

# Original Article

## Educational camp for children with asthma\*

Acampamento educacional para crianças asmáticas

Maria do Rosario da Silva Ramos Costa<sup>1</sup>, Maria Alenita Oliveira<sup>2</sup>, Ilka Lopes Santoro<sup>2</sup>,  
Yara Juliano<sup>3</sup>, José Rosado Pinto<sup>4</sup>, Ana Luisa Godoy Fernandes<sup>5</sup>

### Abstract

**Objective:** To evaluate the impact of a 5-day educational camp program for children with asthma in terms of improving their knowledge of asthma and enhancing their performance in the use of inhaled medication and in physical activities. **Methods:** Every day, the children received 20-min interactive educational sessions, the technique for using the metered-dose inhaler was reviewed, two peak flow readings were recorded, and the children performed physical activities that included breathing and relaxation exercises. A questionnaire regarding knowledge of asthma, as well as asthma triggers, asthma medications, misconceptions regarding asthma, and the use of spacers, was administered before and after the intervention. Correct use of inhaled medication and exercise-related symptoms were also evaluated before and after the intervention. **Results:** A total of 37 children with asthma, aged 8-10 years (15 females and 22 males), were included in this study. Of those, 25% showed an improvement in the level of knowledge of asthma after the educational camp program, as evidenced by the greater number of correct answers on three of the twelve questions analyzed ( $p < 0.05$ ). The exercise-related dyspnea scores decreased significantly ( $p < 0.05$ ). The ability to use inhaled medication correctly was significantly improved after the intervention ( $p < 0.05$ ). **Conclusions:** The asthma educational camp program can improve knowledge about specific questions, encourage participation in physical activities, and improve the asthma management skills of children.

**Keywords:** Asthma; Asthma/prevention & control; Models, educational; Child.

### Resumo

**Objetivo:** Avaliar o impacto de um programa de acampamento educacional para crianças asmáticas, com duração de cinco dias, em termos da melhora do nível de conhecimento sobre a asma e da melhora da destreza no uso de medicação inalatória e na execução de exercícios físicos. **Métodos:** Diariamente, as crianças recebiam 20min de educação interativa, a técnica do uso do inalador dosimetrado era revista, realizavam-se duas medidas de pico de fluxo, e as crianças realizavam atividades físicas que incluíam exercícios respiratórios e de relaxamento. Um questionário que avaliava o conhecimento das crianças sobre a asma, os desencadeadores da crise, a medicação, os conceitos errôneos e o uso de espaçadores foi aplicado antes e após a intervenção. O uso correto da medicação inalatória e os sintomas relacionados às atividades físicas também foram avaliados antes e após a intervenção. **Resultados:** Um total de 37 crianças asmáticas, 15 meninas e 22 meninos (idade de 8 a 10 anos), foi avaliado. Desse total, 25% apresentaram melhora do nível de conhecimento específico sobre a asma, a qual foi demonstrada pelo maior número de acertos em três das doze questões analisadas ( $p < 0,05$ ). Os escores de dispnéia relacionados à atividade física diminuíram significativamente após a intervenção ( $p < 0,05$ ). A habilidade para usar corretamente a medicação inalatória foi significativamente maior após a intervenção ( $p < 0,05$ ). **Conclusões:** O programa de acampamento educacional pode aumentar o conhecimento sobre questões específicas, encorajar a participação em atividades físicas e melhorar a habilidade das crianças no manejo da asma.

**Descritores:** Asma; Asma/prevenção & controle; Modelos educacionais; Criança.

\* Study carried out at the Respiratory Division of the *Universidade Federal de São Paulo/Escola Paulista de Medicina* – UNIFESP/EPM, Federal University of São Paulo/Paulista School of Medicine – São Paulo, Brazil; at the Clinical Department of the *Universidade Federal do Maranhão* – UFMA, Federal University of Maranhão – São Luís, Brazil; and at the Dona Estefânia Hospital, Lisbon, Portugal.

1. Adjunct Professor in the Clinical Department. *Universidade Federal do Maranhão* – UFMA, Federal University of Maranhão – São Luís, Brazil.

2. Staff Physician in the Respiratory Division. *Universidade Federal de São Paulo/Escola Paulista de Medicina* – UNIFESP/EPM, Federal University of São Paulo/Paulista School of Medicine – São Paulo, Brazil.

