

## Research Paper

## Quality of Life, Psychological State, and Cognitive Emotion Regulation Strategies in Allergic Rhinitis Patients vs Healthy Population: A Comparative Study

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**Citation** Shirkhani, M., Aali S., Khoshkhui, M., & Rafizadeh-Ardabili, G. (2022). Quality of Life, Psychological State, and Cognitive Emotion Regulation Strategies in Allergic Rhinitis Patients vs Healthy Population: A Comparative Study. *Journal of Practice in Clinical Psychology*, 10(2), 121-130. <https://doi.org/10.32598/jpcp.10.2.817.1>

**doi** <https://doi.org/10.32598/jpcp.10.2.817.1>

**Article info:****Received:** 17 Jan 2022**Accepted:** 06 Mar 2022**Available Online:** 01 Apr 2022**Keywords:**

Allergic rhinitis, Quality of Life, Psychological state, Cognitive Emotion Regulation Strategies

**ABSTRACT**

**Objective:** Allergic rhinitis, as a global health problem, accounts for several psychological disorders, including fatigue, mood changes, depression, anxiety, and disrupted Quality of Life. How people cope with the symptoms of this disease is essential. The present research is pioneering in comparing the QoL, psychological state, and cognitive emotion regulation strategies of patients with allergic rhinitis and healthy individuals.

**Methods:** Aligned with the purpose of the study, 132 patients and 132 healthy subjects were assigned to two groups. Both groups responded to the QoL symptom checklist (SCL90) and a short form of the Cognitive Emotion Regulation Questionnaire (CERQ). One-way multivariate analysis of variance (MANOVA) was run to make between-group comparisons.

**Results:** The findings revealed that allergic patients had a lower QoL. Similarly, the two groups showed statistically significant differences in physical health, environmental life, and overall QoL. Clinical symptoms prevailed more in the allergic group compared to the healthy. Also, these two groups differed significantly regarding somatization, interpersonal sensitivity, and anxiety sub-scales. The healthy group used more adaptive cognitive emotion regulation strategies (for instance, acceptance and positive reevaluation) than the allergic group. In addition, statistically significant divergences were found in the catastrophizing strategy, which prevailed more in the allergic group.

**Conclusion:** Given the present findings, patients with allergic rhinitis have lower psychological health and QoL compared to the healthy population. These unfavorable conditions can result from inefficient use of cognitive emotion regulation strategies that mutually link allergic and clinical symptoms to the patients' QoL.

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## Highlights

- The healthy group used more adaptive cognitive emotion regulation strategies (for instance, acceptance and positive reevaluation) than the allergic group.
- Patients with allergic rhinitis have lower psychological health and QoL compared to the healthy population.

## Plain Language Summary

Allergic rhinitis, as a global health problem, accounts for several psychological disorders, including fatigue, mood changes, depression, anxiety, and disrupted QoL. The findings revealed that allergic patients have lower psychological health and QoL compared to the healthy population. These unfavorable conditions can result from inefficient use of cognitive emotion regulation strategies that mutually link allergic and clinical symptoms to the patients' QoL.

### 1. Introduction

Allergic rhinitis refers to a common inflammatory disease of the mucous membrane within the nose. It is induced by domestic and environmental allergens (Dick et al., 2020; Kumar & Sarun, 2020). Currently, the world is faced with a rising incidence of this disease because of the long-term indoor exposure to allergens, along with other socioeconomic factors. In recent years, allergic rhinitis has prevailed in 10% to 30% of adults and 40% of children. It is the sixth most prevalent chronic disease worldwide (Canonica et al., 2007; Da Cunha Ibiapina et al., 2008; Kalmarzi et al., 2020; Komnos et al., 2019; Kumar & Sarun, 2020). Similarly, in Iran, as reported by Kalmarzi et al. (2020), the prevalence of the disease is about 18% in children and 25% in young adults. The common symptoms of allergic rhinitis are stuffy, dripping, and itchy nose, along with sneezing (Da Cunha Ibiapina et al., 2008; Dick et al., 2020; Komnos et al., 2019). The secondary and chronic symptoms of the disease include snoring, itching, red eye, coughs, headache, and loss of taste, smell, and hearing senses (Da Cunha Ibiapina et al., 2008; Juniper, 1997; Komnos et al., 2019).

