Response to β₂-mimetics in asthmatic children: Which lung function parameters present reliable response?

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Rationale. Reversible airflow limitation after short-acting β₂-agonist (SABA) is considered as a hallmark of asthma. However, in asthmatic children pulmonary hyperinflation significantly influences airway patency [1]. 'Effective' specific resistance (sRₐff) measures resistive changes throughout the whole breath cycle concomitantly to changes of resting end-expiratory level [2]. Objectives. Response to SABA assessed by various lung function parameters in asthmatic children. Methods. Lung function measurements performed in 194 asthmatic children provided base-line (BL) data of functional residual capacity (FRCₚleth), sRₐff, sRₜot, volume-time and flow-volume indices such as FEV₁, MEF₅₀, and MMEF₇₅₋₂₅, analysed as SDS by z-transformation using reference equations. Reversibility was considered, if after inhalation of 1.25 mg albuterol lung function improved > 2 SD from BL. Results. Significant response to SABA was found for sRₜot in 99.3%, sRₐff in 69.6%, MEF₅₀ in 46.8%, MMEF₇₅₋₂₅ in 23.2% FRCₚleth in 15.5% and FEV₁ in 3.6% of all 754 tests. In 12.5 % of tests, however, spirometry failed to indicate airway limitation at BL. Significant mean differences of improvement in SD were found for sRₐff: 3.6±3.0, sRₜot: 3.4±3.0, and MEF₅₀: -2.0±2.52. Response to SABA was significantly higher in tests demonstrating airway obstruction only than in those with concomitant pulmonary hyperinflation (p< 0.001). Conclusions. Compared to plethysmography, spirometry may fail detection of abnormal airway dynamics at BL, and otherwise only MEF₅₀ reached significant response to SABA. [1]. Kraemer R, et al.: J Pediatr 1983;102(3):347-350. [2]. Matthys H, et al.: Respiration 1975;32(2):121-134.