



Letter

Physical training improves quality of life both in asthmatic children and their caregivers

Uncontrolled asthma and exacerbations can impair quality of life not only in children with asthma but also in their caregivers.^{1,2} Benefits of exercise in asthma have been broadly discussed.³ In a recent systematic review, a trend toward improvement of quality of life outcomes was found in patients with asthma after an aerobic training program.⁴ Because exercise is a powerful trigger for asthma symptoms, we hypothesized that caregivers may be reluctant to allow their asthmatic children to engage in sports practice, fearing an exacerbation of the disease. Therefore, we aimed to assess the effect of children's physical training on caregivers' quality of life.

Data for this study were retrieved from a previous randomized controlled trial aiming to assess the effect of physical training on airway inflammation in asthma.⁵ Thirty-four allergic children with a mean (SD) age of 13 (3) years with controlled asthma treated with small to moderate doses of inhaled corticosteroids, who were followed up in an outpatient clinic were randomly allocated to 2 groups: the intervention group, who received 3 months of exercise training besides standard care, and the control group, who received only standard care. The intervention consisted of 50-minute training sessions, twice a week, of aerobic, strength, balance, and coordination exercises. The effect of the child's asthma on the caregiver's normal daily activities and emotional functioning was assessed using the self-administered Pediatric Asthma Caregiver's Quality of Life Questionnaire (PACQLQ).⁶ This 13-item questionnaire evaluates caregiver burden during a 1-week recall period and contains items in an activity limitation domain ($n = 4$) and in an emotional function domain ($n = 9$). Individual items are weighted equally. Total and domain scores range from 1 to 7, with higher scores indicating a more positive response. The self-administered form of the PAQLQ was used to evaluate health-related quality of life of asthmatic children.⁷ It includes 23 items in 3 domains: activity limitation ($n = 5$), symptoms ($n = 10$), and emotional function ($n = 8$). Scores of the 3 domains and the overall score range from 1 (maximum impairment) to 7 (no impairment). An important difference, for improvement or deterioration, in the PAQLQ score changes has been previously defined for each item and total score and was considered minimal or moderate if there were 0.5- and 1.0-unit changes, respectively.⁸

Because of the heavily skewed distributions of scores, nonparametric tests were used for comparisons in changes in scores, and data were expressed as median (interquartile range). Spearman rank correlation coefficients were used to assess the association of PACQLQ and PAQLQ score changes between baseline and after intervention. Analyses were performed with SPSS statistical software, version 20.0 (SPSS Inc, Chicago, Illinois).

All children were able to maintain the intensity of the training sessions without asthma exacerbations. Two were lost to follow-up (one in the exercise group due to unavailability to attend trainings and

another in the control group), and 2 did not complete the questionnaires. No changes in medication occurred during the program. After finishing the intervention, the exercise group ($n = 15$), compared with the control group ($n = 15$), almost doubled the daily minutes spent in moderate to vigorous activities assessed by accelerometry.⁵

Among caregivers, PACQLQ total, activity, and emotional scores were similar in both groups, before and after intervention (Table 1). In children, despite no significant differences between groups being revealed, there was a verified minimal important change in the training group of total PAQLQ scores and in symptoms, activities, and emotions domains, representing a significant improvement in children's quality of life in the intervention group. Moreover, in the exercise group, significantly positive correlations were seen between the score changes of caregivers' emotional domain and children's scores increase of total ($r = 0.606$; $P < .05$), symptoms ($r = 0.576$; $P < .05$), and emotional ($r = 0.564$; $P < .05$) domains.

An aerobic exercise training program performed by children's with asthma improved their quality of life and was positively correlated with improvement in emotional caregivers' quality-of-life domain scores. To our knowledge, this is the first report to evaluate the effect of asthmatic children's physical training on their caregivers' quality of life. However, results should be interpreted carefully because of the small sample size and because caregivers' perception of asthma burden might be dependent on the respondent affective state, which was not evaluated.⁹ Furthermore, long-term quality of life impact and caregivers' daily burden cannot be inferred.

Exercise-induced bronchoconstriction in patients with asthma can induce feelings of inability to engage in a regular physical activity, which can have a psychological effect on children and their caregivers.⁴ The effect of a child's asthma on the family as a whole may be particularly important for understanding the benefits of specific interventions.

Exercise interventions did not produce a consistent association with pulmonary lung function and asthma severity improvements. However, the PACQLQ has been pointed to as a tool for monitoring asthma in children,¹⁰ and a tendency of exercise to increase quality-of-life scores and improve cardiopulmonary fitness has been reported.^{3,4} These benefits might not directly be similar on caregivers because this intervention could represent an increased workload and a source of anxiety.

Despite the extra burden caused by changes in daily routine and fear of exacerbations, engaging in a physical training program did not have a negative effect on caregivers' quality of life. Physical exercise may even improve both children and caregivers' quality of life. Randomized controlled trials with larger samples and a longer follow-up period focusing on children's and caregivers' quality of life are needed to confirm the true effect of physical training. Therefore, we conclude that appropriate guidance and encouragement to exercise should be provided to children with controlled asthma and their caregivers.

Table 1
Pediatric Asthma Caregiver's Quality of Life Questionnaire (PACQLQ) and Pediatric Asthma Quality of Life Questionnaire (PAQLQ) Scores Before and After the Training Program^a

Domain	Training program (n = 15)			Standard care (n = 15)			<i>P</i> value ^b
	Baseline	End	<i>P</i> value	Baseline	End	<i>P</i> value	
PACQLQ							
Total score	5.8 (5.1-6.4)	6.1 (5.5-6.5)	.20	5.1 (3.8-5.8)	5.5 (4.1-6.2)	.42	.84
Activities	6.3 (5.5-7.0)	6.5 (5.3-7.0)	.21	6.1 (3.5-7.0)	6.3 (4.0-6.8)	.46	.25
Emotions	5.6 (5.3-6.3)	5.8 (5.4-6.6)	.17	4.8 (3.9-5.6)	5.1 (4.3-6.1)	.21	.97
PAQLQ							
Total score	5.7 (4.9-6.1)	6.5 (5.9-6.7)	.003	6.1 (4.8-6.3)	6.2 (5.6-6.5)	.04	.34
Symptoms	5.7 (4.7-6.2)	6.5 (5.6-6.7)	.008	6.1 (4.0-6.4)	6.2 (5.7-6.6)	.21	.46
Activities	4.6 (3.6-5.6)	6.0 (4.6-6.4)	.002	5.0 (4.0-5.6)	5.8 (5.4-6.4)	.007	.29
Emotions	6.3 (5.9-6.6)	6.8 (6.3-6.8)	.009	6.0 (4.8-6.3)	6.4 (5.8-6.8)	.15	.56

^aAll values are presented as medians (interquartile ranges). Group comparisons were performed with the Wilcoxon test.^bMann Whitney test was used to compare changes between the exercise and control group for baseline and at the end of intervention.Diana Silva, MD^{*,†}Mariana Couto, MD^{*,†}Pedro Moreira, PhD^{‡,§}Patrícia Padrão, MPh[‡]Paula Santos, PhD[§]Luís Delgado, PhD^{*,†}André Moreira, PhD^{*,†}*Serviço de Imunoalergologia
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