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Original Article

Investigating the Correlation between Handedness and Emotion Regulation Strategies in Asthma and Allergy Patients

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Abstract

Background: Asthma and allergic diseases are common chronic non-communicable conditions that can negatively impact the quality of life of patients. Psychological factors play a role in both the onset and progression of these conditions. The purpose of this study was to examine the relationship between handedness and emotion regulation and cognitive emotion regulation strategies in patients with asthma and allergies in Isfahan, central Iran.

Methods: We employed a causal-comparative research design. The study population consisted of all patients visiting Asthma and Allergy Clinic in Isfahan. One hundred participants were selected through probability sampling. Data were collected using the Emotion Regulation Questionnaire and the Cognitive Emotion Regulation Strategies Questionnaire, and were analyzed using univariate analysis of variance (ANOVA).

Results: Cognitive emotion regulation was significantly different between right-handed and left-handed patients with asthma and allergies (P=0.0001). A significant difference was also observed between the two groups in their emotion regulation strategies (P=0.031). The rate of positive and negative cognitive regulation strategies was higher in left-handed individuals with asthma and allergies, compared to right-handed individuals.

Conclusion: Overall, handedness has a significant impact on the behavior and mental health of patients suffering from asthma and allergies. Therefore, handedness should be taken into consideration in interventions for emotion regulation.

Keywords: Handedness; Emotion regulation; Asthma; Allergy patients

Introduction

Asthma is a common chronic inflammatory disease of the airways that results in shortness of breath (1). Literature on the relationship between psychosocial factors and asthma is increasing. Understanding the type, cause, timing, and severity of the disease in patients with asthma plays a crucial role in its complete control and recovery (2-4).

Patients' attitudes towards their illness may affect their coping skills and compliance with treatment. Due to the psychosocial effects of asthma, strategies such as cognitive behavioral techniques (5-7),

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counseling (8), and relaxation techniques have been applied (9, 10). Therefore, the treatment of asthma needs to address both the psychological and physiological elements. Allergies are a non-specific immune system reaction that is a worldwide disease (11). The prevalence of respiratory allergies such as asthma and allergic rhinitis is increasing not only in industrialized countries but also in developing countries (12). Food allergies refer to the body's abnormal reactions caused by the immune system's response to food components. It has been suggested as a threat to public health (13). Skin allergies are also one of the most common allergies that include rhino conjunctivitis, urticaria, asthma, eczema, and food allergies, which can be identified without the need for time and high cost (14). In addition to medical symptoms, some research highlighted that patient with allergies experienced issues such as negative physical symptoms, anxiety about food safety, trouble maintaining a healthy diet and anxiety/stress at social occasions. Furthermore, stress and negative mood were significantly higher on days with more allergy issues. Older adults experienced lower positive mood and physical energy on days with more issues (15). High levels of neuroticism, negative emotional states decreased physical activity thresholds.

Psychological interventions can help people to reduce fear, improve respiratory functions, and positively affect overall health and quality of life. Managing and controlling emotions and evaluating people's stressful living conditions depend on how controllable or uncontrollable they find them (16). On the other hand, one of the limitations that people with asthma and allergies face is quality-of-life variables that play an important role in controlling and regulating emotions. Emotion regulation processes are involved in health and disease (17). Emotion regulation specifically describes how people experience, regulate, organize emotions, and how this type of management affects human behavior. Adaptive emotion regulation helps people increase their ability to withstand catastrophic situations (18). The emotion regulation approach conceptualized by Garnowski and colleagues includes effective strategies (acceptance, positive refocus, refocus on planning, positive reassessment, and visibility) and ineffective strategies (including self-blame, blame others, catastrophizing, and ruminating) to regulate emotions (19). A skill that modulates, intensifies, or maintains emotions according to one's goals is called discipline. Cognitive emotion regulation refers to the internal and external processes that are responsible for monitoring, evaluating, and modifying the emotional response (20). When it comes to using emotions, people do not act the same in social situations. A review of previous research reveals three aspects of emotion bias. Most emotions are recognized by the right hemisphere of the brain, and control of emotional expression and related behaviors is mainly in the right hemisphere of the brain. The right hemisphere of the brain is responsible for negative emotions and the left hemisphere is responsible for positive emotions (21).