Allergic rhinitis not only has physical symptoms but can also lead to social and mental consequences (Bavbek et al., 2002; Meltzer, 2016). For instance, a stuffy nose, the most troublesome symptom of the disease, can cause inadequate or disrupted sleep, leading to sleepiness, cognitive or perceptual issues, fatigue, emotional problems, occupational or academic underachievement, irritation during the day, and depression or anxiety. These problems can tremendously decrease the Quality of Life and even lead to suicide (Buske-Kirschbaum et al., 2008;

Fayers & Machin, 2013; Meltzer, 2016; Sikorska-Szaflik & Sozańska, 2020; Szramka-Pawlak et al., 2014).

As mentioned earlier, the symptoms of allergic rhinitis affect many social and psychological aspects of human life, including the QoL (Sikorska-Szaflik & Sozańska, 2020). As a significant psychological construct, the QoL is defined as the person's perception of their status in life along with value-laden and culturally-bound goals, expectations, standards, and concerns (Fayers & Machin, 2013; Szramka-Pawlak et al., 2014). In their research in Korea, Shin et al. showed that allergic rhinitis adversely affected the QoL and mental health and could even lead to suicide (Fayers & Machin, 2013). In another research, Noh et al. showed that allergic rhinitis symptoms affected students' sleep quality and made them experience more accidents at school compared to their healthy peers. Their QoL was also found to be low (Noh et al., 2019). Research findings reported by Sikorska-Szaflik and Sozańska (2020) and Cingi, Orhon, and Eckler (2020) indicate that allergic symptoms could cause inflammation in the respiratory system, leading to hearing damage, which is a critical factor in human interactions. It can also disrupt daily activities and dramatically affect the QoL.

Other relevant studies showed that mental disorders, especially anxiety, depression, and sleep disorders, occur more in patients with allergic rhinitis compared to the ordinary population (Kim et al., 2017; Muñoz-Cano et al., 2018). Accordingly, in recent years, allergic rhinitis has been known as a psychosomatic disease in which the immune system and the nervous system are involved and regulate each other (Rodinkova et al., 2019; Tas & Caglar, 2019). The immune system can cause symptoms because of inappropriate and of-

ten harmful responses to substances that are naturally harmless. In addition, stress and other psychological traits such as anxiety, depression, and aggression affect the nervous system, thus intensifying the symptoms of the disease (Marshall et al., 2013; Mehrinezhad & Rajabi Moghadam, 2012; Parslow et al., 2001).

Today, the role of psychological stressors in the emergence of allergic symptoms is well recognized. Psychological stress has discernable effects on the immune and regulatory systems (Marshall et al., 2013), which can increase sensitivity to different infections and can reactivate hidden viruses. It can affect the body's immune cycles, which has severe consequences for the QoL and disease management through the recurrence of inflammatory diseases, especially allergies (Dave et al., 2011). Therefore, the effect of psychological factors on allergic diseases has been a significant concern in recent decades in the psycho-immunology domain (Angst, 2000).

The association between psychological state and affliction with allergic diseases is two-way. However, it is unclear whether mental disorders cause or result from allergic diseases (Tas & Caglar, 2019). Problems in focusing, chronic fatigue, loss of appetite, under-achievement at school (academic failure), low self-image, unemployment, and less irritability have increased the rate of mental disorders, especially depression, anxiety, and sleep problems in those from allergic rhinitis (Chen et al., 2013; Kim et al., 2017; Uçal et al., 2017).

A psychological investigation of men with allergic rhinitis showed that they received significantly higher scores in depression, paranoia, and social isolation (introversion). In women, the scores in depression, hypochondriasis, and hysteria were significantly higher (Rodinkova et al., 2019). Based on the results of other studies, statistically significant differences are found between the scores of the allergic groups compared to the healthy ones in somatization, obsession, aggression, psychosis (Xi et al., 2012), anxiety, depression (Xiaofei et al., 2015), and neurosis (Uçal et al., 2017).

The findings showed that individuals who use wrong coping strategies, such as rumination, catastrophizing, and self-blame, are more vulnerable to emotional problems than others. However, the vulnerability of those who use coping strategies such as positive reappraisal is lower (Barberis et al., 2017). For instance, Ghanbari et al. (2018) compared children with asthma with their healthy peers and found that the former received lower mean scores for acceptance strategies and positive reap-

praisal, while higher mean scores for self-blame, rumination, putting into perspective, and catastrophizing. The between-group differences were statistically significant.

The findings reported by Aali and Khoshkhui (2021) showed that for patients with allergic rhinitis, using self-blame, other-blame, and rumination strategies significantly predict mental health disorders. However, whether this finding differed between the allergic patients and the normal group was not investigated. This is an important research question as psychological health problems and poor QoL in allergic patients can result from different emotion regulation strategies. For this reason, the present study aims to compare the QoL, psychological state, and cognitive emotion regulation strategies between patients with allergic rhinitis and their healthy counterparts.

