put into the statistical software SPSS 11.0 and t-test was used to analyze the difference between score of QOL and that of pain. Pearson correlation analysis was used to analyze the relationship among pain, age, culture background, income and QOL. Stepwise regression analysis was conducted to analyze the influencing factors on QOL of AR patients.

Results

Comparison of Allergic Rhinitis (AR) symptoms between students with AR and without AR

In the first phase of this study, 1840 questionnaires were distributed, of which 1511 (82%) were completed and

returned. Respondents included 825 (54.6%) girls and 686 (45.4%) boys, all of whom were high school students. Based on the SFAR scale, 291 students (19.3%) had AR, of whom 153 (52.6%) were girls and 138 (47.4%) were boys. Symptoms during the preceding 12 months among students with AR included nose itching (54.3%), congestion (64.3%), and rhinorrhea (76.6%). The rate of eye itching and epiphora was 76.3%. There was a significant difference in symptoms compared with healthy students (**Figure 1A**, $P<0.001$).

Of the students with AR, 176 (61.6%) were aware of their allergy, with 38 (13.1%) already having had an allergic test and 33 (87%) having received positive results. Asthma had already been diagnosed in 18.6% of cases, compared with eczema in 4.1% of cases and AR in 12% ($P<0.001$ versus healthy controls). Compared with healthy families, these diseases were more common among individuals with a family history of allergy ($P<0.001$). However, students

