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ORIGINAL ARTICLE

# Effect of physical training on health-related quality of life in patients with moderate and severe asthma



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## KEYWORDS

Asthma;  
Physical training;  
Health-related quality of life

**Abstract** *Background:* Bronchial asthma is a major healthcare problem worldwide. Patients with asthma may show less tolerance to exercise due to worsening symptoms during exercise that may result in reduced physical fitness. Few studies have been conducted on the effects of physical exercise in patients with asthma, particularly on HRQOL as a primary outcome. So, the aim of this study was to evaluate the effects of physical training on HRQOL in adult patients with moderate and severe bronchial asthma.

*Patients and methods:* A total of 68 patients with moderate and severe asthma were included according to Global Initiative for Asthma (GINA) criteria. All patients were randomized into a physical training group; ( $N = 38$ ), while another group did not join exercise training (control group;  $N = 30$ ). Asthma quality of life questionnaire (AQLQ) was measured before, immediately following and 3 months after the intervention period for all included patients. Pulmonary function tests were also done before and immediately after the interventional period.

*Results:* There were significant improvements in all baseline AQLQ domains, except for environmental exposure domain, immediately following training intervention in the training group and when compared with the control group ( $p < 0.05$ ). The improvements in AQLQ domains were still evident 3 months following training and were significantly greater than any changes observed in the control group. For FVC and FEV<sub>1</sub> values, there was significant difference between the pre- and post-training values in the training group and also, when compared with those of the control group.

*Conclusions:* Physical training can improve HRQOL and pulmonary function in patients with moderate and severe bronchial asthma. Exercise prescription should be integrated as an essential treatment of asthmatic patients. Further studies to compare different combinations of exercise techniques are needed to confirm our findings.

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*Abbreviations:* HRQOL, health-related quality of life; AQLQ, asthma quality of life questionnaire; ICS, inhaled corticosteroids; LABA, long-acting bronchodilators; MHR, maximum heart rate; COPD, chronic obstructive pulmonary disease

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## Introduction

Bronchial asthma is a chronic inflammatory airway disease that has a high extensive burden on patients and their societies

[1]. Uncontrolled asthma is associated with exercise intolerance that can affect the social and emotional lives of such patients with subsequent poor health-related quality of life (HRQOL) [2]. The fear of triggering dyspnea during exercise is responsible for keeping asthmatic patients from joining sports and other physical activities that may result in reduced physical fitness [3].

Although exercises can provoke exercise-induced bronchoconstriction (EIB), recent Global Initiative for Asthma (GINA) guidelines have been considered physical activity as a non-pharmacological treatment particularly for patients with moderate and severe asthma, because they can improve exercise capacity and HRQOL [4]. British thoracic society guidelines regarding physiotherapy management of adult patients with asthma recommend physical training to increase fitness and cardiorespiratory endurance, and improve HRQOL [5]. Physical rehabilitation of asthma can decrease the bronchospasm threshold and improve airway reserve, which effectively reduce air trapping by placing the diaphragm in a more advantageous position [6,7]. Current studies that evaluated the role of exercise in patients with asthma were inadequate and little included HRQOL as an outcome. Therefore, the aim of this study was to evaluate the effects of physical training on HRQOL in adult patients with moderate and severe bronchial asthma.

#### Patients and methods

This study was done at the Respiriology Department Farwaniya Hospital and Kuwait Physiotherapy center, Ministry of Health, State of Kuwait in the period between November 2013 and January 2015. A total 68 patients with moderate and severe asthma were included who were diagnosed and treated according to Global Initiative for Asthma (GINA) criteria [4]. All patients were clinically stable (ie, no exacerbations or changes in medication for the last 4 weeks before enrollment). Moderate asthma is defined as asthma, which is well-controlled with step 3 treatments such as low dose ICS plus LABA, while severe asthma is defined as asthma that required step 4 or step 5 treatments such as high dose ICS plus LABA or oral corticosteroids to prevent it from becoming uncontrolled or asthma remained uncontrolled despite regular controller treatment for the last 3 months. All patients had variable respiratory symptoms (cough, wheeze, shortness of breath, and/or chest tightness) and forced expiratory volume in first second (FEV<sub>1</sub>) to forced vital capacity (FVC) ratio of <0.75 with an increase in FEV<sub>1</sub> of >12% and 200 mL after inhalation of 400 µg salbutamol. Included patients were aged between 25 and 65 years-old with a body mass index (BMI) < 35 kg/m<sup>2</sup>. All of them had a sedentary life (doing < 60 min of physical activity per week) [8]. The patients were randomized into group 1, which included 38 patients (training group) who joined a 6-week exercise program besides the standard medical care and 30 control patients (group 2) received only standard medical treatment. All patients maintained the same bronchodilator and corticosteroid dosage throughout the Interventional period. Number of casualty presentations and hospitalizations in the last year before enrollment was obtained. All patients provided informed consent.

#### Exclusion criteria

The patients were excluded from the study if they had co-existing respiratory, cardiac, or any medical diseases that might impair exercise training. Pregnant patients or planned pregnancy, and patients with smoking history ≤2 years before enrollment were also excluded.

#### Intervention

##### *Group 1 (physical training group)*

The exercise intervention was started within a week of completing the baseline assessment. Supervised physical training was performed for three exercise sessions every week for six weeks at the Kuwait Physiotherapy Centre. The exercise sessions were supervised by a physiotherapist at a temperature of 22–25 °C. The Borg CR-10 scale [9], heart rate, blood pressure, respiratory rate and blood oxygen saturation (SpO<sub>2</sub>) were evaluated before and immediately after each exercise session. Prophylactic bronchodilators were given before (15 min prior to starting the exercise session) or during the session, if needed [10]. Patients were permitted to take short rests during the training if symptoms were intolerable. The session was discontinued if the patient complained chest pain, intolerable dyspnea, cramps, or leg pain. During the exercise session, the initial intensity was started at 60% of maximum heart rate (MHR) reaching a maximum intensity of 80% of MHR with reference values calculated according to the Karvonen formula [11]. The session started with a 10 min warm-up and stretching period that included slow walking on an electric treadmill and stretches focused on the major muscle groups of the lower limbs. The exercise circuit entailed a 20 min training in the first and second weeks and 30 min in the third to sixth weeks according to symptom tolerance [12–13]. Each circuit was comprised of cycle ergometry training, step ups, wall squats and upper limb endurance training followed by a 5 min cooling down period that comprised of a 150 m slow walk on a treadmill with the heart rate maintained at 40% of MHR. Cooling down period was vital due to most exercise-induced bronchospasm events potentially occurred. The whole exercise intervention follows the guidelines for patients with chronic illnesses as those for patients with heart diseases and COPD [12–13].

##### *Group 2 (controls)*

All control patients continued to receive the standard medical care. They were advised to refrain from any structured exercise (i.e., maintained their current behavior and usual life activities) throughout the intervention period.

#### Outcome measures

##### *Asthma quality of life questionnaire (AQLQ)*

AQLQ was used to assess the extent to which asthma limits our patient's life or interferes with their ability to do different activities typical of daily life [14]. AQLQ has 32 items rated on

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