

Article

Investigating the Status of Physical Activity, Adherence to Treatment, and Quality of Life in Individuals with Asthma

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Abstract

Background: Adherence to treatment and regular physical activity in individuals with asthma will culminate in favorable clinical outcomes, including an effective disease management and an improved quality of life.**Objectives:** The present study aimed to determine the physical activity level and association with adherence to treatment and quality of life in individuals with asthma.**Methods:** This cross-sectional study was conducted on 505 individuals referring to the respiratory ward of Vali-e-Asr Hospital in Zanjan, Iran. Participants were selected using a convenience sampling method. Data were collected using the socio-demographic information form, the International Physical Activity Questionnaires (IPAQ), Modanloo Adherence to Treatment Questionnaire (MATQ), and the St. George's Respiratory Questionnaire (SGRQ). Data analysis was performed using descriptive statistics and the Kruskal-Wallis test in SPSS software version 16.**Results:** The majority of participants were male (57.2%) with a mean (standard deviation [SD]) age of 66.35 (15.33) years. The physical activity level of the majority of participants was vigorous (43.4%). The mean (SD) total scores for adherence to treatment and quality of life were 120.83 (8.92) and 35.42 (5.02), respectively. According to the findings, physical activity had no statistically significant association with adherence to treatment ($p=0.535$) and quality of life ($p=0.173$).**Conclusion:** In the present study, physical activity level was vigorous in asthmatic participants. Adherence to treatment among participants was at a good level, and quality of life was at a moderate level. Therefore, the design of supportive educational interventions is recommended to improve quality of life and promote lifestyle modification in individuals with asthma.

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Implications of this paper in nursing and midwifery preventive care:

- Encouraging adherence to treatment among individuals with asthma by nurses can prevent the occurrence of adverse events and unpleasant symptoms associated with the condition.
- By providing self-management training to individuals with asthma, nurses can play a significant role in improving quality of life and preventing disability stemming from the disease.
- By designing a regular and appropriate activity plan, nurses can help prevent symptom exacerbation and promote a sense of well-being in individuals.

Introduction

Asthma is a chronic inflammatory airway disease characterized by symptoms such as wheezing, shortness of breath, chest tightness, cough, and expiratory airflow limitation [1]. Currently, asthma is recognized as the fourteenth most significant chronic disease in terms of prevalence and disability [2]. Asthma is the most common non-communicable chronic respiratory disease, affecting 1 in 12 people in the United States [3]. Approximately 300 million people worldwide have asthma, and this number is projected to increase by another 100 million by 2025 [4]. In

2018, the prevalence of asthma in the adult Iranian population was reported to be 8.9% [2]. Asthma imposes a heavy burden on the lives of those affected, their caregivers, and society, profoundly impacting the daily lives and functioning of patients [1,5]. Despite a global decline in asthma-related mortality with the increased use of inhaled corticosteroids in recent years, the disease continues to cause significant disability and impair patients' quality of life [5] so that numerous studies have reported a poor quality of life among individuals with asthma [6,7].

This disease strongly impacts individuals' quality of life, both physically and psychologically, and is associated with consequences, such as symptom exacerbation, learning efficiency reduction, and physical activity limitations [7,8]. The quality of life of individuals with asthma is associated with factors such as age, body mass index (BMI), smoking, physical activity level, adherence to medication, and disease control [9,10]. Additionally, the quality of life of these patients is influenced by the frequency of asthma exacerbations, which manifests through impacts on daily activities, reduced social and occupational activities, etc. [5]. Physical activity in daily life is a crucial dimension of quality of life. Poor physical activity may give rise to worsened asthma outcomes. Consequently, the onset or exacerbation of asthma symptoms during activity may result in reduced exercise tolerance, and due to fear of experiencing such symptoms, many patients may intuitively or preemptively avoid physical activity and adopt a sedentary lifestyle. In the modern era, the ultimate goal of asthma management involves minimizing symptoms so that patients can maintain their normal activity levels and achieve a good quality of life [11].

Asthma is not curable; however, given the chronic nature of this disease, patients should adhere to medication regimens and also follow non-pharmacological recommendations to prevent symptom exacerbation. Various non-pharmacological approaches can improve symptoms in individuals with asthma, but they frequently are utilized. In this regard, current guidelines recommend that individuals with asthma engage in regular physical activity. Few studies have focused on assessing the physical activity levels of individuals with asthma. Engaging in physical activity in individuals with asthma is complex because physical activity can worsen or trigger symptoms. Symptom exacerbation with physical activity may reflect inadequate asthma control [5,11-13].