Handedness, or hand preference, is identified as the predominant use of one hand in one-handed tasks (22). The coordination between the two hands is controlled by specialized functions in the cerebral hemispheres, which requires suppression of the opposite limb when using one hand. Studies have found that left-handed individuals may have a higher risk of allergies and asthma, while autoimmune disorders such as arthritis are more prevalent in right-handed individuals (23). The reason for these differences is yet to be fully explained (21). Some clinical studies on children with autism have revealed deficits in social and emotional functioning, including abnormal reactions to social and emotional cues, abnormal facial processing, and negative emotion expression (24). These defects may occur at the basic emotional processing level, hindering behavior and social and emotional development. Additionally, exercise has the potential to increase handedness in children with autism disorders (24). Hand preference has an effect on emotional processing lateralization and patterns of lateralization are different in right-handed and left-handed individuals (25). There is a lack of research on hand-

edness and its effects on individuals with asthma and allergies in Iran, and due to the impact these conditions have on quality of life and stress control, the importance of studying this topic is more prevalent than ever.

We aimed to investigate the effect of handedness on emotion regulation and cognitive emotion regulation strategies in people with asthma and allergies.

Methods

The current study employed a causal-comparative research design. The study population consisted of all attendees at the Asthma and Allergy Clinic in Isfahan City, central Iran during autumn and winter of 2021. One hundred attendees were selected through probability sampling from three asthma and allergy clinics.

Inclusion criteria included patients suffering from asthma and allergies, who attended the clinics in Isfahan city, were 18 years of age or older, were under the supervision of a specialist in the clinic, and had a medical record for more than 6 months. Due to the lack of accurate statistics on the asthma and allergy population, other similar studies were used to determine the sample size. Attendees were asked to sign voluntarily an informed consent form to participate in the study. The study method was quantitative, using a structured questionnaire designed and administered by the investigators.

Written consent to participate in the study was obtained from attendees willing to participate. The instruments used in this study were the Gross and John (26) Cognitive Emotion Regulation Strategies (ERQ) and the Persian version of the Cognitive Emotion Regulation Questionnaire (CERQ-*P*).

The following questionnaires were used to collect data:

Cognitive Emotion Regulation Strategies was developed by Gross and John (26). This questionnaire includes 10 items, each using a 7-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). The questionnaire measures two dimensions: instrumental suppression and re-evaluation. The Cronbach's alpha for instrumental suppression was 0.77, for re-evaluation was 0.79 and for the whole questionnaire was 0.85. In the present study, the Cronbach's alpha for the whole questionnaire was 0.91.

CERQ-*P* was designed by Garnowski et al (19) to assess the cognitive strategies used by individuals after experiencing life-threatening events or stress. The questionnaire includes 36 items and nine distinct subscales: five for adaptive strategies (acceptance, positive refocusing, refocusing on planning, positive reappraisal and putting into perspective) and four for maladaptive strategies (self-blame, rumination, catastrophizing and blaming others). Each strategy is evaluated using four items, measured on a five-point scale from 1 ("Almost never") to 5 ("Almost always") in terms of frequency of use. The scores for each strategy range from 4 to 20, and the total scores range from 36 to 180. Garnefsky et al. (19) found the reliability of the test to be high, with Cronbach's alpha coefficients of 0.91, 0.87, and 0.93. In Iran, Hasani estimated the Cronbach's alpha for the scale to range from 0.76 to 0.92 and its correlation coefficient from 0.51 to 0.77. The correlation between the subscales was 0.72 (27). Participants who met the study inclusion criteria and were willing to participate were provided with a written consent form to sign, which included understanding their rights to access their information and the right to withdraw at any point. The research questionnaires were administered online among patients with asthma and allergies in three clinics in Isfahan. The link to the questionnaire was sent via SMS to the mobile numbers in the medical records of the participants.

After completing the questionnaires, which took about 35 minutes to complete, the data was analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA) and the statistical method of analysis of variance.

