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REVIEW ARTICLE

Impact of physical activity on the quality of life of asthmatic children and adolescents: A narrative review

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Keywords:
Child,
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Abstract

Introduction: Asthma is a common chronic respiratory disease in childhood, characterized by bronchial inflammation. Physical activity is essential for controlling symptoms and improving quality of life. The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) assesses quality of life in children and adolescents with asthma. **Objective:** To verify the influence of pulmonary rehabilitation on the quality of life of asthmatic children and adolescents Methodology: A bibliographic literature review was conducted using the databases LILACS, PEDro, PubMed, and SciELO. The descriptors "Asthma," "Quality of Life," "Exercises," and "Children" were used with the Boolean operator "AND." Inclusion criteria were randomized clinical trials in English and Portuguese from the past 10 years that used the PAQLQ in populations aged 6 to 18 years. Systematic review articles and articles not available in full were excluded. **Results:** Nine articles were found, which six were included. One study performed aerobic training, observing increased PAQLQ scores, decreased symptoms, and improved lung function. Another study used aerobic training and demonstrated a decrease in inflammatory markers, along with increased PAQLQ scores. An indoor training trial improved quality of life, lung function, and physical capacity. In contrast, three articles utilized interventions such as combined exercises, a multifactorial program, and high-intensity interval training, without significant changes. **Conclusion:** Pulmonary rehabilitation through physical training has shown to improve the quality of life in asthmatic children and adolescents, with positive results on the PAQLQ.

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INTRODUCTION

Asthma is the most common chronic respiratory disease in childhood, causing a significant impact on the quality of life of both patients and their families, in addition to generating high direct and indirect costs to society[1]. In Brazil, approximately 350,000 hospitalizations due to asthma occur each year. This condition is the fourth leading cause of hospital admissions in the Unified Health System (SUS), and the prevalence of asthma among children is 24.3% and among adolescents, 19%[1,2].

Bronchial inflammation is the main pathophysiological feature of asthma, resulting from multiple and complex interactions among inflammatory cells, inflammatory mediators, and structural airway cells[3,4]. Respiratory symptoms include wheezing, dyspnea, chest tightness, and cough, which vary in intensity and frequency and may be spontaneously reversible or responsive to medication. These symptoms occur more frequently at night or in the early morning and are generally triggered by an interaction between genetics, allergens, and environmental exposure[5].

Physical activity is essential for the growth and development of children, inducing positive physiological and psychological effects and improving cardiovascular, respiratory, and muscular systems[6]. However, the percentage of children and adolescents meeting the recommended 60 minutes of daily activity has decreased significantly over the past 50 years, with only 24% of children aged 6 to 17 years meeting this guideline[7].

Physical activity is often neglected in modern lifestyles, especially among children and adolescents with asthma[8]. Many restrict their activities due to family influence or personal perception of symptom exacerbation during exercise[9,10]. Children and adolescents with asthma should be encouraged to engage in regular physical activity, as lack of physical conditioning resulting from inactivity can worsen symptoms[9,11]. Exercise training programs have demonstrated benefits such as reducing recurrent asthma episodes, decreasing hospital admissions, lowering the need for medication to control the disease, reducing the frequency of wheezing, and minimizing emergency visits[12,13]. Furthermore, they promote positive immunological changes, thereby reducing allergic inflammation[14,15].

Asthma can affect various aspects of children's lives, from school performance to social interactions. Respiratory difficulties are part of their daily lives, leading to school absences, impaired academic performance, and reduced socialization with peers. In addition, daily adaptations are necessary, such as avoiding environments with allergens, and some of these restrictions may cause frustration. Frequent medical consultations for monitoring or hospitalizations due to symptom exacerbation interfere with both school routines and daily living activities[16,17].

Several instruments assess quality of life in children with asthma, considering the impact on both the children and their parents. With advances in monitoring methods, greater specificity has been sought[18]. In 1995, Juniper and colleagues developed the *Pediatric Asthma Quality of Life Questionnaire* (PAQLQ) to evaluate the quality of life in children and adolescents with asthma. The PAQLQ includes 23 items and consists of three domains (symptoms, activity limitations, and emotional function). The questionnaire is completed based on children's own experiences, using a 7-point scale where 1 represents the greatest negative impact and 7 represents no impact[19]. The questionnaire has been translated, adapted, and validated for use in Brazil and is easy to apply and efficient for assessing the quality of life of children with asthma[20].

The objective of this study was to review the literature on quality of life after a rehabilitation program in children and adolescents with asthma.

METHOD

This study is a literature review conducted using the following databases: LILACS (Latin American and Caribbean Health Sciences Literature), PEDro (Physiotherapy Evidence Database), PubMed, and SciELO (Scientific Electronic Library Online). The descriptors "Asthma," "Quality of Life," "Exercises," and "Children" were used, combined with the Boolean operator "AND."