3. Associate Professor in the Prevention Division. *Universidade Federal de São Paulo/Escola Paulista de Medicina* – UNIFESP/EPM, Federal University of São Paulo/Paulista School of Medicine – São Paulo, Brazil.

4. Staff Physician in the Allergy and Immunology Department. Dona Estefânia Hospital, Lisbon, Portugal.

5. Associate Professor in the Respiratory Division. *Universidade Federal de São Paulo/Escola Paulista de Medicina* – UNIFESP/EPM, Federal University of São Paulo/Paulista School of Medicine – São Paulo, Brazil.

Correspondence to: Ana Luisa Godoy Fernandes. Departamento de Pneumologia, Rua Botucatu, 740, 3º andar, CEP 04023-062, São Paulo, SP, Brasil.

Tel/Fax 55 11 5084-1268. E-mail: analgf@terra.com.br

Submitted: 17 February 2007. Accepted, after review: 12 July 2007.

## Introduction

One of the main recommendations in asthma management guidelines is that educational programs be offered to patients.<sup>(1)</sup> However, the success of such programs depends on various elements, including attendance at meetings, transfer of information, and inclusion of information regarding routine treatment. Although access to educational programs has increased, formal or alternative programs are available to only 26% of the children with asthma in the United States.<sup>(2)</sup>

Asthma educational programs have been developed for application in hospitals, offices, community centers, and schools, as well as in camp settings or vacation courses.<sup>(2-8)</sup> Camp settings or vacation courses provide alternative access for children with asthma and create opportunities for them to enhance their learning skills. Approximately 125 asthma camps have been established in the United States. Most are recreational and do not include a formal educational component but rather serve to provide an enjoyable camping experience. Few projects offer opportunities for children with asthma to engage in camp activities to learn strategies and skills for asthma self-management.<sup>(7-12)</sup>

Although our group previously developed a successful structured educational program for adult patients with asthma in a hospital context,<sup>(3,4,13)</sup> we have no experience with camps for asthma patients, especially for pediatric asthma patients. Therefore, the objective of the present study was to evaluate the impact that a structured short-term educational camp program for children with asthma has on their understanding of asthma as well as on their performance in the use of inhaled medication and on their ability to engage in physical activities.

## Methods

This was an observational study designed to evaluate the impact of a short-term educational program developed for children with asthma. This educational program has been conducted annually since 1991 as a vacation course (over the Easter break) for children with asthma in the town of Gouveia, Serra da Estrela, Portugal.

Thirty-seven children with asthma attended a 5-day educational camp program in 2001. All the children had previous access to regular medical care, and their asthma had been classified in accordance

with the Global Initiative for Asthma guidelines.<sup>(1)</sup> The children were recruited from the outpatient clinics of the Dona Estefânia Hospital (Lisbon), São João Hospital (Porto), Vila Nova de Gaia Hospital Center (Gaia), and Pedro Hispano Hospital (Matosinhos).

A multidisciplinary team worked in this program. The health team comprised two physicians, two nurses, a psychologist, and a physiotherapist from the Allergy and Immunology Department of the Dona Estefânia Hospital. This team was responsible for organizing and coordinating the vacation course. One psychologist and five teachers from the João de Deus College composed the team of professional educators.

The educational camp program included recreational and sports activities that took place in spacious outdoor facilities. A monastery, a stadium, a park, and the Gouveia City Zoo were just around the corner. A mountain center in the Serra da Estrela National Park was also nearby.

The vacation course included educational, athletic, and social activities. For each activity, the children were divided into groups of eight, and each group was assigned to a teacher.

At the camp, the children received 20-min interactive educational sessions, on a daily basis, to improve their knowledge of asthma, asthma triggers, and asthma medications (use and side effects), as well as their knowledge of disease-related psychosocial behavior. The proper use of spacer devices and peak flow meters in asthma self-management was also taught.

Every morning and evening, the health team measured peak flow and supervised the use of metered-dose inhalers (MDIs), monitoring the technique and improving the regular use of maintenance medication.

Each group of children had daily physical therapy activities in which they learned how to control their breathing. They also performed breathing and relax-

**Table 1** – Subject characteristics.

Characteristic	n (%)
Gender	
Male	22 (59.1)
Female	15 (40.9)
Asthma severity	
Mild	18 (48.7)
Moderate	13 (53.1)
Severe	06 (16.2)

ation exercises and were taught skills to prevent exercise-induced asthma.

