






# Comparison of Self-Efficacy and Problem-Solving Skills Between Women with Asthma and Healthy Controls: A Cross-Sectional Study

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## Abstract

**OBJECTIVE:** Problem-solving skills and self-efficacy are among the topics that are frequently investigated in people with various chronic conditions. However, there are limited studies on asthma patients. Our study aims to compare self-efficacy and problem-solving skills in asthma patients and healthy controls.

**MATERIAL AND METHODS:** We included 23 women with asthma [age: 39 (34-56) years] and 23 healthy controls [age: 42 (30-55) years] in the study. Participants' sociodemographic and disease-related characteristics, Asthma Control Test, and the Modified Medical Research Council Dyspnea Scale scores were recorded. We examined problem-solving skills with the Problem-Solving Inventory and self-efficacy with General Self-Efficacy Scale. We compared groups with the chi-square test, Mann-Whitney *U*-test, and Independent Sample *t*-test.

**RESULTS:** Age, body mass index, educational status, marital status, and occupational status were similar among the groups ( $P > .05$ ). However, smoking was significantly higher in healthy controls ( $P < .05$ ). It was found that women with asthma had worse self-efficacy and problem-solving skills compared to healthy controls ( $P < .05$ ).

**CONCLUSION:** These results showed that there may be problems in socio-cognitive skills associated with the disease. Our study focused on the possibility that female asthma patients may have low levels of self-efficacy and problem-solving skills. Therefore, health professionals designing the rehabilitation program should take these skills into account while conducting the assessment as they may be useful in developing an efficient rehabilitation program.

**KEYWORDS:** Asthma, women, self-efficacy, problem-solving

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## INTRODUCTION

Asthma is a chronic inflammatory disease of the airways in which many cells and cellular elements play a role. It progresses with exacerbations and presents with many respiratory symptoms such as shortness of breath, chest tightness, and cough.<sup>1</sup> The primary goal of healthcare professionals in treatment is to control symptoms during the disease process.<sup>2</sup> The integration of self-management strategies in disease treatment is one of the key aspects stressed in the asthma guidelines. Self-management in asthma refers to the actions taken by patients to monitor the disease situation, control the disease symptoms, and avoid exacerbations.<sup>2</sup> A Cochrane review showed that patients with asthma who were trained in asthma management, periodically under medical supervision, and who had an action plan for disease management had fewer emergency applications, fewer hospital admissions, improved lung function, and peak expiratory flow, had less symptoms, and used less frequent rescue medication during the disease process.<sup>3</sup> Experts in the National Asthma Education and Prevention Program expert panel underlined that a self-management program should include approaches for cognitive components in asthma patients.<sup>2</sup> Experts mentioned that the improvement of self-efficacy and problem-solving skills may also be used as a strategy to manage disease in addition to disease knowledge and action.<sup>2</sup> The generic set of abilities identified by Lorig and Holman<sup>4</sup> for effective self-management includes problem-solving, decision-making, resource utilization, creating a partnership between patients and healthcare providers, and taking action. The development of these abilities boosts self-efficacy.

Self-efficacy is a concept that has become a main topic of discussion following Bandura's Social Cognitive Theory. According to this theory, self-efficacy is an important psychosocial parameter emphasizing that a person's belief or confidence is a powerful indicator of the initiation and maintenance of future behavior.<sup>5</sup> Self-efficacy theory identifies that the power of the belief in one's capacity, motivation, and behavior can affect outcomes. Furthermore, the theory includes explanations that enhanced self-efficacy will pave the way for improved behaviors, motivation, thought patterns, and emotional well-being.<sup>6</sup> The improvement of self-efficacy often comes to the fore as strengthening the patient's physiological and psychosocial aspects and being a part of the patient's self-management criteria.<sup>7</sup>

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Along with self-efficacy, the problem-solving ability is a crucial component of a healthy life process and is crucial for the management of stressful situations. Problem-solving skill contains the personal context and barriers of patients' lives and is a crucial step for successful disease management.<sup>8</sup> Advanced problem-solving skills are among the key elements in disease management and can provide positive outcomes.<sup>9</sup>