Results

The right-handed group consisted of 58 people and the left-handed group consisted of 42 peo-

ple. Overall, 78% of the participants were female (47 right-handed and 31 left-handed) and 22% were male (11 right-handed and 11 left-handed). Participants in the age group of 30-35 years were 36 right-handed and 17 left-handed, in the age group of 36-40 years were 19 right-handed and 10 left-handed, in the age group of 41-45 years were 2 right-handed and 10 left-handed, and in the age group of 46-50 years were 1 right-handed and 3 left-handed (Table 1). The mean and standard deviation of indicators are related to the Emotion Regulation and Cognitive Emotion Regulation Strategies Questionnaire (Table 1).

Table 1: Descriptive indicators related to the emotion regulation and cognitive emotion regulation strategies in right- and left-handed patients

Variable	***Right -handed***		***Left-handed***	
	Mean	Standard Division	Mean	Standard Division
Cognitive Emotion Regulation	42.41	11.10	45.43	11.26
Negative Emotion Regulation Strategies	52.62	7/08	70.52	7.24
Positive Emotion Regulation Strategies	65.30	8.93	73.26	8.84

For data analysis and selection of relevant tests, normality and statistical assumptions were examined. The result of the Shapiro-Wilk test indicates that the condition of normal distribution of scores is established. The value of its significance level for the variables was more than 0.05, which indicates that the distribution of variables is normal. The result of the Levin test also shows the establishment of the condition of homogeneity of variance in the research variables. To compare the effect of handedness on study variables, univariate analysis of variance was used (Table 2).

Table 2: Results of univariate analysis of variance in Cognitive Emotion Regulation and Cognitive Emotion Regulation strategies in right and left-handed patients

Source	***Variables***	***SS***	***df.***	***MS***	***F***	***Sig.***
Handedness	Cognitive Emotion Regulation	548.96	1	548.96	4.781	0.031
	Negative Emotion Regulation Strategies	7807.99	1	7807.99	136.392	0.0001*
	Positive Emotion Regulation Strategies	5610.131	1	5610.131	19.550	0.0001*
Error	Cognitive Emotion Regulation	11253.402	98	114.831		
	Negative Emotion Regulation Strategies	5610.131	98	57.146		
	Positive Emotion Regulation Strategies	7754.136	98	79.124		
Total	Cognitive Emotion Regulation	210540.000	100			
	Negative Emotion Regulation Strategies	375100.000	100			
	Positive Emotion Regulation Strategies	480446.000	100			

**P <0.05*

As shown in Table 2, the results of the analysis of variance showed the difference between the mean scores of cognitive emotion regulation with handedness and showed that the value of F obtained due to the handedness variable for cognitive regulation of emotion (F = 4.781) with 1 and 98 degrees of freedom at the level (P <0.05) was significant. As a result, the degree of cognitive regulation of emotion of the right-handed and left-handed people was different. Comparison of means showed that the rate of cognitive regulation of emotion in the left-handed people was higher than the right-handed people with asthma and allergy. Also, the results of the analysis of variance of the mean score difference between the groups showed that the value of F obtained with the handedness variable for negative cognitive regulation strategies (F = 136.392) and positive cognitive regulation strategies (F= 19.550) was significant at the level of (P <0.0001) and the amount of negative and positive emotion regulation strategies of the right-handed and left-handed people is different. Means comparison showed that the rate of positive and negative cognitive regulation strategies in left-handed people was higher than the right-handed people with asthma and allergy (Fig. 1).