## 2. Participants and Methods

The present research is a causal-comparative study. The statistical population consisted of patients with allergic rhinitis who were referred to the Asthma and Allergy Clinic of Ghaem Hospital in Mashhad City, Iran, in the summer and autumn of 2016, as well as healthy counterparts. We used the convenience sampling method to recruit the samples. For this purpose, 132 patients diagnosed with allergic rhinitis aged 15 to 50 were selected. A total of 132 subjects were assigned to the healthy group. The exclusion criteria were having other allergic or non-allergic diseases, acute psychiatric illness, and incomplete questionnaires such as psychotic disorders.

### Study instruments

We use the following instruments for data collection:

#### Quality of Life Questionnaire

The QoL questionnaire was developed in 1989 by the World Health Organization (WHO). It contains 26 items and explores physical and psychological health, social relations, and environmental health. The scoring is done on a self-rating 5-point Likert scale. A higher score shows a higher QoL. The first two items assess the overall QoL, and the rest assess one's perception and behavior in different qualitative aspects. In each domain, a score of 4 indicates the worst, and 20 indicates the best state (Group, 1998). The Cronbach  $\alpha$  was estimated at 0.80 for physical health and 0.76 for psychological health. For social relations and environmental health, the Cronbach  $\alpha$  was 0.66 and 0.80, respectively. Moreover, the test-retest reliability of the instrument was found to be acceptable (Skevington et al., 2004). In Iran, this ques-

tionnaire was standardized by Nejat et al. (2006). The Cronbach  $\alpha$  in a normal distribution was 0.70 in physical health, 0.73 in psychological health, 0.55 in social relations, and 0.84 in environmental health. Moreover, the test-retest reliability of the questionnaire was found to be 0.70 after two weeks.

### The Symptom Checklist (SCL90)

The symptom checklist (SCL90) test includes 90 self-rating items to assess psychological symptoms along 9 psychiatric dimensions: somatization, obsessive-compulsive, interpersonal sensibility, depression, anxiety, anger-hostility, phobic-anxiety, paranoid ideation, and psychoticism. The items are rated on a 5-point Likert scale ranging from 0=not at all to 4=to a great degree. There are seven more items in this scale that are not categorized under any of the dimensions mentioned above. This test assesses an individual's state a week before taking the test. The highest correlation was estimated for depression (0.95) and the lowest for the dissociative disorder (0.77) (Akhavan Abiri & Shairi, 2020; Sereda & Dembitskyi, 2016).

### The Short Form of the Cognitive Emotion Regulation Questionnaire

The short form of the Cognitive Emotion Regulation Questionnaire is a self-rating questionnaire developed by Garnefski and Kraaij (2006). It contains 18 items exploring 9 cognitive emotion regulation strategies, including self-blame, acceptance, rumination, positive refocusing, planning refocusing, positive reevaluation, accepting comments, catastrophic and other-blame. This questionnaire is rated on a 5-point Likert scale. The Cronbach  $\alpha$  was estimated at 0.73 to 0.80 for the subscales, and the test-retest reliability was found to be 0.41 to 0.59. In Iran, Hasani (2010) reported the Cronbach  $\alpha$  of this questionnaire to be 0.76 to 0.92, and the test-retest reliability was found to range between 0.51 and 0.77. The correlation coefficient of the subscales was reported from 0.32 to 0.67.

### Study procedures

In this research, patients of both sexes aging from 15 to 50 participated. The participants suffered from one or more allergic rhinitis symptoms, including a stuffy or runny nose, itchy or watery eyes, and so on, four days a week (or less) but lasting for at least four consecutive weeks. When their disease was confirmed by an immunology specialist, the patients were selected as the allergic rhinitis group. Then, their personal and demographic

information was recorded, and the purpose of the research, along with the content of the questionnaires, was elaborated. When they consented to participate in the research, they received the questionnaires. To ensure confidentiality, the data were collected anonymously to protect the respondents' identity, which was only revealed to the research team. Besides, attempts were made to gain the participants' trust and encourage them to participate in the research. They were free to complete the questionnaires (or withdraw at their convenience from the study). Meanwhile, other ethical considerations were taken into account in the present research.

### Statistical analysis

Considering the psychological state, QoL, and cognitive emotion regulation strategies as the dependent variables and the group (allergic vs healthy) as the independent variable of the study, the data were assessed by a 1-Way Multivariate Analysis of Variance (MANOVA) using the SPSS software, version 26.