Inadequate asthma control as a result of poor adherence to treatment is linked to increased emergency room visits, use of rescue medications, higher healthcare costs, and elevated mortality [14,15]. Unfortunately, adherence to treatment among individuals with asthma has been reported to be very poor. Existing evidence estimates that

the rates of non-adherence to treatment in these patients range from 20% to 80%, presenting a complex challenge for healthcare systems [16-18]. Despite the importance of physical activity, adherence to treatment, and quality of life in individuals with asthma, limited studies have been found in this area. Identifying and understanding the physical activity level, adherence to treatment, and quality of life in individuals with asthma plays a crucial role in promoting preventive care in nursing. By expanding research in this field and designing personalized interventions, a brighter future can be achieved for individuals with asthma. Hence, the present research was designed and conducted to elevate knowledge and better understanding regarding the physical activity level and association with adherence to treatment and quality of life in individuals with asthma.

Methods

This cross-sectional study was conducted on 505 individuals with asthma referring to the respiratory ward of Vali-e-Asr Hospital in Zanjan, Iran, over a six-month period from October 2020 to March 2021.

The sample size adequacy was determined using the formula for estimating a qualitative attribute, considering an asthma prevalence of 7.48% [19], a 95% confidence level, a 5% margin of error, and $d=0.3P$, resulting in an estimated sample size of 504 participants. Accounting for a 5% attrition rate, a total of 530 participants was projected.

Individuals with asthma, with a history of at least one year of diagnosis and under the care of a pulmonologist with a uniform and specific medication protocol (based on the Global Initiative for Asthma (GINA) guidelines, including preferred controller medications for asthma attack prevention according to the five-step approach), were selected for inclusion in the study. Individuals with musculoskeletal problems, limb deficiency, cardiovascular diseases, acute illnesses, or pregnancy were excluded from the study. Incomplete or partially completed questionnaires were not analyzed.

Data were collected using a demographic information form, the International Physical Activity Questionnaires (IPAQ), Modanloo Adherence to Treatment Questionnaire (MATQ) and the St. George's Respiratory Questionnaire (SGRQ). The demographic information form

included variables such as age, gender, marital status, and occupation.

The IPAQ, developed by the World Health Organization (WHO) in 1990, was used to assess the physical activity levels of individuals with asthma. This questionnaire comprises 24 items and measures activities across 4 domains. The IPAQ provides three physical activity levels based on categorized scores:

(Category 1): Light: This category represents the lowest physical activity level. Individuals who do not meet the criteria for Categories 2 or 3 are considered sedentary.

(Category 2): Moderate: Any one of the following three criteria:

- 3 or more days of high-intensity activity for at least 20 minutes per day; OR

- 5 or more days of moderate-intensity activity or walking for at least 30 minutes per day; OR

- 5 or more days of a combination of walking, moderate-intensity activity, and high-intensity activity for a minimum of 600 metabolic equivalent (MET) minutes per week;

(Category 3): Vigorous: Any one of the following three criteria:

- Relatively high-intensity activity on at least three days for overall a minimum of 1500 MET minutes per week; OR

- 7 or more days of a combination of walking, moderate-intensity activity, and high-intensity activity reaching a minimum of 3000 MET minutes per week.

The validity and reliability of the Persian version of this questionnaire were evaluated in Moghaddam et al.'s study. The reliability of the questionnaire in the Iranian population was confirmed with a Cronbach's alpha coefficient of 0.7, and its validity has been confirmed with a content validity index (CVI) of 0.85 and a content validity ratio (CVR) of 0.77 [20]. In the present study, the Cronbach's alpha coefficient for this questionnaire was calculated to be 0.63.

The MATQ, designed by Seyyed Fatemi et al., comprises 40 items and 7 subscales, including attention to treatment (9 items), willingness to engage in treatment (7 items), adaptability (7 items), integrating treatment with life (5 items), sticking to treatment (4 items), commitment to treatment (5 items), and strategies in treatment implementation (3 items). The questionnaire items have been designed on a five-point Likert scale

(ranging from strongly disagree = 1 to strongly agree = 5). To calculate each dimension's score, the scores of each item related to that dimension are summed. To calculate the questionnaire total score, the scores of all items are summed. The minimum and maximum scores in the domains are as follows: Attention to treatment (9-45), willingness to engage in treatment (7-35), adaptability (7-35), integrating treatment with life (5-25), sticking to treatment (5-20), commitment to treatment (5-25), and strategies in treatment implementation (3-15). According to the questionnaire designer's instructions, the initial scores are converted to scores between 0 and 100. Based on this questionnaire, a score of 75-100% indicates very good adherence to treatment, a score of 50-74% indicates good adherence to treatment, a score of 26-49% indicates moderate adherence to treatment, and a score of 0-25% indicates poor adherence to treatment. The validity and reliability of this questionnaire have been confirmed using internal consistency and a Cronbach's alpha coefficient of 0.92, and this questionnaire is utilized as a valid and reliable instrument, consistent with the cultural context of the Iranian society, to assess adherence to treatment in adult patients with chronic diseases [21]. In the present research, the Cronbach's alpha coefficient for this questionnaire was calculated to be 0.70.

