Methacholine challenge test by wheezing and oxygen saturation in preschool children with asthma

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Abstract

Methacholine challenge test (MCT) performed with spirometry is a commonly used test to evaluate bronchial hyperreactivity (BHR) in children. However, preschoolers do not usually collaborate.

Objectives

To assess the usefulness of MCT through clinical evaluation (wheezing auscultation and decreased pulse arterial oxygen saturation [SpO2]) in recurrent wheezing preschoolers with asthma, in comparison to healthy controls.

Methods

We performed the MCT (modified Cockroft method) on healthy and on asthmatic preschoolers. The end point was determined by the presence of wheezing in the chest and/or tracheal auscultation (PCw) and/or a decrease in SpO2 of ≥5 from the baseline value (PCSpO2). Maximal methacholine concentration was 8 mg/ml.

Results

The study population comprised 65 children: 32 healthy and 33 asthmatic children. There were no differences in demographic characteristics between the groups. The median methacholine doses for PCw and for PCSpO2 were significantly lower among asthmatic than healthy children: 0.5 mg/ml (0.25–0.5 mg/ml) vs. 2 mg/ml (1–4 mg/ml), respectively, $p < 0.001$; and 0.25 mg/ml (0.25–0.5 mg/ml) and 2 mg/ml (0.5–4 mg/ml), respectively, $p < 0.001$. The best cut-off point of PCw was observed at a methacholine concentration of 0.5 mg/ml (AUC = 0.72 [95% CI = 0.66–0.77]), its sensitivity was 91%, specificity 43%, PPV 16% and NPV 98%. For PCSpO2 the best cut-off point was a methacholine concentration of 1 mg/ml (AUC = 0.85 [95% CI 0.81–0.89]), with sensitivity of 80%, specificity 74%, PPV 49%, and NPV 92%. There were no adverse reactions.

Conclusion

MCT using clinical parameters such as wheezing auscultation and SpO2 measurement could be a useful and safe test to confirm BHR among preschoolers.