Allergic rhinitis on QOL

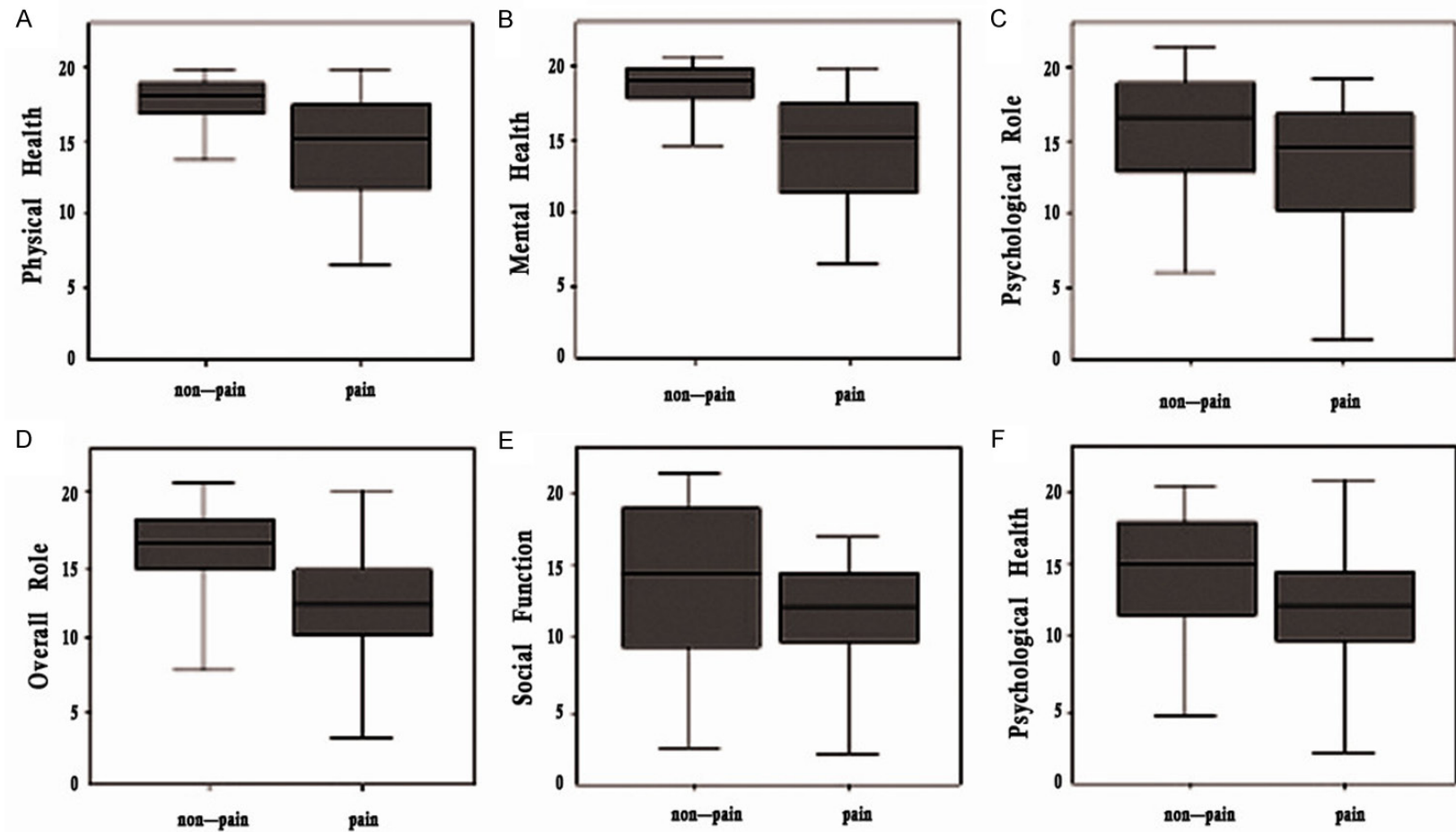


Figure 3. Pain on the QOL of AR patients. Of the AR patients with pain, the QOL scores of Physical Health (A), Mental Health (B), Psychological Role (C), Overall Health (D), Social Function (E), Psychological Health (F) were decreased significantly comparing with those without pain (the line in the box indicating the mean and the upper and lower rim representing the 95% confidence interval).

Allergic rhinitis on QOL

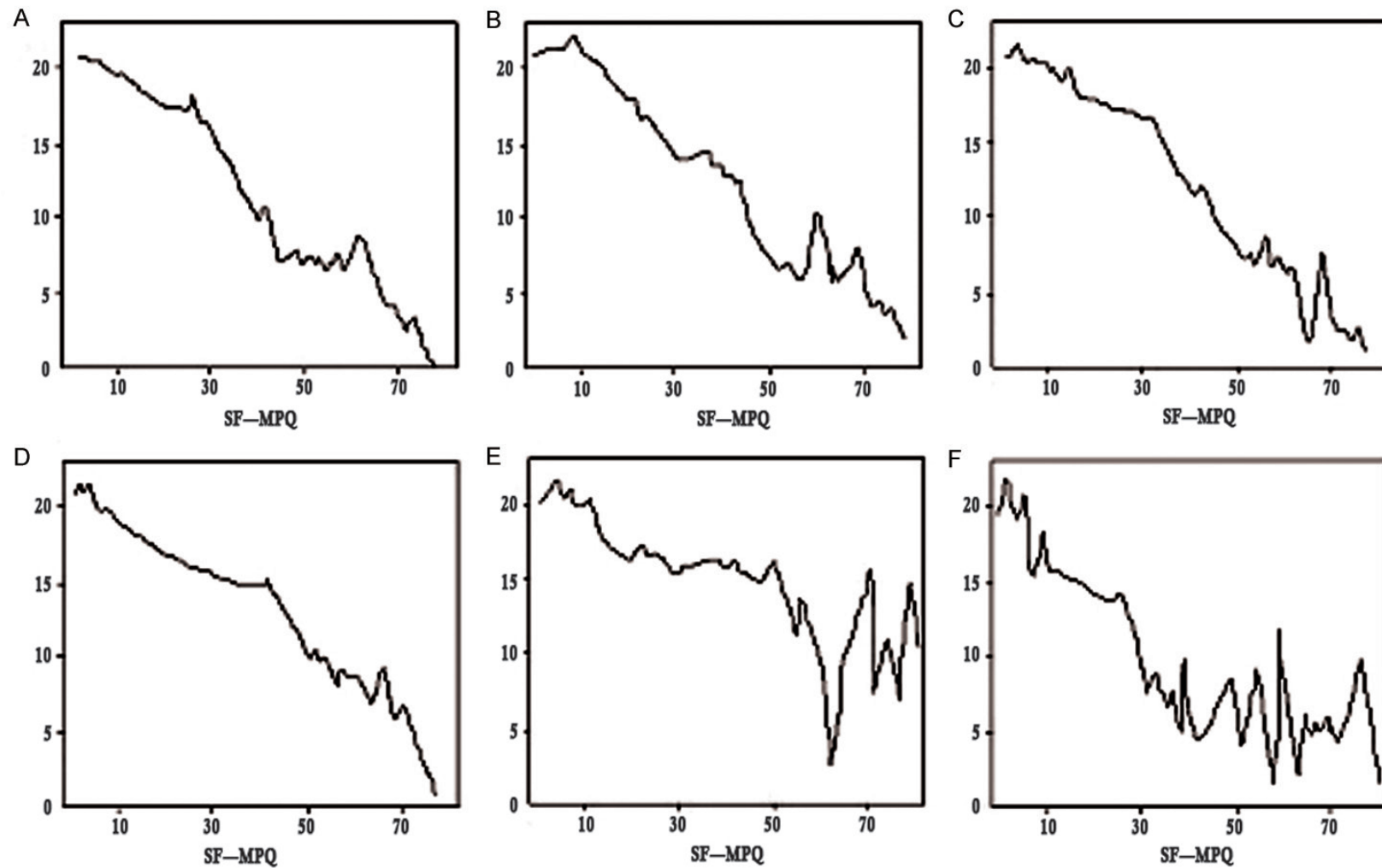


Figure 4. Pain on the SF-MPQ of AR patients. With the increasing of the SF-MPQ score, the QOL of the Physical Health (A), Mental Health (B), Psychological Role (C), Overall Health (D), Social Function (E), Psychological Health (F) decreased correspondingly.

with an allergy background had greater contact with tobacco smoke and opium compared with healthy controls ($P<0.001$). A comparison of AR symptoms between students with and without AR is shown (**Figure 1B**).

