



ORIGINAL ARTICLE

Adherence to pharmacotherapy improves school performance in children with rhinitis and asthma

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KEYWORDS

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Abstract

Background: Adherence to pharmacotherapy reduces symptoms of asthma and rhinitis, however, little is known of its impact on school performance.

Objective: To evaluate the impact of pharmacotherapy in absenteeism and school performance in a child population.

Methods: A cross-sectional study, carried out in eight schools. All participants and their parents were given a questionnaire assessing parameters related to respiratory diseases and pharmacotherapy. Data on school performance was obtained from the academic history of each child who participated in the study. Adherence to pharmacotherapy was classified as a correct use of therapy for more than five days per week.

Results: 1109 children agreed to participate. Students were divided into two groups: symptomatic (36%) and asymptomatic (63%). The symptomatic group had a higher frequency of school absenteeism (1 vs. 3.1 days/year/patient $p < 0.01$) and lower academic performance (failed: 20% vs. 33% $p < 0.01$). After dividing the symptomatic group between adherents and non-adherents to the pharmacotherapy, the group of adherents had a similar school performance to the asymptomatic group and it was significantly different from the no-adherent group.

Conclusion: Respiratory symptoms are associated with poor school performance and with an increase in school absenteeism, but adherence to pharmacotherapy can reduce these negative impacts in children.

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Introduction

Several studies have shown the high prevalence of asthma and rhinitis worldwide, especially in children.¹⁻⁶ These diseases have an important detrimental effect on the quality of life, as they alter the personal development and lifestyle of patients and their families.^{7,8} Several studies have shown the social impact of these diseases.^{9,10} Lack of clinical control could potentially lead to lack of concentration, poor school performance and school absenteeism. So far only few studies have investigated the impact of asthma and/or rhinitis on school performance.

The efficacy of pharmacotherapy in controlling allergic respiratory diseases has been demonstrated in several studies.¹¹⁻¹³ However, it has not been studied whether if the negative impact for children in the process of learning can be recovered with adequate pharmacological treatment.⁹ In addition, as chronic diseases, they require prolonged management, which makes an adequate adherence difficult.

In a previous study,¹² we observed that those children of school age who had asthma and/or rhinitis had, in comparison to children without respiratory diseases, more absences in school and lower school performance. In this article, taking into account the positive impact of pharmacotherapy on the control of symptoms of respiratory diseases such as asthma or rhinitis, we seek to explore whether pharmacological treatment can reverse the negative impact of these diseases in the learning process of children.

Methodology

Population and study design

This is a cross-sectional descriptive study. We included children over six years old of eight schools in two cities of Colombia (Medellin and Cartagena). Through medical records and questionnaires based on the ISAAC study, the ARIA guidelines and the GINA guidelines (www.ginasthma.org), we obtained information on the presence or absence of respiratory diseases and other chronic diseases, pharmacological treatment and severity of symptoms. Data were collected by the investigators from all families who agreed to participate, however, we used the Charlson Comorbidity index,¹⁴ to exclude patients with severe chronic comorbidities that could overestimate the severity of symptoms for causes other than the diseases studied and might influence the interpretation of the results.

Data on school performance in the previous school year was obtained from the academic history of each child who participated in the study. For the evaluation of the primary outcome (clinical impact of respiratory diseases in school performance), we used as measurement variables the number of absent days, the average grade of students in Mathematics and Spanish during the last academic year. Mathematics and Spanish have the same academic curriculum among the schools, so they were selected to evaluate school performance. Moreover, they are academic areas that use similar objective evaluative parameters for their grading in all schools. To present the academic score in the eight

schools, we unified the results using a semi-quantitative scale: >80% (Excellent performance according to the scale of each school), 60–79% (average), and <60 (insufficient). For school absent days we took into account only those related to health issues that could be directly or indirectly related to the diseases we studied. We excluded absent days due to vacations, permits for non-medical procedures, etc.

To evaluate the secondary outcome (clinical impact of pharmacotherapy in school performance), we performed a stratified analysis among patients with respiratory diseases (asthma and/or rhinitis), according to whether the patient was receiving pharmacotherapy and if so, whether they had good adherence or not. We classify as good adherence patients who received treatment at least five days per week according to medical recommendations taking into account previous data.¹²

Ethical considerations

All parents signed an informed consent (with the child's consent) authorizing the review of the academic data kept by the institution, the medical records and also agreed to complete the questionnaire. The ethics committee of the University of Cartagena evaluated and granted permission to carry out the present study.

Statistical analysis

For the primary analysis, we divided the children between symptomatic and asymptomatic according to the presence or absence of symptoms of asthma or rhinitis. For the secondary endpoint we divided the group of symptomatic into two sub-groups between adherents and non-adherents. In Colombia the evaluation of Mathematics and Spanish subjects have the same objectives, and the same parameters are used in all schools, so we do not expect that variables in the system of qualification could influence the results. However, we conducted intergroup analysis in each school to identify other factors that could influence school scores that were different from the study objectives.

A sample size calculation was performed based on the probabilities difference technique (χ^2 test) with Yates continuity correction by the Fleiss formula. A Type I error of 0.05 was chosen; a Type II error of 0.20; a confidence level of 95%; we estimated a proportion of cases of rhinitis of 30% and of asthma of 12% based on previous studies carried out in this area; with an expected number of two controls per case. Therefore, a minimum sample size was obtained for the cases of 312 patients and for the controls of 628 patients.

The analyses were performed using the SPSS software version 21 for Windows using the Wilcoxon *U* test for intergroup analysis, Mann Whitney for intragroup and the *T* test for mean differences in independent samples. A $p < 0.05$ was considered statistically significant. For analysis of multiple comparisons, we used the Dunn test. The proportions were analyzed using contingency tables and the Fisher exact test.

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