The SGRQ, designed to assess the impact of respiratory diseases on the lives of individuals with asthma and chronic obstructive pulmonary disease (COPD). The SGRQ, as a well-established questionnaire for evaluating the quality of life of individuals with asthma, contains 50 questions divided into three sections, including "symptoms, activity, and impact." Questions are scored from 0 to 100 and expressed as percentages. Higher scores denote a poorer quality of life. The questionnaire is completed by the patient under the supervision of an interviewer. The validity and reliability of this questionnaire have been approved in a Fallah Tafti et al.'s study. The Cronbach's alpha coefficients reported for the symptoms, activity, and impact sections were 0.69, 0.80, and 0.87, respectively, and 0.93 for the overall questionnaire. The results of this study demonstrated that the Persian translation of this questionnaire, in addition to being consistent with the concepts of the original English version, is

adaptable to the concepts of the Persian language and culture and can be used to assess the quality of life of patients with chronic respiratory diseases [22]. In the present study, the Cronbach's alpha coefficient for this questionnaire was calculated to be 0.68.

Participants were recruited using a convenience sampling method from patients hospitalized in the respiratory ward of Vali-e-Asr Hospital. After disease confirmation by the attending physician, questionnaires were completed through interviews.

Data analysis was performed using SPSS software version 16. The Kolmogorov-Smirnov test was employed to assess the normal distribution of quantitative variables. The standardized mean scores of adherence to treatment and quality of

life were not normally distributed ($p < 0.05$). Data were analyzed using descriptive statistics, including mean, standard deviation (SD), frequency, and percentage, and the Kruskal-Wallis test. In the current research, a statistical significance level of less than 0.05 was considered

Results

A total of 530 questionnaires were distributed among eligible participants. The participation rate was 95.3%. Eleven cases were excluded due to unwillingness to participate, and 14 cases were excluded due to incomplete questionnaires. The majority of participants were male (57.2%), married (98%), and unemployed (51.7%). The participants' demographic characteristics are presented in Table 1.

Table 1: The participants' demographic characteristics (n= 505)

Qualitative Variable		n	%
Gender	Male	289	57.2
	Female	216	42.8
Marital status	Single	10	2
	Married	495	98
Employment status	Employed	244	48.3
	Unemployed	261	51.7
Quantitative Variable		Mean	SD
Age		66.35	15.33

*SD: Standard deviation

The mean (SD) of the total adherence to treatment score was 60.41 (4.46). The scores of adherence

to treatment and quality of life for asthmatic participants are presented in Table 2.

Table 2: The scores of physical activity, adherence to treatment, and quality of life in the study asthmatic participants

Variables	Mean	SD
Total physical activity score	2.27	0.728
Attention to treatment	27.53	4.19
Willingness to engage in treatment	21.17	3.67
Adaptability	20.90	3.68
Integrating treatment with attention to treatment	15.19	3.17
Sticking to treatment	11.75	2.77
Commitment to treatment	15.14	3.12
Strategies in treatment implementation	9.14	2.49
Total adherence to treatment score	60.41	4.46
Total quality of life score	35.42	5.02

*SD: Standard deviation

The physical activity level of the majority of participants was vigorous (43.4%) (Table 3).

Table 3: The physical activity level of the study asthmatic participants

Physical Activity	n	%
Light	84	16.6
Moderate	202	40
Vigorous	219	43.4

The standardized mean (SD) adherence to treatment score was 60.41 (4.46) out of 100, indicating a good level. According to the findings, no statistically significant difference was

observed in the mean adherence to treatment score in terms of the physical activity levels among the asthmatic participants ($p = 0.535$) (Table 4).

Table 4: Comparison of standardized mean adherence to treatment score in terms of the physical activity level

Physical Activity Level	n	Mean Rank	Kruskal-Wallis
Light	84	262.32	df = 2 p = 0.535
Moderate	202	244.36	
Vigorous	219	257.39	

The standardized mean (SD) quality of life score was 50.61 (7.18) out of 100, indicating a moderate level. The findings revealed no statistically significant difference in the mean

quality of life score in terms of the physical activity levels among the asthmatic participants ($p = 0.535$) (Table 5).

Table 5: Comparison of standardized mean quality of life score in terms of the physical activity level

Physical Activity Level	n	Mean Rank	Kruskal-Wallis
Light	84	269/85	df = 2 p = 0.173
Moderate	202	238/78	
Vigorous	219	259/65	

Discussion

The current study was conducted to determine the physical activity level and association with adherence to treatment and quality of life in individuals with asthma at Vali-e-Asr Hospital in Zanjan, Iran.