The search was carried out from June 2024 to August 2024. Inclusion criteria comprised randomized clinical trials in English published within the last 10 years that used the *Pediatric Asthma Quality of Life Questionnaire* (PAQLQ) as an instrument to assess quality of life in children and adolescents with asthma following physical exercise interventions. Exclusion criteria included articles not available in full text, systematic reviews, or studies not aligned with the proposed topic.

RESULTS AND DISCUSSION

A total of nine articles were identified. Of these, three were excluded because they were systematic reviews, were published more than 10 years ago, did not correspond to the proposed topic, or were unavailable in full text.

Six articles met the inclusion criteria and were selected for analysis. These are presented in Table 1.

Abdelbasset *et al.*[20] (2018) found that after 10 weeks of aerobic physical training, significant improvements occurred in pulmonary function and aerobic capacity among children with asthma. The results were significant within the intervention group across all PAQLQ domains ($p < 0.05$). An increase in overall scores was observed, particularly in the domains of activity limitation ($p = 0.001$) and symptoms ($p = 0.001$), indicating that regular and consistent physical training can reduce respiratory symptoms such as shortness of breath and coughing, in addition to improving functional capacity. In the conventional treatment group, no significant differences were observed between the pre- and post-intervention periods.

Table 1. Selected articles.

Author/Year	Objective	Intervention	Main Results	Conclusion
Abdelbasset *et al.* (2018)[20]	To investigate the effects of moderate-intensity physical training in school-age children with asthma.	Moderate-intensity aerobic exercise (treadmill), 40-minute sessions, three times/week for 10 weeks.	Comparison of pre- and post-treatment mean values for overall quality of life, activities, symptoms, and emotional scores indicated significant differences in the intervention group. However, the conventional treatment group showed no significant improvement in all PAQLQ dimensions at the end of the study period.	Improving the level of physical activity among children with asthma has a positive effect on lung function, aerobic capacity and quality of life.
Latorre-Román *et al.* (2014)[21]	To analyze the effects of a 12-week intermittent therapy indoor training program on lung function, physical capacity, body composition, and quality of life in children with asthma.	Three weekly 60-minute sessions of *indoor physical exercise* designed to allow alternating low intensities, such as walking, weight-bearing exercises, flexibility, coordination or relaxation, and high intensity, such as running, weight-bearing exercises with a companion or team sports. The training program included lower limbs and upper limbs.	The quality of life in the group that performed exercise increased significantly in relation to the control group according to the values presented in the dimensions of the PAQLQ.	An intermittent exercise program in an *indoor environment* was found to improve lung function, physical fitness, body composition, and quality of life in children with asthma who followed a regular exercise routine. The training program was well received by students and parents. Children with stable asthma should be encouraged to participate in regular exercise without fear of exacerbation symptoms.
De Andrade *et al.* (2014)[22]	To evaluate the short-term effectiveness of an aerobic training program on the inflammatory response in asthmatic children. The secondary objective was to evaluate the effects of the intervention on functional and respiratory capacity, muscle strength, quality of life, and number of asthma-free days.	Supervised aerobic training (treadmill) was performed 3 times per week for six weeks. The exercise consisted of a 5-minute lower-body stretching session, followed by a 10-minute warm-up, 20 minutes of training in the first and second weeks, and 30 minutes in the third and sixth weeks, followed by a 5-minute cool-down period.	Overall PAQLQ scores and individual domain scores increased significantly in the exercise group. Furthermore, scores in this group improved compared to the control group. When assessing symptom scores, the mean number of asthma-free days was higher in the exercise group than in the control group. At the end of the study, the sensation of dyspnea was lower in the exercise group compared to the control group.	Six weeks of aerobic exercise did not result in changes in plasma cytokines; however, increases in functional capacity, maximal respiratory pressure, quality of life, and disease-related symptoms were found in asthmatic children.
Sanz-Santiago *et al.* (2020)[23]	To analyze the effects of a combined physical training program (resistance and aerobic) on aerobic fitness, lung function, asthma control and quality of life in a group of children with mild to moderate asthma.	12-week program, with a frequency of 3x/week (36 sessions), each session lasting 60 minutes. Aerobic exercises consisted of a 10-minute warm-up on a cycle ergometer , and aerobic cycle ergometer for 20 to 40 minutes. Then, resistance exercises of the upper and lower limbs were performed, one series of 12-15 repetitions.	There were no significant differences in quality of life found between the groups, although the variation (delta) of the quality of life questionnaire scores was greater in the intervention group.	A combined resistance and aerobic exercise training program can improve cardiorespiratory fitness and muscle strength in children and adolescents with controlled asthma and exercise symptoms. Incorporating controlled exercise training, including resistance exercises, as part of treatment may benefit children and adolescents with asthma.