The children participated in athletic activities and were encouraged to perform them to the best of their ability. These activities, which included soccer, basketball, walking tours, and games of a competitive nature, were supervised by the teachers, the physiotherapist, and the psychologists.

The social activities included visits to the zoo, museum outings, and trips on mountain trails, as well as handicraft activities. The children also received a visit from a special guest, the well-known sports personality and Portuguese champion marathon runner Rosa Mota. She has asthma and came to visit the camp in order to tell the children about her asthma difficulties and how she prepared for races. Her visit served to improve the self-esteem of the entire group since the children realized that asthma had not been a threat to her outstanding performance in sport.

In order to evaluate the performance of the educational program, the children were asked to complete a questionnaire on the first and on the last day of the camp, and this constituted our pre- and post-measurement. This questionnaire assessed knowledge of asthma, recognition of triggers, perception of asthma symptoms, and knowledge of asthma management strategies and names of medications (use and tips), as well as the ability to engage in sports.<sup>(14,15)</sup> The questionnaire comprised twelve questions, and each correct answer received one point in the total score.

Dyspnea was measured using a validated scale of exercise-related asthma symptoms.<sup>(16)</sup> The children

invariably completed this 4-point scale on asthma diary cards, self-reporting their asthma symptoms before and after the educational camp program. They also completed an analog scale of well-being whose scores ranged from 0 (no symptoms) to 10 (maximal symptoms).

The evaluation of the use of MDIs was performed during the supervised use of inhaled medication. At least five correct steps were necessary to meet the criteria of appropriate use of MDIs as follows: (1) shake canister; (2) position canister upright; (3) exhale completely; (4) inhale slowly and deeply; and (5) hold breath for 10 s. All patients were evaluated and received the MDI use score every night while at the camp.

The changes in the results obtained before and after the educational program were analyzed using the McNemar test (for the questionnaire) and the Wilcoxon test (for the scales). Statistical analysis of the use of MDI techniques was performed using the Friedman test. Values of  $p \leq 0.05$  were considered statistically significant.

This study was approved by the Ethics in Research Committees of the governing institutions. Written informed consent was obtained from the parents or legal guardians of all participants.

## Results

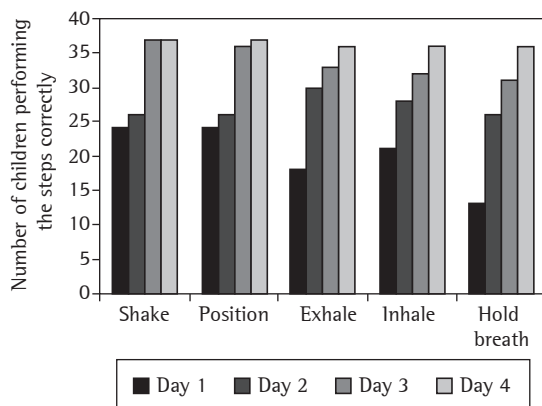
Table 1 shows the characteristics of the 37 children enrolled in this study.

Table 2 illustrates the answers regarding knowledge of asthma before and after the intervention.

**Table 2** – Questions included on the questionnaire and the number of children answering each of them correctly before and after attending the educational program.

Question	Before (n)	After (n)	p <sup>a</sup>
1. What can make your asthma symptoms worse?	32	37	0.03
2. Do you have asthma?	37	37	NS
3. Do you have shortness of breath during an asthma attack?	29	33	NS
4. Can you achieve asthma control?	29	33	NS
5. Are there any preventive medications for asthma?	20	31	0.00
6. Can children with asthma play sports?	17	33	0.00
7. Do you use rescue medication before doing exercise?	26	32	0.07
8. Does cigarette smoke worsen your asthma symptoms?	36	36	NS
9. Do you know of any device used to monitor asthma?	20	25	0.13
10. Do you know the name of your asthma medication?	34	36	NS
11. Do you think that children with asthma are worse students?	35	37	NS
12. Can a teacher allow the use of medication in class?	33	35	NS

<sup>a</sup>McNemar test; and NS: not significant.