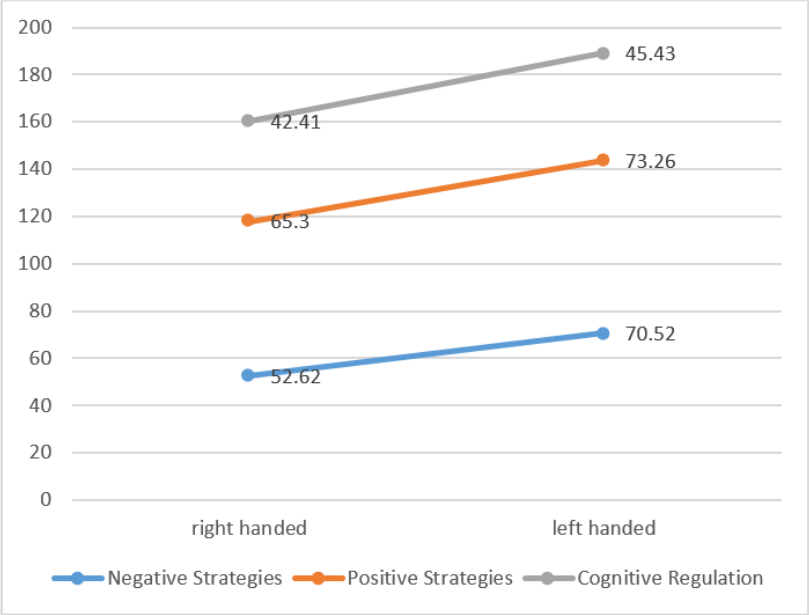

Fig. 1: The comparison of negative and positive strategies and cognitive regulation divided by handedness

Discussion

The aim of this study was to determine the impact of handedness on cognitive emotion regulation and the use of cognitive emotion regulation strategies among patients with asthma and allergies in Isfahan. The findings indicate that left-handed individuals have a higher rate of cognitive emotion regulation and use more positive and negative cognitive emotion regulation strategies compared to right-handed patients who suffer from asthma and allergies.

This finding aligns with the results found in previous studies by other studies (16, 17, 24, 25). The findings of this study can be explained by the fact that the brain hemispheres have distinct structural and functional characteristics, each specializing in specific cognitive functions (21). Given the specialized functions of the cerebral hemispheres and the differences in hemisphere dominance between left-handed and right-

handed individuals, it is expected that these two groups would exhibit variations in cognitive and mental abilities.

Additionally, the results of current study indicated utilizing adaptive cognitive emotion regulation strategies is positively correlated with positive health outcomes, while using maladaptive strategies is associated with negative health outcomes. Therefore, it can be inferred that utilizing adaptive techniques to regulate emotions can successfully decrease cognitive stress and prevent chronic illnesses. Conversely, the use of maladaptive techniques in regulating emotions can exacerbate stress and lead to chronic illnesses.

The findings of this study suggest that individuals who frequently use suppression strategies tend to experience emotions that are more negative and fewer positive emotions compared to those who use this strategy less often. They also experience more severe symptoms associated with various mental disorders and chronic illnesses (28). The structural differences in the brain among individuals result in different emotional processes and subsequently, different personality patterns. These results align with previous research that found that handedness is a reliable predictor of cognitive emotion regulation strategies, and that left-handed individuals have a higher rate of cognitive emotion regulation and use more positive and negative cognitive emotion regulation strategies compared to right-handed patients who suffer from asthma and allergies. Additionally, we showed that utilizing adaptive cognitive emotion regulation strategies is positively correlated with positive health outcomes, while using maladaptive strategies is associated with negative health outcomes. The relationship between depression and difficulties in regulating emotions has been studied in previous research (20, 30).

This is why many patients with asthma and allergies feel that their problems and thoughts are unique to them, which exacerbates their social isolation (31). The severity of symptoms and stress in patients with asthma and allergies negatively affects their quality of life. Asthma and allergies can impede an individual's independence and ability to actively participate in their family and community, resulting in feelings of inadequacy and insecurity (32).

This study had several limitations, including the limited sample size, which only included patients from three asthma, and allergy clinics in Isfahan city who agreed to participate, making it difficult to generalize the results. Another limitation was the use of self-report tools, which could have introduced bias in the data. Therefore, future research should employ more accurate methods such as structured clinical interviews and focus on psychological variables to enhance the health and quality of life for patients with asthma and allergies.

Conclusion

Our study highlights the significance of evaluating the impact of handedness on emotion regulation and cognitive emotion regulation strategies among patients with asthma and allergies. Furthermore, it suggests that attention should be paid to both positive and negative emotion regulation strategies in the design of intervention programs for both right and left-handed patients.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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