

Evaluation of the Psychological Status in Seasonal Allergic Rhinitis Patients

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Key Words

Allergic rhinitis • Nasal symptoms • Psychological status

Abstract

Objective: To investigate the psychological status of Chinese adults with seasonal allergic rhinitis (SAR) in the allergic season, and evaluate the effects of nasal symptoms on their psychological status. **Methods:** The Symptom Checklist 90 (SCL-90) or Self-Reporting Inventory was employed to analyze the psychological status of 337 SAR patients. **Results:** The SCL-90 scores of the SAR patients were statistically higher than those of nonallergic adults in terms of somatization, depression, anxiety, hostility and psychosis. No statistical discrepancies existed in gender or age, the impact of disease course was limited to somatization, compulsion and phobic disorders and the impact of the educational level was that the lower the level of education, the more obvious the hostility. The behavior of somatization, compulsion, depression and anxiety in patients with a history of eczema or asthma was much more obvious than in patients without such a history. Nasal obstruction had a conspicuous impact on somatization, compulsion, interpersonal sensitivity, depression, anxiety and psychosis, while nasal itching contributed to somatization, depression and anxiety. **Conclusion:** The psychological status of SAR patients is evidently worse than that of

nonallergic adults. Symptoms such as nasal obstruction and nasal itching had an obvious impact on the psychological status of the patients.

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Introduction

While allergic rhinitis (AR) is one of the most common chronic respiratory diseases [1], affecting 10–25% of the world's population, China has an incidence rate of 8.7–24.1% [2]. It has been classified as perennial AR and seasonal AR (SAR), which is due to an expansion of the type 2 subset of T cells and the generation of immunoglobulin E antibodies to common allergens, with classic symptoms such as nasal itching, sneezing, nasal obstruction and running nose [3].

In 1997, Meltzer [4] recognized the behavioral complications of AR such as the development of sleep disturbance and fatigue as a consequence of obstruction of the airways, which induces a decrease in work efficiency and psychological disorders. Because of the large number of

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patients and the increasing incidence rate, more attention has recently been paid to the psychological status and quality of life of AR patients. Psychological complications including anxiety and depression in patients with SAR during the allergic season have previously been reported [5].

Previous studies have described the association between psychological symptoms and anaphylactic diseases such as asthma, AR and sensitization dermatitis. Studies of children found that attention-deficit hyperactivity disorder is likely to be an indication for an allergic disorder, and that both conditions may share a common biological background [5, 6]. Meltzer [7] suggested that AR in childhood is associated with increased disorders of learning performance, memory, anxiety and autism, and that children and adolescents with psychological disorders are predisposed to atopic disease. Meanwhile, studies on adults with AR found that allergic reactions can cause central nervous system symptoms in some individuals, such as phobias, irritability, anxiety, sleep disturbance, apathy and depression [8]. The rates of depression, anxiety and sleep disturbance are higher in patients with AR than in the general population, and AR may even become one of the risk factors for suicide. However, there are only few papers exploring the correlation between SAR and psychological status in Chinese adults.

Patients and Methods

Subjects

All the adults with SAR included in this study were outpatients of the Otolaryngology, Head and Neck Surgery Department of the Beijing Tongren Hospital from March 2008 to November 2008. The inclusion criteria were as follows. First, the patients suffered from nasal symptoms in the allergic season (either spring or autumn, or both). The main nasal symptoms included nasal itching, sneezing, nasal obstruction and running nose, which were scored each on a scale of 0–3. A score of 0 indicated no nasal symptoms, 1 indicated slight nasal symptoms, 2 indicated obvious nasal symptom which could still be endured, and 3 indicated obvious nasal symptoms that could not be endured. Second, a nasal endoscopy showed a pale and edematous nasal mucosa, nasal discharge and swollen inferior turbinates. Third, the age of the subjects was between 16 and 60 years. Fourth, a skin prick test (Allergopharma, Reinbeck, Germany) resulted positive to at least 1 allergen, the level of response being equal to or exceeding ++. The following allergens were tested: *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, animal hair, *Blatella germanica*, giant ragweed, mugwort, lambsquarters, *Humulus*, *Chenopodium album*, dandelion, grasses, pine, plantain, locust, trees, *Aspergillus fumigatus*, *Penicillium notatum*, *Curvularia lunata*, *Alternaria tenuis* and *Candida albicans*. The reactions were evaluated based on the mean wheal diameter at 15 min after application of the ex-

