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ORIGINAL ARTICLE

Comparison of the Global Initiative for Asthma Guideline–based Asthma Control Measure and the Childhood Asthma Control Test in Evaluating Asthma Control in Children

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Background: Reliable assessment of asthma control is essential for effective treatment. While several validated tools for assessing asthma control in children are currently available, few studies have evaluated the correlations between different asthma control measures in children. This study aimed to determine the correlations between the Childhood Asthma Control Test (C-ACT) and the Global Initiative for Asthma (GINA) guideline–based asthma control measure (ACM) with lung function parameters in children with asthma.
Methods: Sixty-three children aged 6–11 years with mild-intermittent to severe-persistent asthma were evaluated. They completed the C-ACT, the GINA guideline–based assessment and lung function tests with the help of their caregivers.
Results: C-ACT scores and GINA guideline–based ACM were positively correlated. The average C-ACT scores for children with controlled, partly controlled and uncontrolled asthma according to the GINA guidelines were 24.4±0.3, 22.8±0.6 and 21.3±1.0 (mean±SE), respectively. High C-ACT scores were also noted in children with uncontrolled asthma based on the GINA guidelines. The GINA guideline–based ACM was correlated with spot spirometry parameters (forced vital capacity, forced expiratory volume in 1 second, and maximal mid-expiratory flow). Conversely, the C-ACT score was not correlated with these spirometry parameters.
Conclusions: The C-ACT may overestimate asthma control in certain circumstances. For children with poorly controlled asthma or poor symptom perception, more frequent visits and serial pulmonary function tests are recommended.

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1. Introduction

The 2002 Global Initiative for Asthma (GINA) guidelines subdivided asthma severity into four categories (i.e., mild-intermittent, mild-persistent, moderate-persistent, and severe-persistent) according to levels of symptoms and airflow limitation and variability.[1] However, treatment endpoints are not quantitatively defined. By aiming for a defined level of good control, the level of control is considered a better approach. Asthma control can be defined in a variety of ways. Meanwhile, since 2006, the revised GINA guidelines emphasize that treatment decisions should be based on achieving and maintaining asthma control, considering the symptoms present, degree of activity limitation, use of rescue bronchodilators, and lung function.[2]

Reliable and valid assessment of asthma control is essential for effective treatment of asthma. Several validated and promising tools for asthma control assessment in children are currently available including the Childhood Asthma Control Test (C-ACT) for children aged 4–11 years old, the Asthma Control Test (ACT) for adolescents and young adults aged ≥12 years old, and the GINA guideline–based assessment of asthma control.[2,3] All of these approaches are applicable in various clinical situations. Furthermore, when translated into Chinese, the C-ACT remained reliable, valid and responsive.[4] Ideally, new assessments should give more information on the condition of asthma control not provided by the currently available tools.

To date, no studies have determined the correlations between different tools that assess asthma control in children. Therefore, this study was performed to determine the correlations between the C-ACT and GINA guideline–based asthma control measure (ACM) with spot spirometry function parameters in children aged <12 years old with asthma.

2. Materials and Methods

This retrospective study evaluated asthmatic children aged 6–11 years who completed the Chinese version of the C-ACT, the GINA guideline–based ACM, and bronchodilator tests on the same day in one visit. Between October and December 2007, 63 children with mild-intermittent to severe-persistent asthma who consecutively attended the outpatient department of the Chang Gung Memorial Hospital-Kaohsiung Medical Center, Taiwan, were included. Their basic characteristics and medications were reviewed. All children included in this study had a history of asthma for ≥1 year and were provided with regular treatment according to GINA guidelines. Patients younger than 6 years old were excluded. The Institutional Review Board of Chang Gung Children's Hospital at Kaohsiung approved the study protocol.

Asthma severity was assessed according to the National Heart, Lung and Blood Institute guidelines and GINA guidelines.[1,2,5] All of the children had allergies/sensitivities to at least one of the common allergens in Taiwan, and was determined by specific immunoglobulin E (IgE) measurement with the Pharmacia Cap System (Phadia AB, Uppsala, Sweden) as described previously.[6] Spirometry was measured using the Jaeger MasterScreen Spirometry system (Jaeger Co., Wurzburg, Germany) according to the American Thoracic Society guidelines.[7] Standard spirometric measures included forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF), and maximal mid-expiratory flow [MMEF; forced expiratory flow between 25–75% of vital capacity (FEF25–75%)].

Airway responsiveness to a bronchodilator was assessed measuring lung function 15 minutes after terbutaline inhalation (2 mg terbutaline diluted in normal saline to 2.5 mL). Spirometric measures in childhood were converted to percentages of the predicted value of normative values for non-asthmatic subjects.[8] Changes in the percentage of predicted FEV1, FVC, and PEF values were derived by subtracting the baseline percent predicted values and dividing them by the baseline percent predicted value.

2.1. Statistical analysis

Statistical comparisons were made using the Wilcoxon rank sum test or Kruskal Wallis test, as appropriate. The sample size was initially set at 60, based on the study power of 0.8, effect size of 0.20 and a two-sided significance level of 0.05. We finally included 63 asthma children for this study. Correlations were determined using Spearman's rank correlation test. A p value <0.05 was regarded as statistically significant. All statistical tests were performed using SPSS 12.0 (SPSS Inc., Chicago, IL, USA).

3. Results

3.1. Participant characteristics

Sixty-three children (43 boys and 20 girls) aged 6–11 years (mean±SD, 8.3±1.7 years) were included. Asthma severity was based on the 2002 GINA guidelines. Of the 63 children, 8 had mild-intermittent asthma, 28 had mild-persistent asthma, 20 had moderate-persistent asthma, and 7 had severe-persistent asthma. Although total IgE levels were higher in children with moderate-persistent and severe-persistent asthma, there were no statistical