Self-efficacy and problem-solving skills are among the topics frequently in the adolescent group; however, there are only limited studies evaluating these concepts in adult asthma patients.<sup>10-12</sup> The aforementioned studies have different characteristics of the aforementioned problem-solving skill which is a metacognitive skill in terms of evaluating the problem-solving skills based on mathematics in the adolescent group. Additionally, self-efficacy examined in the studies has been reflected in asthma-specific self-efficacy. Uncertainty exists regarding general self-efficacy and problem-solving skills in adult asthma. In addition, one potential factor affecting these cognitive variables is gender.<sup>13</sup> Women are more likely to develop asthma after puberty, and it worsens more quickly. Additionally, Pignataro et al<sup>14</sup> indicated that women with asthma have more symptoms, and more rescue medication usage results in reduced quality of life than in men. This gender difference may affect psychocognitive skills. However, to the best of our knowledge, there is no study that investigated self-efficacy and problem-solving skills among women with asthma. Most of the studies examined self-efficacy and problem-solving skills in adolescent asthma participants and investigated disease-related self-efficacy but not focused on women. Therefore, our purpose is to examine the self-efficacy and problem-solving skills in women with asthma and determine if there are any differences in self-efficacy and problem-solving skills between women with asthma and healthy controls. We hypothesized that women with asthma have poor self-efficacy and problem-solving skills.

## MATERIAL AND METHODS

We carried out our cross-sectional study between April and June 2022 at the Dr. Suat Seren Chest Diseases and Thoracic Surgery Training and Research Hospital in İzmir, Turkey. All of the participants in our study provided informed written consent. The Ethics Committee of İzmir Katip Çelebi University

approved the study protocol (Approval Number: 114). We performed our study following the principles of the Helsinki Declaration.

### Participants

We selected the study participants according to the inclusion and exclusion criteria among patients who applied to the outpatient clinic in Dr. Suat Seren Chest Disease and Surgery Training and Research Hospital between April and June 2022. We included the women diagnosed with bronchial asthma according to GINA criteria<sup>1</sup> by a physician who is a specialist in chest diseases, on regular medical treatment, and aged 18-65 years who volunteered to participate in our study. We included the study participants for control groups as follows: volunteering to participate, being a woman aged between 18 and 65 years, and having no pulmonary disease. The healthy control group consisted of hospital staff and patient relatives. After explaining the purpose and content of the study to the volunteers, those who wanted to participate were included in the control group. We excluded all participants who were unable to understand the Turkish commands, had psychiatric, musculoskeletal, and neurological disorders, symptomatic heart disease, or any kind of malignancy that could affect variables.

### Outcome Measures

Before the assessment, we recorded participants' information such as sociodemographic, physical, and clinical variables, respiratory symptoms (cough, dyspnea, sputum), asthma control status, and dyspnea severity. We used the Asthma Control Test for asthma control status and the Modified Medical Research Council (mMRC) Dyspnea Scale for dyspnea severity. Following, we assessed self-efficacy levels by the General Self-Efficacy Scale and problem-solving skills by the Problem-Solving Inventory.

### General Self-Efficacy Scale

The original 23-item form of the scale was developed by Sherer et al.<sup>15</sup> The Turkish adaptation, validity, and reliability study of the scale was performed by Yildirim and İlhan.<sup>16</sup> The scale includes the main question "How well does it describe you?" and all of the items are scored on a 5-point Likert-type scale. The total score varies between 17 and 85. A higher score indicates better self-efficacy.

### Problem-Solving Inventory

Problem-Solving Inventory developed by Heppner and Petersen<sup>17</sup> is a self-report scale that measures an individual's self-perception about problem-solving skills. The inventory consists of 32 items, and a Likert-type scale is scored between 1 and 6 (1 = I always act like this and 6 = I never act like this). The total score varies from 32 to 192. A high total score on the scale indicates inadequate problem-solving skills.<sup>18</sup>

### Asthma Control Test

The Asthma Control Test is a self-reported questionnaire consisting of 5 items and scores from 0 to 5. It is used to identify patients with insufficient control. As an assessment tool, the patient uses day and night symptom frequency, activity limitation, use of medication, and self-perception of asthma control. The control status of the patient is determined by summing the scores. The maximum score is 25, and the

#### MAIN POINTS

- Self-efficacy and problem-solving skills play a crucial role in the self-management of chronic diseases such as asthma.
- Most of the studies that examined the self-efficacy and problem-solving skills in asthma had adolescent participants and investigated disease-related self-efficacy but did not focus on women.
- Our aim is to examine the self-efficacy and problem-solving skills in women with asthma and determine if there are any differences in self-efficacy and problem-solving skills between women with asthma and healthy controls.
- We found that the self-efficacy and problem-solving skills of women with asthma deteriorated compared to healthy controls.

minimum score is 5. A score of 19 and below indicates that the disease is not under good control.<sup>19</sup> Its Turkish adaptation was made by Uysal et al.<sup>20</sup>

**Modified Medical Research Council Dyspnea Scale**

It measures perceived dyspnea. It is a categorical scale scored 0-4 points, and patients choose the statement that best describes their dyspnea level out of 5 statements about dyspnea.<sup>21</sup>

**Statistical Analysis**

Before the study started, the pilot study was performed with 10 patients with asthma and 9 healthy controls. The sample size was calculated at a minimum of 23 per group for a power of 0.80 with a 5% type 1 error and 0.748 effect size in a 2-sided test at the 0.05 level (G\*Power, ver. 3.1., Universität Düsseldorf, Düsseldorf, Germany). The main results did not include data from the pilot study.