tracts. The mean diameters of allergen wheals were calculated from the sum of the largest measurement across the wheal and the largest wheal measurement perpendicular to this divided by 2. In addition, we calculated the skin index (SI) as the ratio of allergen wheal diameter divided by the histamine wheal size. The skin prick test result for each allergen was defined in terms of the SI value as follows: + = $SI \leq 0.5$; ++ = $0.5 < SI \leq 1.0$; +++ = $1.0 < SI \leq 2.0$, and ++++ = $SI > 2.0$.

The exclusion criteria were as follows: (1) AR combined with hypertension, diabetes or other chronic diseases; (2) AR combined with tumor in the nasal cavity; (3) acute infection in the past week; (4) failure to complete the questionnaire, and (5) AR patients undergoing negative life events.

Evaluation of Psychological Status

The general state of health list included gender, age, educational level, course of AR, association of AR with asthma, drug allergy or not, and major life events in the past week.

Psychological status was evaluated using the Symptom Checklist 90 (SCL-90), which is also called the Self-Reporting Inventory. The patients filled in the forms according to their own perception of the past week. The SCL-90 scores for the 337 patients were entered into the psychological test procedure and were then obtained.

We used the SCL-90 scores for nonallergic (normal) Chinese people as the control group [9]. This involved analyzing 1,388 normal Chinese aged from 18 to 60 years, consisting of 724 males and 664 females. The scores of the SCL-90 were compared between the SAR patients and the control group.

Statistical Analysis

The results were analyzed using the statistical software SPSS, version 15.0, and compared to the SCL-90 China standard. Logistic regression analyses were used to assess possible influential psychosocial factors – such as gender, age, educational level, course of AR, and whether being the only child in a family or not – which may be associated with asthma or eczema and nasal symptoms. Results were considered significant if $p < 0.05$ (two-sided).

Results

A total of 337 patients were recruited, including 201 males and 136 females, with an average age of 30.2 years. The allergens included mugwort (61% positive skin prick test), *Humulus* (54%), dandelion (48%) and giant ragweed (43%).

SLC-90 Scores for Patients with SAR

Table 1 and figure 1 show the SLC-90 scores for the patients with SAR. Significant differences were found between SAR patients and nonallergics (normals) in terms of somatization, depression, anxiety, hostility and psychosis. Neither age nor gender had an influence on the scores on the SCL-90 for the SAR patients.