**Figure 1** - Evaluation of the step-by-step use of metered-dose inhalers during the educational camp program.

All participants willingly admitted to suffering from asthma prior to attending the program. Over 90% of all the children had already answered four questions correctly before the educational program was completed: questions 3 and 8 (about symptoms); question 10 (about medication); and question 11 (about misconceptions).

A significant improvement was observed in terms of the knowledge demonstrated by the children on three of the twelve questions: question 1 ("What can make your asthma symptoms worse?"); question 5 ("Are there any preventive medications for asthma?"); and question 6 ("Can children with asthma play sports?") There was no statistically significant improvement on the other questions.

Figure 1 highlights the results of significant improvement in the use of MDI techniques during the educational camp program ( $p < 0.001$ ). There was also improvement in the score of the techniques employed by children throughout the program. (Mann-Whitney test;  $p = 0.007$ ).

Table 3 highlights a decrease in the exercise-related dyspnea score ( $p < 0.05$ ) and in the analog well-being score obtained after the educational intervention.

## Discussion

The short-term educational program improved knowledge of asthma, allaying fears and correcting misconceptions about asthma management. This study showed the positive effect of a short-term educational intervention for children with asthma conducted in a different setting: a vacation camp.

**Table 3** - Exercise-related dyspnea scores and analog well-being scores obtained before and after the five-day educational intervention.

	Score	Before	After	p (Z score) <sup>a</sup>
Dyspnea (rank score)		1.41	1.12	0.03
Well-being (rank score)		3.18	2.54	0.21

<sup>a</sup>Wilcoxon test.

Educational programs are typically conducted in offices or in hospital settings during traditional in-patient visits. Camps for asthma patients provide quite a pleasant alternative setting for conducting asthma educational programs. Camps are the ideal place to improve the transfer of asthma-related knowledge. With the use of novel techniques and the help of a multidisciplinary team, asthma patients can be provided with a good opportunity to improve their motivation and actively participate in the treatment of their disease. This setting and approach also offer patients the chance to learn and internalize correct concepts and to alter misconceptions that threaten their well-being and normal development.

The children evaluated in our study already had a good theoretical knowledge of asthma. For example, all the children knew that they had asthma and that it worsened when they were exposed to cigarette smoke. However, they improved their knowledge of other triggers of asthma attacks. In Brazil, a similar interview study showed that only 50% of the children in an asthma clinic recognized their symptoms to be those of asthma.<sup>(17)</sup>

In our study, nearly half of the children were unaware of the fact that they could be actively involved in sports. During the educational camp program, they learned that children with asthma can perform physical exercise after the use of their bronchodilator. They came to understand the differences between the anti-inflammatory and the bronchodilator effects of the asthma drugs, as well as the use of bronchodilators as a preventive medication for asthma symptoms. Because of this new awareness, we observed a significant reduction in the exercise-related dyspnea score. Casas Vilá et al. and Cerdá et al. obtained similar results during an educational camp program in Spain.<sup>(11,12)</sup>

Improvement in the performance of physical activities might also be related to physical therapy, which can help control dyspnea through relaxation strategies and proper breathing techniques.<sup>(18)</sup>

Proper use of MDIs is essential for the delivery of inhaled medication. Many publications, including the National Institutes of Health guidelines for asthma management,<sup>(1)</sup> have stressed the importance of repeating instructions to patients and training them in the use of inhaled medication. We trained the children every day using a standard protocol that included step-by-step instructions for the correct use of MDIs and observed that, after the intervention, there was a significant improvement in all steps. This training was also recognized as an effective technique to improve the therapeutic management in other studies.<sup>(8,9)</sup>

There were several significant limitations to the present study. First, even though the educational intervention had a significant effect, it is not possible to predict the duration of that effect. Second, although we observed an improvement in the knowledge of asthma management after the intervention, the patients involved had already received appropriate follow-up treatment for asthma. Finally, the socioeconomic profile of the group of children evaluated precludes the generalization of the results.

This experience highlighted the fact that asthma camps run as vacation courses create an effective environment for conducting asthma educational programs. Such programs provide children with asthma with the opportunity to improve their knowledge of asthma and learn how to use prescription medications properly. We hope that these data will encourage hospitals, managed care organizations, and pharmaceutical companies to support research on alternative interventions to promote the appropriate management of asthma treatment.