## 3. Results

Among the 264 participants, 105 (39.8%) were male, and 159 (60.2%) were female. Their Mean $\pm$ SD age was 30.16 $\pm$ 9.04 years. Regarding the education level, 14% of the participants had a junior high-school degree, 22.3% held a diploma (high school degree), 11% had an associate degree, 43.6% had a bachelor's degree, 7.2% had a master's degree, and 1.9% had a PhD. A total of 102 participants (38.6%) were single, and 162 (61.4%) were married.

Mean $\pm$ SD values of the psychological state, QoL, and cognitive emotion regulation strategies were calculated for each group (allergic rhinitis patients and healthy people). They are provided in Table 1.

As seen in Table 2, the Wilks' lambda test was significant ( $F=7.952$ ,  $P=0.002$ ;  $\eta^2=0.421$ ), meaning that allergic and healthy subjects differed significantly in terms of their psychological state, QoL, and cognitive emotion regulation strategies.

Based on the results of the psychological state subscales, the three subscales in the allergy group had the highest level and their differences with the healthy group were significant. These three subscale, including somatization ( $F=29.98$ ,  $P<0.001$ ,  $\eta^2=0.10$ ), interpersonal sensibility ( $F=4.02$ ,  $P<0.05$ ,  $\eta^2=0.01$ ), anxiety ( $F=4.04$ ,  $P<0.05$ ,  $\eta^2=0.01$ ), and subscales of QoL, including physical health ( $F=9.38$ ,  $P<0.05$ ,  $\eta^2=0.02$ ), environ-

**Table 1.** Mean±SD scores of the psychological state, QoL and cognitive emotion regulation strategies

Subscale	Mean±SD	
	Allergy	Healthy
Somatization	31.44±9.96	24.75±9.90
Obsessive-compulsive	21.81±7.92	22.44±9.69
Interpersonal sensibility	19.79±6.75	18.13±6.68
Depression	25.75±12.05	23.24±11.66
Anxiety	21.43±8.57	19.41±7.72
Paranoid ideation	12.22±6.30	12.90±6.22
Psychoticism	16.91±5.97	16.86±7.27
Phobic-anxiety	11.80±3.89	12.37±8.07
Anger-hostility	12.12±6.30	12.18±6.14
SCL-90(total score)	185.55±50.90	175.66±59.84
Physical health	24.03±5.32	25.61±4.84
Psychological health	20.71±4.31	21.19±5.68
Social Relationship	10.02±2.21	10.19±2.46
Environmental health	25.71±5.30	27.20±5.64
QoL (total score)	80.48±14.18	84.21±16.32
Self-blame	4.59±1.84	4.87±1.93
Acceptance	5.28±1.74	7.12±1.75
Rumination	5.75±1.96	5.84±2.05
Positive refocus	5.57±1.95	5.46±2.23
Planning refocus	6.84±2.08	7.09±2.10
Positive reevaluation	6.41±2.08	6.98±2.10
Accept comments	6.34±2.15	6.45±2.17
Catastrophic	5.34±1.96	4.61±1.89
Blame other	3.82±1.73	4.03±1.34

mental health ( $F=4.89$ ,  $P<0.05$ ,  $\eta^2=0.01$ ), and the total score of QoL ( $F=3.92$ ,  $P<0.05$ ,  $\eta^2=0.01$ ) had a higher score in the healthy group, and were significantly different between two groups.

Allergic and healthy subject differed significantly in terms of cognitive emotion regulation strategies, including acceptance ( $F=73.08$ ,  $P<0.001$ ,  $\eta^2=0.21$ ), positive

reevaluation ( $F=4.84$ ,  $P<0.05$ ,  $\eta^2=0.01$ ), and catastrophic ( $F=9.40$ ,  $P<0.01$ ,  $\eta^2=0.03$ ). Among these, acceptance and positive reevaluation were higher in the healthy group and catastrophic in the allergy group.

**Table 2.** Results of the significance test for the MANOVA

Test	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Wilk's Lambda	0.579	7.952	22	241	0.002	0.421

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#### 4. Discussion

Emotional and psychological problems have always been a significant concern in asthma and allergy. When the allergy symptoms emerge, the background psychological problems are aggravated. Accordingly, the present research aimed to compare the QoL, psychological state, and cognitive emotion regulation strategies between allergic patients and healthy participants. As indicated in Table 2, the two groups differed significantly in physical health, environmental health, and overall QoL. Comparing the two groups regarding clinical symptoms revealed statistically significant differences in somatization, interpersonal sensitivity, and anxiety. Finally, the results indicated significant between-group differences in acceptance, reappraisal, and catastrophizing strategies.