Willeboordse *et al.* (2017)[24]	To determine the effects of a multifactorial weight reduction intervention on the treatment of asthma in overweight/obese children with a clinical diagnosis of asthma or at high risk of developing asthma.	Regular group exercise (2x times a week during the initial phase, 3x per month during the follow-up phase lasting 60 minutes per session. A session consisted of 10 minutes of warm-up, 20 minutes of aerobic exercise, 20-25 minutes of interval training (basketball, soccer, jumping rope and tag). and 5 minutes of recovery.	The PAQLQ improved slightly more in the intervention group than in the control group, although the improvement was not significantly different between groups. The PAQLQ significantly improved by an average of 0.48 ± 0.72 points in children with asthma in the intervention group.	They conclude that children with asthma decreased body weight and BMI-SDS, and demonstrated clinically significant improvements in all lung function indices (FEV1, FVC, ERV, TLC), asthma control, aerobic fitness, without improving quality of life.
Winn *et al.* (2019)[25]	To evaluate the effectiveness of a 6-month high-intensity interval training (HIIT) intervention in adolescents with and without asthma.	A 6-month HIIT program with 30-minute sessions, 3 times a week. The sessions consisted of a combination of circuits and recreational activities lasting between 10s and 30s followed by an equal period of rest (1:1).	The intervention had no effect on asthma control or asthma-related quality of life.	The authors suggest that HIIT-type training is safe and well tolerated by adolescents with asthma.

The increase in oxygenation and strengthening of respiratory muscles likely contributed to the reduction of dyspnea during daily activities, consequently increasing confidence in exercise performance, which may explain the improved scores in all questionnaire domains.

According to Kuder *et al.*[26] (2021), "physical activity can improve asthma control, lung function, and health-related quality of life, providing a sense of well-being perceived by patients." In this context, Latorre-Román and collaborators[21] confirmed the effectiveness of physical training in promoting quality of life among children with asthma. While the study by Abdelbasset *et al.*[20] (2018) demonstrated a 20% increase in PAQLQ scores, Latorre-Román *et al.*[21] (2014) found a significant difference across all domains in the intervention group ($p < 0.001$), highlighting even greater progress in the emotional domain. This difference may be attributed to the indoor training program, which had a dynamic and playful nature, incorporating varied activities and social interactions, thereby reducing stress and anxiety associated with asthma attacks.

The study by De Andrade *et al.*[22] (2014) showed that a six-week aerobic physical activity program resulted in significant differences in all questionnaire scores when comparing groups after intervention: total ($p = 0.031$), symptoms ($p = 0.019$), emotions ($p = 0.046$), and activities ($p = 0.033$), with an approximate 30% reduction in symptom intensity according to the PAQLQ. While Latorre-Román *et al.*[21] (2014) focused on improvements in the emotional domain, De Andrade *et al.*[22] (2014) emphasized the reduction of symptoms, suggesting that enhancement of functional capacity leads to better perception of respiratory symptoms. With fewer asthma exacerbations, children participated more in activities, which likely resulted in positive outcomes for quality of life.

Sanz-Santiago *et al.*[23] (2020) analyzed the effects of an aerobic and resistance exercise program in children and adolescents with controlled asthma. Although the program yielded positive results in functional performance and lung function, no relevant differences in PAQLQ scores were observed between the control and exercise groups. These findings suggest that, while training may improve functional capacity, it may not have a significant impact on quality of life. The lack of breaks between exercises and the non-playful nature of activities may have affected motivation, particularly among children.

Willeboordse *et al.*[24] (2017) implemented a multifactorial weight-reduction program, which was initially conducted twice a week and later reduced to three times per month during the follow-up phase. In the intervention group, a progressive improvement in PAQLQ scores was observed over 18 weeks ($p < 0.001$). However, when comparing groups, no statistically significant differences were found ($p = 0.06$), possibly because weight loss and physical effects of the intervention are not the only determinants of quality of life. Children with asthma face emotional and social challenges that were not adequately addressed. Therefore, interventions focused solely on weight reduction may not effectively improve quality-of-life aspects, as psychological and social factors play an equally crucial role in perceived well-being.

Winn *et al.*[25] (2019) investigated the effect of high-intensity interval training (HIIT) in adolescents with asthma. The total PAQLQ scores showed significant improvement ($p < 0.05$); however, specific domains did not exhibit relevant changes. Although HIIT is effective in enhancing aerobic capacity, its high intensity may have been excessive for these adolescents, potentially increasing anxiety related to exercise and offsetting the physical benefits.

Another noteworthy aspect is the relationship between the environment in which activities are performed. In the study by Latorre-Román *et al*.[21] (2014), the training program was conducted indoors, whereas Winn *et al*.[25] (2019) used an outdoor environment. The indoor setting may influence the perception of safety, as it minimizes exposure to allergens and unfavorable weather conditions—factors that can trigger asthma attacks in children. This environmental factor may have contributed to the improvement in the emotional domain observed in the study by Latorre-Román and collaborators, as previously mentioned.

CONCLUSION

Pulmonary rehabilitation has been shown to improve the quality of life of children and adolescents with asthma, as evidenced by improvements in the PAQLQ domains. It is important to consider that quality-of-life scores are influenced by multiple interrelated factors, including emotional, social, and physical aspects. The present study observed that the enhancement of quality of life is associated with the improvement of respiratory symptoms—such as shortness of breath and coughing—as well as functional capacity following aerobic and resistance training sessions.

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