All analyses were performed using Statistical Package for the Social Sciences 20.0 (IBM Inc., Armonk, NY, USA) Windows statistics software. The normality was checked by

Shapiro–Wilk tests. Continuous variables were presented as mean ± standard deviations or median (interquartile range), and categorical variables were presented as percentages (%). Mann–Whitney *U*-test and Independent Sample *t*-test were used to compare the groups. The chi-square test was performed for comparison of the categorical variables. A *P* value of <.05 was considered statistically significant.

**RESULTS**

We included 23 women with asthma (median age: 39 years) and 23 healthy controls (median age: 42 years) in the study. Participants had similar sociodemographic characteristics such as age, weight, height, body mass index, educational status, marital status, and employment status except for smoking variables (*P* < .05). Participants in the control group were more active smokers and had higher pack years (*P* > .05) (Table 1).

The clinical and disease-related characteristics of asthma patients are summarized in Table 2. Most patients with an average of 4.66 ± 3.05 years of diagnosis had partially controlled asthma (66.7%) and dyspnea (85.7%) (Table 2). Moreover, the mMRC scores of the patients were between 0 and 2 and there were no patients with scores 3 and 4 (Table 2).

In terms of problem-solving skills and self-efficacy, asthma patients scored better on problem-solving skills and lower on self-efficacy when compared to healthy controls (*P* < .05) (Table 3).

**DISCUSSION**

In our study, we compared the self-efficacy and problem-solving skills of women with asthma with those of the control

**Table 1.** Sociodemographic Characteristics of Participants

	Asthma Patients (n = 23)	Asymptomatic Controls (n = 23)	<i>P</i>
Age, years	39 (34-56)	42 (30-55)	.178
Weight, kg	63 (53-80)	71 (56-75)	.635
Height, cm	165 (160-169)	165 (161-166)	.733
Body mass index, kg/m <sup>2</sup>	23.05 (20.47-27.82)	26.07 (20.75-27.95)	.635
Educational status, n (%)			
Primary school	4 (17.39)	3 (13)	.541
High school	5 (21.74)	6 (26.09)	
University	3 (12.04)	6 (26.09)	
Postgraduate	11 (48.83)	8 (34.82)	
Marital status, n (%)			
Single	6 (26.09)	8 (34.78)	.380
Married	14 (61.87)	13 (56.52)	
Divorced	3 (12.04)	2 (8.70)	
Occupational status, n (%)			
Employed	18 (78.26)	21 (91.30)	.812
Unemployed	5 (21.74)	2 (8.70)	
Retired	0	0	
Smoking status, n (%)			
Smoker	3 (12.04)	10 (43.48)	
Ex-smoker	10 (43.48)	8 (34.78)	.041*
None	10 (43.48)	5 (21.74)	
Smoking consumption (pack-years)	7 (4-10)	20 (13-32)	.037*

Values are expressed as median (1 and 3 quartiles) or n (%). Mann–Whitney *U*-test and chi square test were used. \**P* < .05.

**Table 2.** Clinical and Disease-Related Characteristics of Asthma Patients

	Asthma Patients (n = 23)
Time of diagnosis, years	4.66 ± 3.05
Symptoms, n (%)	
Breathlessness	18 (78.26)
Cough	8 (34.78)
Phlegm	0 (0)
Chest pain	7 (30.43)
Number of asthma attacks in last year, n	1 (0/2)
mMRC dyspnea scores, 0-4	
0	3 (12.04)
1	13 (57.53)
2	7 (30.43)
Asthma control group, n (%)	
Well-controlled asthma	8 (34.78)
Partially controlled asthma	14 (61.87)
Uncontrolled asthma	1 (4.35)

Values are expressed as mean ± standard deviation or n (%). mMRC, Modified Medical Research Council.

**Table 3.** Problem-Solving and Self-Efficacy Scores of Participants

	Asthma Patients (n = 23)	Asymptomatic Controls (n = 23)	P
Problem-solving scores, 35-210	98 (74/112)	72 (65/84)	.047 <sup>a</sup>
Self-efficacy scores, 0-85	48.5 ± 6.85	58.8 ± 7.62	.036 <sup>a,b</sup>

Data presented as median (1 and 3 quartiles) and mean ± standard deviation.  
<sup>a</sup>Mann-Whitney *U*-test.  
<sup>b</sup>Independent Sample *t*-test.

group. We found that the self-efficacy and problem-solving skills of women with asthma deteriorated compared to the healthy controls.