## Acknowledgments

This study was partially supported by AstraZeneca Portugal. The first author would like to thank the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES, Coordination of the Advancement of Higher Education) for the opportunity to develop a joint program involving the Dona Estefânia Hospital and the *Universidade Nova de Lisboa*, both located in Lisbon, Portugal, together with the Federal University of São Paulo, in São Paulo, Brazil.

## Referências

1. National Heart Lung and Blood Institute. World Health Organization. Global Initiative for asthma (GINA): global strategy for asthma management and prevention. Bethesda: National Institute of Health; 1995.
2. Georgiou A, Buchner DA, Ershoff DH, Blasko KM, Goodman LV, Feigin J. The impact of a large-scale population-based asthma management program on pediatric asthma patients and their caregivers. *Ann Allergy Asthma Immunol.* 2003;90(3):308-15.
3. Martins MA, Cabral ALB, Carvalho WAF, Chinen M, Barbiroto RM, Boueri FMV. Effectiveness of a health program in controlling childhood asthma. *Am J Respir Crit Care Med.* 1995;151(4):352.
4. de Oliveira MA, Faresin SM, Bruno VF, de Bittencourt AR, Fernandes AL. Evaluation of an educational programme for socially deprived asthma patients. *Eur Respir J.* 1999;14(4):908-14.
5. Gibson PG, Coughlan J, Wilson AJ, Abramson M, Bauman A, Hensey MJ, et al. Self-management education and regular practitioner review for adults with asthma. (Cochrane Review). In: *The Cochrane Library* 2001; Issue 2. Oxford: Update Software.
6. Yoon R, McKenzie DK, Bauman A, Miles DA. Controlled trial evaluation of an asthma education programme for adults. *Thorax.* 1993;48(11):1110-6.
7. Kelly CS, Shield SW, Gowen MA, Jaganjac N, Andersen CL, Strobe GL. Outcomes analysis of a summer asthma camp. *J Asthma.* 1998;35(2):165-71.
8. Robinson LD Jr. Evaluation of an asthma summer camp program. *Chest.* 1985;87(1 Suppl):S105-S7.
9. Fitzpatrick SB, Coughlin SS, Chamberlin J. A novel asthma camp intervention for childhood asthma among urban blacks. The Pediatric Lung Committee of the American Lung Association of the District of Columbia (ALADC) Washington, DC. *J Natl Med Assoc.* 1992;84(3):233-7.
10. Punnett AF, Thurber S. Evaluation of the asthma camp experience for children. *J Asthma.* 1993;30(3):195-8.
11. Casas Vilá C, García-Cubillana A, Puertas Roig AM, Vida Blanca JM. Campamentos para Niños con Asthma Bronchial. *Rev Port Imunoalerg.* 1998;(2):1-3.
12. Cerdá JC, Martorell A, Torro I, Alvarez V, Benedicto M, Albars P. Colonia de verano para niños com asma en la Comunidad Valenciana. *Rev Esp de Alergol e Inmunol.* 1993;8(3):58.
13. Costa MR, Portela LB, Santos MA, Assunção AM, Fernandes AL. Is it possible to control asthma following an education plan? [abstract] *Am. J. Respir. Crit. Care Med* 1998; 157(7):A165.
14. Rosado Pinto JE. Curso de férias para crianças asmáticas na Serra da Estrela- Uma experiência a repetir. *Rev Port Imunoalerg.* 1993;1(4):177-9.
15. Bevis M, Taylor B. What do school teachers know about asthma? *Arch Dis Child.* 1990;65(6):622-5.
16. Lima PB, Cabral AL, Santoro IL, Caetano LB, Fernandes AL. Validation of dyspnea 0-3 rated scale for FEV1 variability in asthmatic children. *Proc Am Thorac Soc.* 2006;3:A487.
17. Yamada ES. Prevalência de asma, rinite e eczema atópico em escolares da região centro-sul da cidade de São Paulo [Dissertation]. São Paulo: Universidade Federal de São Paulo; 1998.
18. Tehan N, Sloane BC, Walsh-Robart N, Chamberlain MD. Impact of asthma self-management education on the health behavior of young adults. A pilot study of the Dartmouth College "Breathe Free" program. *J Adolesc Health Care.* 1989;10(6):513-9.