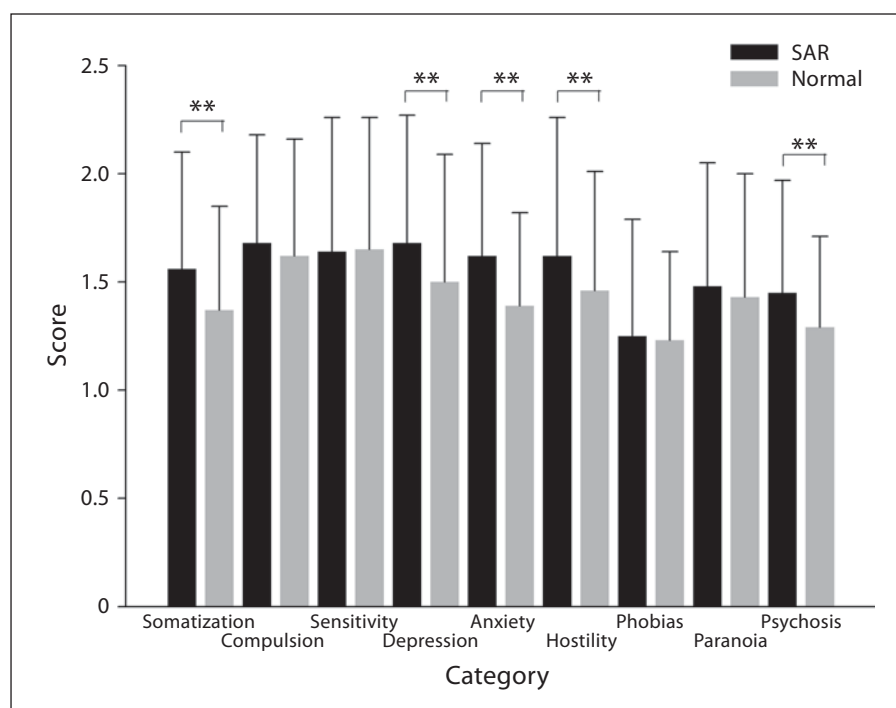


Fig. 1. Comparison of SCL-90 scores of SAR patients with normal controls. ** $p < 0.01$.

Table 1. SCL-90 scores of patients with SAR

	SAR	Normals	T	p
Somatization	1.56 ± 0.54	1.37 ± 0.48	6.42	0.00**
Compulsion	1.68 ± 0.5	1.62 ± 0.54	1.74	0.08
Interpersonal sensitivity	1.64 ± 0.62	1.65 ± 0.61	0.01	0.99
Depression	1.68 ± 0.59	1.50 ± 0.59	5.91	0.00**
Anxiety	1.62 ± 0.52	1.39 ± 0.43	8.98	0.00**
Hostility	1.62 ± 0.64	1.46 ± 0.55	4.20	0.00**
Phobias	1.25 ± 0.54	1.23 ± 0.41	0.01	0.99
Paranoia	1.48 ± 0.57	1.43 ± 0.57	0.09	0.93
Psychosis	1.45 ± 0.52	1.29 ± 0.42	5.75	0.00**

Values denote means ± SD. ** $p < 0.01$.

Effects of Different Nasal Symptoms on Patients' SCL-90 Scores

The effects of the main symptoms of SAR including nasal itching, sneezing, nasal obstruction and running nose on the SCL-90 scores of the SAR patients are summarized in table 2. Nasal obstruction had a conspicuous impact on somatization, compulsion, interpersonal sensitivity, depression, anxiety and psychosis, while nasal itching contributed to somatization, depression and anx-

iety. No significant correlation was found between the scores for the 9 SCL-90 categories and sneezing or running nose.

Effects of Disease Course and Educational Level on Patients' SCL-90 Scores

For the disease course, the patients were divided into 6 groups (<1, 1–5, 5–10, 10–15, 15–20 and >20 years). A significant difference could be seen in terms of somatization, compulsion and phobic disorders: the longer the disease course, the higher the scores the patients recorded in the SCL-90 (table 3).

When the patients were subgrouped according to their educational level – i.e. below the level of junior high school, senior high school, college degree, undergraduate degree, master's or doctoral degree –, the impact of the educational level on the psychological status was that the lower the educational level, the more obvious the degree of hostility (table 3).

Effects of Number of Children in Families and of Association of SAR with Asthma or Eczema on Patients' SCL-90 Scores

There were 139 patients who were the only child in a family. The other 198 patients were from multi-child families. The SCL-90 scores for the patients from a one-

Table 2. Effects of different nasal symptoms on SCL-90 scores of SAR patients

	Nasal obstruction		Sneezing		Running nose		Nasal itching	
	correlation coefficient (r)	p	correlation coefficient (r)	p	correlation coefficient (r)	p	correlation coefficient (r)	p
Somatization	0.23	0.00**	0.02	0.83	-0.02	0.82	0.22	0.00**
Compulsion	0.15	0.01**	-0.02	0.77	0.01	0.92	0.10	0.12
Interpersonal sensitivity	0.14	0.02**	-0.03	0.70	-0.03	0.72	0.06	0.32
Depression	0.14	0.02**	-0.04	0.65	-0.04	0.60	0.14	0.03**
Anxiety	0.23	0.00**	-0.02	0.62	-0.03	0.69	0.14	0.03**
Hostility	0.12	0.05	-0.02	0.79	0.00	1.00	0.03	0.66
Phobias	0.11	0.08	-0.09	0.24	-0.03	0.65	0.10	0.14
Paranoia	0.10	0.10	-0.05	0.54	-0.05	0.53	0.06	0.36
Psychosis	0.13	0.03**	-0.05	0.54	-0.02	0.74	-0.09	0.15

** p < 0.01.

child family were higher than for those from a multi-child family in all of the 9 psychological symptom categories (somatization, compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic disorders, paranoid personality and psychosis). However, significant differences were found between the 2 groups in somatization, depression, anxiety and paranoid personality (table 4; fig. 2).