Patients with asthma, especially those who have poor asthma control and exacerbations, may encounter intermittent, temporal, and prolonged hypoxemia periods.<sup>22</sup> This clinical characteristic of asthma may result in hypoxia-related hippocampal neurotoxicity and end in poor cognition.<sup>23</sup> Although it has been argued in recent studies that cognitive impairment may be associated with asthma, the mechanism of cognitive impairment in asthma has not been understood. Rhyou and Nam<sup>24</sup> found that cognitive impairment in adult asthma patients was frequently observed (44.1%) and older adults experienced more prevalent. Additionally, it implies that low cognition may be linked to depression and anxiety.<sup>25</sup> It may indicate how these fundamental cognitive impairment mechanisms and the processes associated with them may impact socio-cognitive abilities including self-efficacy and problem-solving abilities.

Self-efficacy reflects individuals' belief in their ability to achieve goals and accomplish tasks, and it has a subjective feature. In other words, it expresses how the person perceives their capacity to deal with the challenges they will face.<sup>26</sup> Considering these definitions, it is undeniable that self-efficacy is one of the key parts of chronic disease management. It was said that self-efficacy might change by the experienced emotions and individual behaviors when managing exacerbations in asthma patients.<sup>27</sup> Melgarejo González-Conde et al<sup>28</sup> reported that 40% of the participants had low self-efficacy in their study evaluating self-efficacy in adolescents with asthma. There are no clear results in the literature that self-efficacy was affected in adult asthma patients compared to the healthy control group. In comparison to healthy controls, we discovered that women with asthma had lower levels of self-efficacy. To the best of our knowledge, our study was the first to compare asthma patients with the control group for self-efficacy. Therefore, this outcome might serve as a new and important foundation for future studies.

One of the criteria defined by Lorig and Holman<sup>4</sup> among a group of abilities that have been successfully used to manage chronic diseases and enhance the disease management process is problem-solving skills.<sup>29</sup> People with chronic lung diseases are reported to have cognitive problems, such as

impairments in problem-solving skills, which have an impact on disease management.<sup>30</sup> When we searched the literature, no study examined the problem-solving skills of asthma patients. In our study, we observed that the perceived problem-solving skills of asthmatic women were lower compared to the healthy controls. More research, however, is required to corroborate these findings because problem-solving skills are involved in various contexts.

Our participants consisted of young adults of the same age, physical characteristics, and educational, marital, and occupational status except for smoking status between asthma and control groups. In our study, women with asthma were relatively recently diagnosed, had few attacks in the previous year, had partially low mMRC scores, and had good asthma control. However, most of the patients experienced dyspnea symptoms. Despite the comparatively good disease-related characteristics, the asthma group's self-efficacy and problem-solving skills were lower than those of the healthy controls. In the last 5 years, research has underlined the importance of enhancing and promoting self-efficacy and problem-solving in the practice of basic healthcare.<sup>29</sup> Therefore, if possible, after diagnosis, both self-efficacy and problem-solving skills should be taken into account and evaluated.

Our study had some limitations. In this study, we investigated only sociodemographic variables such as age, educational status, and occupational status. Assessment of participants' functional status and getting information about daily living activities, physical activity status, and challenges in daily life might help to interpret these differences in detail. Additionally, our study did not look into psychocognitive characteristics such as anxiety level, decision-making ability, and asthma-self efficacy did not investigate in our study. These variables might be important to clarify the mechanism of deterioration of self-efficacy and problem-solving skills in women with asthma. The other limitation was that we only included adult women with asthma in this study. However, we did not ask the participants about their menopausal status. Menopausal status may be a parameter that influences self-efficacy and problem-solving skills. Also, the sample size of our study could have been larger. In future studies, these limitations might be considered. Besides, we did not analyze the factors related to self-efficacy and problem-solving skills in women with asthma because of the small sample size for correlation analysis. First of all, the sample size of our study could have been larger. It should investigate these factors in future studies.

## CONCLUSION

Self-efficacy and problem-solving skills play a crucial role in the self-management of chronic diseases such as asthma. In chronic disease management, the assessment and improvement of self-efficacy and problem-solving skills constitute the biggest steps to be taken in the self-management process within the scope of providing the patient with healthy life behaviors such as exercise and nutrition. Our study showed that self-efficacy and problem-solving skills were worse in women with asthma compared to the healthy control group. Our study, which we conducted on women asthma

patients considering that these parameters will vary specifically for gender, underlines the need to consider self-efficacy and problem-solving skills when planning rehabilitation programs.

**Ethics Committee Approval:** This study was approved by Ethics committee of İzmir Katip Çelebi University (Approval Number: 114, Date: 24.03.2022).

**Informed Consent:** Written informed consent was obtained from the patients who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

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