

Letter

Blood pressure monitoring in children undergoing food challenge: association with anaphylaxis

The diagnosis of food allergy is based mainly on oral food challenge (OFC).¹ Anaphylaxis represents the most serious outcome of OFC. Anaphylaxis has been proposed to be highly likely when exposure to known allergens elicits a 30% or greater decrease in systolic blood pressure (SBP) or a low SBP for age either isolated or accompanied by gastrointestinal, skin, or respiratory symptoms.² However, studies addressing the validity of these diagnostic criteria for anaphylaxis are needed.^{2,3} Data on blood pressure measurements during OFC are missing. We sought to determine whether suggested SBP values are helpful for diagnosing anaphylaxis in children who undergo OFC.

The study group consisted of 80 children (male-female ratio, 53:27; age range, 18 months to 16 years; median age, 5 years 4 months) with a history of reaction to foods and/or positive food specific IgE tests. Exclusion criteria included a history of anaphylaxis or intake of small food amounts with clinical symptoms in the past 2 years. All children underwent an open OFC. When open

challenge resulted in subjective or unclear symptoms, a double-blind, placebo-controlled OFC was performed.⁴ Before OFC, children were not given antihistamines for 7 days and corticosteroids, theophylline, leukotriene modifiers, or chromoglycates for 24 hours. The test consisted of the administration of increasing doses of food every 20 minutes until it reached a daily mean amount. Before OFC and every 10 minutes during OFC, brachial blood pressures were measured with an automated oscillometric device (Dinamap pro200v2; GE Healthcare, Milan, Italy), using a cuff with an inflatable bladder width that was 40% of the arm circumference and length covering 80% of the arm. Children were seated with the arm supported horizontally to keep the cuff at heart level⁵ and controlled to avoid sudden movements. The supervising investigator was masked to the blood pressure values until a reaction severe enough to terminate OFC occurred.

The most common foods challenged were hen's egg ($n = 45$), cow milk ($n = 25$), wheat ($n = 3$), and soy ($n = 2$). The OFC results were positive in 26 of 80 children (32%): 19 children (73%) tested

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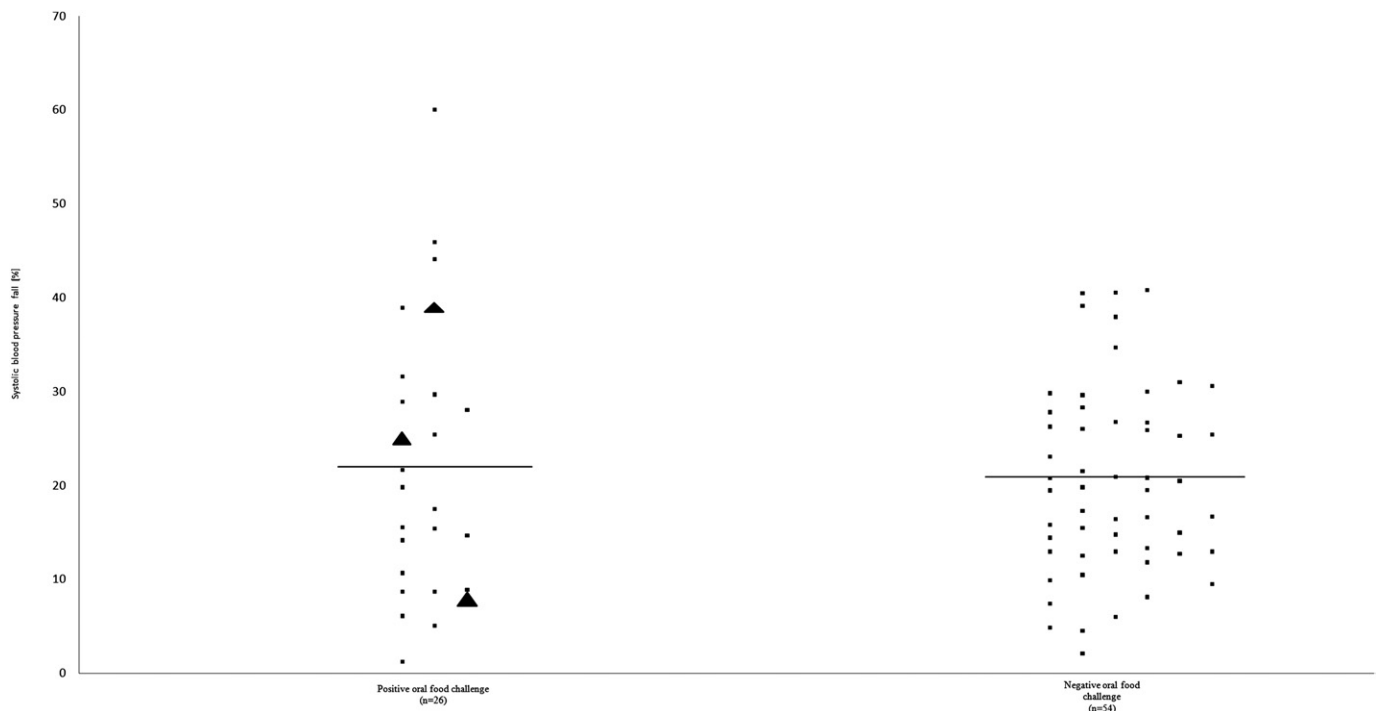