The frequencies of association of SAR with asthma, eczema or both were 38, 23 and 8%, respectively. SAR patients who also suffered from asthma or eczema scored higher than others, especially in somatization, compulsion, depression and anxiety (table 5; fig. 3).

Discussion

Since the 1950s, scientists have been concentrating on research into the relationship between psychological status and atopic disease. The fact of atopic disease frequently being accompanied by psychological disorders such as anxiety and depression has been acknowledged [1]. SAR patients in the allergic season have both nasal symptoms including nasal itching, sneezing, nasal obstruction and running nose, and psychological symptoms such as depression and anxiety, which may induce a decrease in task performance and quality of life [1]. Marshall et al. [8, 10] found that during the ragweed flowering season, some patients with AR reported symptoms of fatigue and changes in mood as well as cognitive disorders, indicating that depression might directly result from AR, but not

Table 3. Effects of disease course and educational level of SAR patients on SCL-90 scores

	Disease duration (T)	p	Educational level (F)	p
Somatization	3.33	0.00**	1.68	0.14
Compulsion	2.00	0.05*	1.75	0.12
Interpersonal sensitivity	1.70	0.09	1.70	0.14
Depression	0.94	0.35	1.64	0.15
Anxiety	1.94	0.06	1.51	0.19
Hostility	1.74	0.08	3.37	0.01**
Phobias	2.69	0.01**	1.67	0.14
Paranoia	1.92	0.13	2.22	0.06
Psychosis	1.15	0.25	1.75	0.12

* p < 0.05, ** p < 0.01.

from bodily fatigue. Nowadays, while many studies concentrate on the psychological status of SAR patients, the possible pathomechanism of a causal relationship between AR and psychological disorder is still a matter of controversy. Tonelli et al. [11] studied the pharmacogenetics of this relationship, using molecular biology, psychoneuroimmunology and pharmacogenetics, and suggested that the allergy could directly influence the biochemical response of the central nervous system, which might lead to psychological disorders. Psychological disorders in allergic individuals, such as anxiety and depression, have been proposed to affect AR in turn, not only

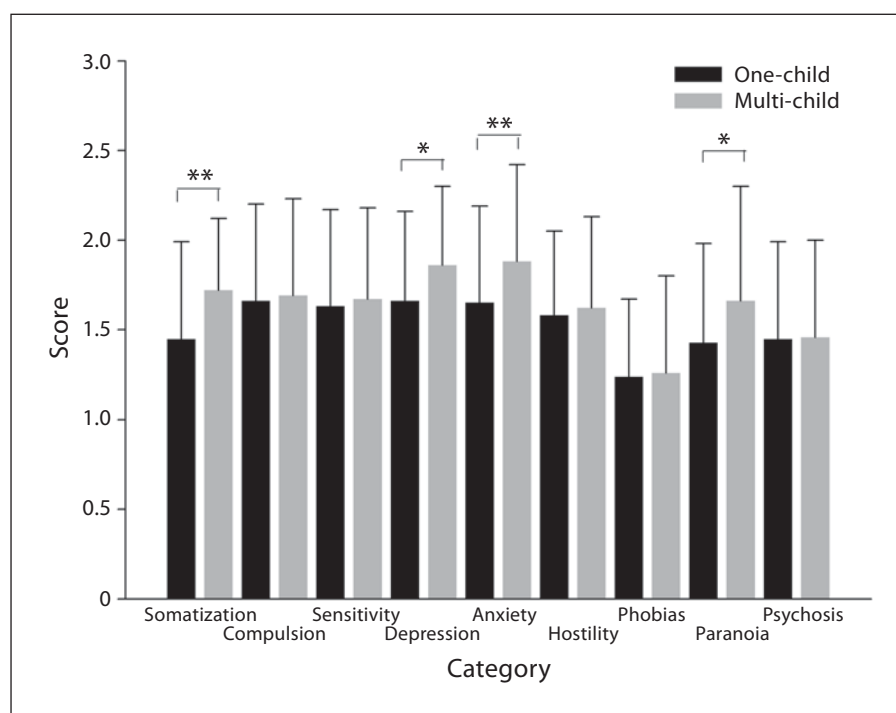


Fig. 2. Comparison of SCL-90 scores of SAR patients from one-child families with patients from multi-child families. * $p < 0.05$, ** $p < 0.01$.