Comparison of quality of life between students with and without AR

The quality of life of the 126 students with AR as well as 133 healthy students was investigated using the SF-12 questionnaire. After calculating the scores, quality of life was studied across the eight domains, and it was determined that the lowest scores were related to general health then social functioning, while the highest score was related to physical functioning. A comparison of quality of life between students with and without AR is shown in **Figure 2**. The only significant differences between the two groups relates to physical functioning and bodily pain. This comparison shows that the quality of life of the students with AR was worse than that of the healthy students ($P<0.05$).

The analysis of pain on the QOL of AR patients

Among all the AR patients with pain, their QOL scores of 6 dimensions (Physical Health, Mental Health, Psychological Role, Overall Health, Social Function, Psychological Health) were decreased significantly comparing with those without pain and the decreased proportion were 21.3%, 19.5%, 18.2%, 12.1%, 16.7% and 31.2% ($P<0.01$) respectively. As shown by **Figures 3** and **4**, with the increasing of the SF-MPQ score, the QOL of the Physical Health, Mental Health, Psychological Role, Overall Health, Social Function and Psychological Health decreased correspondingly and the correlation analysis indicated the coefficient R were 0.321, 0.187, 0.037, 0.323, 0.256 and 0.273 respectively.

Discussion

Allergic rhinitis (AR) is a chronic upper airway disease of increasing prevalence and remains an important healthcare problem [10]. The condition can have a major detrimental impact on quality-of-life and social productivity. Clinical practice guidelines for the management of AR recommend clear goals, including the prevention of allergy, reduction in allergen exposure, and effective pharmacological treatment [11].

The main objective of this research was to study the prevalence of allergic rhinitis among high school students (15-18 years of age) in the city of Zhengzhou (south east of China) using the SFAR scale. Based on this study, the prevalence of AR is estimated at 19.3%. This compares with other studies carried out in China using the International Study of Asthma and Allergic in Childhood protocol (ISSAC), which have previously show a prevalence of 17.7% in Kunming (west of China) and 25.5% in Shantou (south of China) [12-14]. The ISSAC method considers seasonal AR predominantly, while other types of rhinitis, such as perennial disease, are not studied [15]. Thus, the difference in prevalence compared with the statistics obtained in the city of Zhengzhou might be explained by weather changes and changes in allergen levels, or by the kind of questionnaire used.

Furthermore, in our current study, patients with AR had had greater contact with cigarette and opium smoking, consistent with previous studies [16]. The SAFARI study conducted in Hamadan [17] showed that 37.2% of the samples had persistent AR, while a different study conducted in France showed a rate of persistent AR of 49%. Furthermore, in a study carried out in France among those with $SFAR \geq 7$, 10% had mild intermittent AR, 14% had moderate-to-severe intermittent AR, and 59% had severe-to-moderate persistent rhinitis [17]. In the present study, 41.9% of patients had moderate-to-severe rhinitis, of whom 43.1% had persistent AR.

It has previously been shown that the quality of life at school of students with AR is lower than that of peers without AR, and it has also been estimated that AR is responsible for the loss of 3.5 million working days and 2 million school days each year [18]. One study evaluated the impact of AR and asthma on quality of life, and proved that patients with AR experience problems with social and daily activities and have a lower mental well-being than patients without AR. Furthermore, patients with AR had poorer general health and lower vitality than subjects without AR [19].

In our study the lowest score was related to general health and the highest score was related to physical functioning, and the only significant difference between groups related to bodi-

ly pain. These findings were in contrast with some other studies reported. Hellgren studied quality of life in noninfectious rhinitis (NIR) and demonstrated that NIR patients scored lower in vitality, physical function, and social function than healthy persons [20]. Bunny estimated a difference between AR patients and controls in all SF-36 domains except Social Functioning dimension [21-23]. Our results are most consistent with those of Hellgren. The differences between our study and others might be due to the use of different cultures as well as different problems and patient symptoms.

As the scales used in this study were not the same as the scales used in similar studies in other cities, the prevalence of rhinitis in Zhengzhou cannot be compared directly with previous reports from other cities. However, considering the value of the scale used in this study and the prevalence calculated in this study, as well as our knowledge about the effect of this disease, we can state with some confidence that AR reduces physical function and increases bodily pain among young people. As observed in this study, AR is highly dependent on smoking and opium habits. Therefore, reducing contact with these factors might reduce the allergic attacks which have such a negative impact on individuals' performance. This finding highlights the negative consequences and high price associated with drug usage.

Disclosure of conflict of interest

None.

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