The findings of the present study demonstrate that the self-reported physical activity levels of the majority of asthmatic participants were vigorous. The results of De-Miguel-Diez et al.'s (2024) study in Spain revealed a positive trend in physical activity among individuals with asthma [13]. As reported by Daşdemir et al.'s (2022) study, the overall physical activity level vigorous physical activity, and walking were lower in individuals with asthma compared to healthy individuals [23], which is inconsistent with the results of the current study. The discrepant results may be attributed to the fact that Daşdemir's study was conducted during the coronavirus disease 2019 (COVID-19) pandemic. During the pandemic, individuals with asthma were more

inactive due to their chronic disease. Moreover, the present study did not include a comparison of the physical activity level with healthy individuals. In their study in England, Ahmad et al. (2015) found that the physical activity level of the majority of the asthmatic participants was low [24], which was also inconsistent with the results of the present study. The discrepant results may be due to differences in the research setting, age, and sample size between the two studies.

The study findings revealed that adherence to treatment among the asthmatic participants in the present study was at a good level. In this regard, Özdemira et al.'s (2023) study indicated that the majority of adults with asthma adhered to their medication regimens [25]. According to existing evidence, good adherence to treatment is associated with better asthma control and a reduced risk of asthma symptom exacerbations [17,26]. Thus, it is recommended that educational programs and regular follow-ups be designed by healthcare providers to specifically promote

adherence to treatment in individuals with asthma. A study by Bassam et al. (2021) in Africa reported unsatisfactory adherence to medication among individuals with asthma [17], which is inconsistent with the findings of the present study. The discrepant results may be attributed to cultural differences in the research setting, the age of the participants, and the instruments employed to assess adherence to treatment.

Additionally, the findings revealed that the quality of life of the asthmatic participants in the present study was at a moderate level. Jarab et al. (2023) also found a moderate level of quality of life in asthmatic patients [27], which is consistent with the findings of the present study. This finding can be explained by the fact that the mean age of participants in this study was high, with older individuals being more susceptible to diseases and complications that reduce their quality of life. The rates of complications, repeated hospitalizations, and mortality are higher in older patients with asthma compared to younger patients. Consequently, healthcare policymakers should take specific guidelines into account to improve asthma management and reduce the burden of asthma on older patients, their families, and the healthcare system [27,28]. In Pedram Razi et al.'s (2007) research, the quality of life of individuals with asthma referring to the pulmonary clinic of Imam Khomeini Hospital in Tehran was reported to be unfavorable [29]. Moreover, Belachew et al. (2023) found in their study that the quality of life of more than half of the asthmatic patients was at a good level [1]. Kharaba et al. (2022) also reported poor quality of life among individuals with asthma [5]. The results of the aforementioned studies contradict those of the present study. The reasons for the discrepancy in the obtained results may be due to variations in the instruments utilized to assess quality of life, sample size, study period, and research setting.

According to the findings, there was no statistically significant association between physical activity level and quality of life in individuals with asthma. Aligned with the present study, Rajabi et al. (2021) also found no significant association between lifestyle modifications in the exercise domain and quality of life in asthmatic patients [30]. Conversely, the results of Ahmad et al.'s (2015) study demonstrated a statistically significant association

between physical activity and quality of life in individuals with asthma [24]. Additionally, Jarab et al. (2023) reported light physical activity as a significant predictor of poor quality of life in individuals with asthma [27]. The discrepancies between the aforementioned studies and the present study may be attributed to differences in research settings, age, and sample size. Physical activity has a potential role in improving the quality of life of individuals with asthma. Hence, healthcare providers should incorporate personalized physical activity programs tailored to the severity of asthma into patients' treatment regimens.

Conclusion

The findings revealed no statistically significant association between adherence to treatment and the physical activity level in individuals with asthma. Contrary to the findings of the present study, Rockette-Wagner et al.'s (2024) cross-sectional study reported a statistically significant association between physical activity and asthma control [31]. Regular physical activity, in addition to its general health benefits, appears to be a crucial component in the successful management of asthma. Greater adherence to physical activity accompanies favorable clinical outcomes, such as improved lung function, asthma control, exacerbation rates, and healthcare utilization [11]. The limitations of the present study, given its descriptive nature, were the caution required in generalizing the results to other populations and the use of self-reporting in data collection.

Ethical Consideration

This study was approved by the Research Ethics Committee of Zanjan University of Medical Sciences (IR.ZUMS.REC.1399.266).

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This study was extracted from a research project approved by Zanjan University of Medical Sciences (research code: 3989). The authors would like to thank the individuals with asthma for their participation and cooperation in the study.

Conflict of interest

No Conflict of interest.

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Authors' contributions

The authors contributed equally to this work, and all authors have approved the final version of the manuscript.

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