Table 4. Effect of number of children in the family on patients' SCL-90 scores

	More than 1 child scores	1 child scores	T	p
Somatization	1.45 ± 0.54	1.72 ± 0.40	-3.21	0.00**
Compulsion	1.66 ± 0.54	1.69 ± 0.54	-0.92	0.36
Interpersonal sensitivity	1.63 ± 0.54	1.67 ± 0.51	-0.90	0.35
Depression	1.66 ± 0.50	1.86 ± 0.44	-2.32	0.02*
Anxiety	1.65 ± 0.54	1.88 ± 0.54	-2.75	0.01**
Hostility	1.58 ± 0.47	1.62 ± 0.51	-0.57	0.57
Phobias	1.24 ± 0.43	1.26 ± 0.54	-0.11	0.90
Paranoia	1.43 ± 0.55	1.66 ± 0.64	-1.98	0.05*
Psychosis	1.45 ± 0.54	1.46 ± 0.54	-0.10	0.96

Values denote means ± SD.

* $p < 0.05$, ** $p < 0.01$.

resulting in an aggravation of allergic symptoms but also impacting the results of laboratory examinations [12, 13]. Thus, a full understanding of the patients' psychological status is eminently important.

The SCL-90 we used in our research is one of the most famous psychological measuring scales. It is sourced from the Cornell Medical Index and is widely used in

psychiatric departments and psychological counseling clinics. Thousands of related studies have confirmed that the SCL-90 is a good tool with satisfactory reliability, validity and utility, and it includes somatization, compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic disorders, paranoid personality, and psychosis. Bavbek et al. [14] used the SCL-90 to study patients with perennial AR and SAR, and while no statistical differences were found between these two groups, compared with nonallergics (normals), significant differences were observed in all subscales of the SCL-90, particularly in somatization, depression and the general symptom index subscales. Moreover, a positive correlation was found between nasal symptoms and the SCL-90 scores. Our research suggests that Chinese adults with SAR scored statistically higher than normals in terms of somatization, depression, anxiety, hostility and psychosis.

Paus Jenssen and Cockcroft [15] studied the effects of age and gender on the psychological status of patients with atopic disease. They reported that females had higher scores for anxiety than males, and that females aged 18–20 years scored the highest compared with other ages. A marked correlation was also found between depression and atopic disease. We did not find statistical discrepancies existing between different genders or ages in terms of the 9 symptom categories in the SCL-90. Meanwhile,