Fig. 1. Percentage of systolic blood pressure decrease in children with positive or negative oral food challenge results. Horizontal line indicates the mean percentage of systolic blood pressure and black triangle indicates children who had anaphylaxis.

positive to egg, 5 (19%) to cow milk, and 2 (7%) to wheat. In 26 children, OFC elicited skin symptoms (12 urticaria-angioedema, 11 rash, and 3 pruritus), in 11 children gastrointestinal reactions (3 oral allergy syndrome, 2 vomiting, 1 diarrhea, 1 nausea, and 1 abdominal pain), in 1 child bronchospasm, wheezing, and coughing. Three of the 26 children with positive OFC results had symptoms consistent with anaphylaxis.² Age, height, weight, and sex did not differ between reactive and tolerant children. The mean (SD) SBP was 99.5 (14) mm Hg (coefficient of variation, 14.1%). During OFC, a SBP decrease greater than 30% was recorded in 6 children (23%) with positive OFC results and in 8 tolerant children (14%) ($P > .05$) (Fig 1). Among reactive children, a SBP decrease greater than 30% was measured in 1 child when anaphylactic symptoms occurred and in 5 children when they were nonsymptomatic but not during a reaction. A low SBP for age (defined as <70 mm Hg from 1 month to 1 year, <70 mm Hg + $[2 \times \text{age}]$ from 1 to 10 years, and <90 mm Hg from 11 to 17 years²) was recorded in 11 children (42%) with positive OFC results and in 28 children (51%) with negative OFC results ($P > .05$). In reactive children, low SBPs for age were measured in 3 children when anaphylactic symptoms occurred and in 8 children only in the absence of symptoms. A SBP below the mean minus 3 SDs (<57.44 mm Hg) was reached in 2 children during reaction and in 1 tolerant child.

In summary, decreased SBP was not associated with the outcomes of OFCs. Furthermore, we have not found anaphylactic reactions characterized only by low SBP.² On the contrary, the criterion of isolated SBP decrease was satisfied during anaphylaxis to antibiotics or contrast media in adults.⁶ This finding may suggest that a SBP decrease is probably not caused by an inflammatory reaction. Our findings showed that symptoms characteristic of anaphylaxis² induced by OFCs were associated with low SBP. Therefore, monitoring blood pressure is helpful when systemic reactions occur.⁷ The SBP decrease in tolerant children may suggest inaccurate measuring. However, we found small SBP variability, indicating good method precision. A limitation of this study is the low number of children developing anaphylaxis, which may depend on stopping OFC at the onset of symptoms to avoid anaphylaxis. Another weakness is that our results may be due to selection bias. However, no patient refused blood pressure measurement; therefore, we think

that our findings are generalizable to a tertiary care setting. Despite these limitations, our study suggests that decreased SBP² appears unhelpful in diagnosing anaphylaxis during OFCs in asymptomatic children. Larger studies and comparable data for other agents (ie, drugs) are needed to extend our findings.

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