As demonstrated in Table 2, allergic patients had a lower QoL than the healthy population. The two groups also differed significantly in physical health, environmental health, and overall QoL. These findings are consistent with a body of research (Cingi et al., 2020; Noh et al., 2019; Shin et al., 2018; Sikorska-Szaflik & Sozańska, 2020). It can be argued that respiratory problems and symptoms that emerge inside and outside the nose adversely affect daily life, physical or psychological health, and social functioning (Fidan et al., 2013; Shin et al., 2018). The symptoms cause so much suffering that patients' daily routine is disrupted, and their QoL is lowered (Cingi et al., 2020). Moreover, allergic rhinitis alters the round-the-clock rhythm of the cortisol hormone. This change can, in turn, modify the intensity of the stress experienced and the QoL (Fidan et al., 2013).

The findings also showed that clinical symptoms were more severe in the allergic group than in the healthy group. The two groups showed significant differences in somatization, interpersonal sensitivity, and anxiety. This finding was consistent with a body of research (Uçal et al., 2017; Xi et al., 2012; Xiaofei et al., 2015) (Zhang et al., 2020). This result can be explained by the fact that allergic rhinitis disease not only negatively affects the patients' physical condition but also affects their psychological health (Meltzer, 2016). This disease makes patients constantly worried about their health and can block effective communication, and cause much suffering (Tsiakiris et al., 2017; Wang et al., 2021). Although the symptoms of allergic

rhinitis do not directly induce mortality, in the long run, they can cause many adverse effects and lead to depression, anxiety, immune system dysfunctionality, lower QoL, and even suicide (Wang et al., 2021).

These findings can be explained in a number of ways. First, allergy symptoms can affect the level of anxiety and interpersonal relationships of patients by affecting their quality of sleep, education, and employment. Second, because allergies weaken the immune system and make them vulnerable to many physical diseases, the level of anxiety and worry about physical symptoms in allergic patients is increased. Third, the biological basis of mood disorders, anxiety, and allergic rhinitis in some cases is common, which causes the allergic disease to be associated with psychiatric disorders.

Our results also showed that healthy participants used more adaptive cognitive emotion regulation strategies, such as acceptance and positive reappraisal than patients. Moreover, allergic patients significantly differed from their healthy counterparts in using the less adaptive catastrophizing strategy. This finding was in line with a body of research (Aali & Khoshkhui, 2021; Barberis et al., 2017; Ghanbari et al., 2018). Arguably, emotion plays a crucial role in many aspects of life (Gamefski et al., 2007). Allergic patients suffer from many problems; thus, they find it difficult to express their feelings, which can cause significant problems (Ghanbari et al., 2018). Intense stress in allergic rhinitis patients leads to maladaptive emotion regulation strategies such as catastrophizing and mental rumination. Using these maladaptive strategies on their own can cause stress, intense sadness, and even failure to cope with adverse life events (Glenk et al., 2020). Thus, inefficient cognitive emotion regulation strategies intensify the association between allergic or clinical symptoms and the QoL. The severity of allergic symptoms can increase clinical symptoms. If allergic patients use cognitive, emotional regulation strategies inefficiently, they will face more clinical symptoms followed by more severe allergic symptoms, therefore, lower QoL.

#### Study limitations

The present study's findings provided insightful information about the psychological differences between allergic patients and the normal population. However, the

present study faced certain limitations that can be considered in future research. First, the sampling was limited to patients visiting the Asthma and Allergy Clinic of Ghaem Hospital in Mashhad. Thus, the generalization of results should be made with caution. It is suggested that a similar study be conducted with a larger and more representative statistical population. Second, the study used self-reporting instruments that can influence the results of social desirability. Therefore, it is suggested to use more accurate methods for future research, such as structured clinical interviews. Third, this research only examined cognitive emotion regulation strategies along with psychological health and QoL. Other variables affecting mental health and QoL, such as personality traits and mindfulness capabilities, could not be measured. They need to be explored in future lines of research.

## 5. Conclusion

the present study revealed the differences between cognitive emotion regulation strategies, mental health, and QoL of allergic patients and the normal population. Attention is drawn to the importance of using therapeutic methods and psychological education along with medical interventions to regulate allergic patients' emotions.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the Research Ethics Committee of Mashhad University of Medical Sciences (Code: MUMS. Fm. REC.1396603). In this research, all ethical principles were considered. The goals, method, and importance of the research were explained to the patients. Also, the anonymity and confidentiality of participants were assured. Also, the patients provided written informed consent to participate in the research.

### Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflicts of interest.

## Acknowledgments

The authors would like to thank all the staff and personnel of the Asthma and Allergy Clinic of Ghaem Hospital in Mashhad and the patients who participated in this study.

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