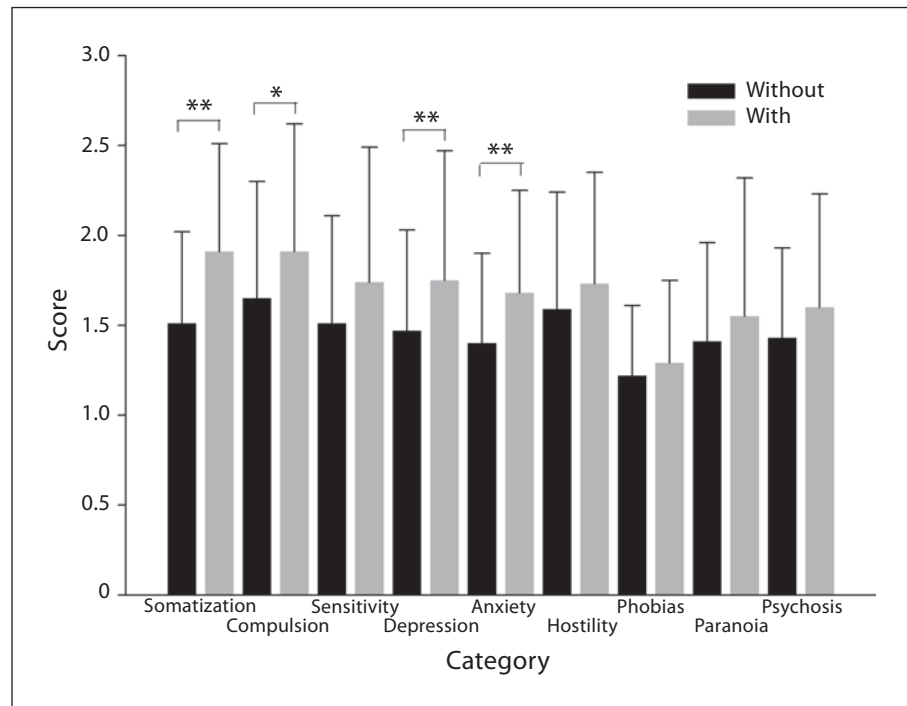


Fig. 3. Comparison of SCL-90 scores between patients without asthma or eczema and patients with asthma or eczema. * $p < 0.05$, ** $p < 0.01$.

Table 5. Effects of asthma or eczema on patients' SCL-90 scores

	Without asthma or eczema scores	With asthma or eczema scores	T	P
Somatization	1.51 ± 0.51	1.91 ± 0.60	-4.41	0.00**
Compulsion	1.65 ± 0.65	1.91 ± 0.71	-2.31	0.02*
Interpersonal sensitivity	1.51 ± 0.60	1.74 ± 0.75	-1.79	0.08
Depression	1.47 ± 0.56	1.75 ± 0.72	-2.85	0.01**
Anxiety	1.40 ± 0.50	1.68 ± 0.57	-2.62	0.01**
Hostility	1.59 ± 0.65	1.73 ± 0.62	-1.26	0.21
Phobias	1.22 ± 0.39	1.29 ± 0.46	-0.93	0.36
Paranoia	1.41 ± 0.55	1.55 ± 0.77	-1.43	0.15
Psychosis	1.43 ± 0.50	1.60 ± 0.63	-1.91	0.06

Values denote means ± SD.

* $p < 0.05$, ** $p < 0.01$.

the impact of the disease course on somatization, compulsion and phobic disorders was observed to be significant, showing that the longer the course of the disease, the more serious the symptoms. Early studies suggested that a higher educational level might result in a psychological disorder [16], but we found that the patients with a lower educational level experienced a more obvious de-

gree of hostility, this result possibly arising from a sense of inferiority and social experience.

Since the family planning policy was developed in China in the 1970s, most urban families have had only one child. In the current study, the SCL-90 scores for SAR patients who were the only child in a family were clearly higher in terms of somatization, depression, anxiety and paranoid personality, which is similar to previous findings [16]. A possible cause might be excessive concern and overprotection during their growth, leading to a poor psychological endurance capability.

Pearson [17] found abnormal psychological status in the course of the classic atopic diseases such as asthma, AR and eczema. The rate of asthma patients with depression was 5–15%, while the rate for anxiety was up to 33%. Mancuso et al. [18] investigated 230 asthma patients, finding that more than half of them suffered from depression. In terms of somatization, compulsion, depression and anxiety, patients with a history of eczema or asthma showed a significant difference from those without such a history. This is in accordance with our results, explaining the more serious psychological disorders of patients with a history of eczema or asthma.

A study on patients aged 5–18 years indicated the relationship between nasal obstruction and attention-deficit disorder. As one of the classical symptoms of AR, nasal

obstruction might result in sleep disturbance, psychological disorder and alcohol abuse [5–7]. We analyzed the four classical symptoms of SAR and found nasal obstruction had a conspicuous impact on somatization, compulsion, interpersonal sensitivity, depression, anxiety and psychosis, while nasal itching contributed to somatization, depression and anxiety. Therefore, better control of nasal obstruction and nasal itching may be conducive to good psychological health. However, a large number of these patients were not diagnosed and treated for psychological disorders. Thus, more attention should be paid to

the psychological status of AR patients, and appropriate treatment should be provided to improve their symptoms and quality of life.

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