

align with the minorities' diminished return hypothesis, which states that "SES generates less health for blacks than whites."⁶

Although the evidence examining SES factors and asthma control and management is increasing, the literature on the role of SES factors that affect allergic disease development is sparse.^{7–9} These analyses are in line with recent analyses of the National Survey of Children's Health.¹⁰ Among children living above the poverty line vs those living below the poverty line, white children, but not black children, were less likely to have reported a physician diagnosis of asthma. These and the present data suggest that societal and structural barriers exist and underlie these racial disparities.¹⁰ Future work in disease causation must assess the role of these elusive barriers to yield breakthroughs in allergic disease prevention that will benefit all individuals.

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Effect of topical pramoxine hydrochloride on discomfort, wheal and flare associated with epicutaneous allergy test



Prick-puncture test is the primary diagnostic modality for immunoglobulin E (IgE) mediated hypersensitivity reactions.¹ Allergen extracts are applied to the skin with a prick-puncture device. Wheal and flare diameters are measured 15 minutes after application and compared with positive (histamine) and negative (saline) controls.² Although this technique is very sensitive for the diagnosis of IgE-mediated hypersensitivities, it is occasionally deferred because of concerns for discomfort, particularly among children. Few studies have evaluated the effect of applying topical anesthetics before skin test. Sicherer and Eggleston³ studied the effect of Eutectic Mixture of Local Anesthetics (EMLA), a 1:1 mixture of topical lidocaine and prilocaine oil in water emulsion, on skin test.⁴ Significant pain and flare reduction were demonstrated without an effect on the wheal response (from 2.5 ± 0.7 to 1.1 ± 0.6 for prick test and from 3.2 ± 0.9 to 1.13 ± 0.9 for intradermal, $P < .001$).³

Pramoxine hydrochloride, an aromatic ether, decreases the permeability of the neuronal membrane to sodium ions.⁵ It exhibits excellent qualities as a topical anesthetic, has a low sensitizing potential, and has a rapid onset of action (3–5 minutes).⁶ Compared with EMLA, pramoxine has a faster onset of action and is less expensive. To our knowledge, no study has examined the effect of topical pramoxine hydrochloride on discomfort during skin prick

testing. We sought to explore the effect of this topical anesthetic on pain and wheal and flare formation.

We performed a double-blind placebo trial with randomly selected volunteers from an academic outpatient clinic. The participants did not have a history of anesthetic allergic reactions. The University of Puerto Rico Institutional Review Board approved the study. Informed consent was obtained before the study. Adult patients ($n = 11$) were recruited from ambulatory academic center outpatient clinics in the Metropolitan Area of San Juan, Puerto Rico, during 2017. Pramoxine hydrochloride (Sarna Pramoxine Hydrochloride 1%; Crown Laboratories, Johnson City, TN) and Cetaphil Daily Advance lotion (Galderma Laboratories, For Worth, TX) (placebo) were stored in 2 identical bottles numbered 1 and 2 by experimenter 1. After the skin had been cleansed with an alcohol solution, experimenter 1, with previous experience in skin testing, applied even amounts of lotion on the volar aspect of each arm and waited 5 minutes. Experimenter 1 then performed a skin test with *Dermatophagoides pteronyssinus* extract, and histamine and saline control on both arms using Greer picks (Stallergenes Greer, Cambridge, MA). *Dermatophagoides pteronyssinus* was selected because of high prevalence of asthma sensitization in Puerto Rico.⁷ Experimenter 2, a blinded investigator, asked volunteers to rate the discomfort level on each arm, using the numeric rating scale for pain,⁸ from 0 or no pain, 1–3 mild, 4–6 moderate, and 7 to 10 severe. After 15 minutes, experimenter 2 outlined wheal and flare diameters in both arms using a trace paper and measured in mm. The size of the reaction was calculated as a mean wheal/flare diameter

Table 1
Effect of Treatment on Wheal and Flare Response^a

	<i>D pteronyssinus</i>	Saline	Histamine
Wheal on placebo-treated skin	3.00 ± 3.07	0.00	4.23 ± 0.68
Wheal on pramoxine-treated skin	3.05 ± 2.54	0.00	3.64 ± 1.60
<i>P</i> value	.87	—	.11
Flare on placebo-treated skin	14.55 ± 12.41	0.00	24.50 ± 6.32
Flare on pramoxine-treated skin	19.09 ± 13.38	0.00	24.86 ± 8.72
<i>P</i> value	.18	—	.40

^aWheal and flare sizes are mean diameters in millimeters ± standard deviation.

(longest wheal/flare diameter [D] and the diameter perpendicular to D [d] divided by 2). Wilcoxon matched-pairs signed-ranks test was used to determine the effect of treatments (placebo vs pramoxine) on wheal and flare for each allergen test.

Eleven female patients with a mean age of 40 years, without a history of anesthetic allergy and without use of antihistamines 3 days before the study, participated. Table 1 compares the size of the wheal and flare reaction and standard deviation for each antigen. No statistical difference was found between wheal and flare diameters for dust mite, histamine, or saline prick tests between the emollient and the pramoxine-treated arm ($P > .05$). However, mean pain scores were significantly reduced from 3.09 (±2.91) to 2.09 (±2.17) in the pramoxine group ($P = .02$), compared with the placebo (results not shown). The clinical relevance of this difference has not been determined. No side effects were reported among the participants.

Our study demonstrated that the discomfort associated with skin prick testing may be reduced by prior application of topical pramoxine hydrochloride without affecting wheal and flare formation during allergy skin prick test. Although most patients did not describe the discomfort as significant (mean pain score of 3.09 on placebo-treated skin), pretreatment with topical pramoxine hydrochloride may be used in patients with symptoms of hyperalgesia. Our results agree with Sicherer and Eggleston's study demonstrating the beneficial effect of topical anesthetic application, such as EMLA, to reduce skin test discomfort without affecting wheal size response.³

Nonetheless, some limitations may be present in our study. Caution must be exercised in interpreting these results as generalizable to the Puerto Rican population. The current study was limited to a small sample of patients receiving treatment at ambulatory academic center outpatient clinics in the Metropolitan

Area of San Juan, Puerto Rico. In addition, all of our subjects were woman, although no difference in pain has been described by sex in the literature. Thus, our results about treatment effect cannot be extrapolated to children or men. Future studies in children, using more antigens and intradermal test, are warranted based on these results. We report that topical pramoxine does not affect wheal and flare response to allergens nor histamine control and can be used in subjects with hyperalgesia to reduce discomfort associated with the skin test procedure.

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Prediction of acute asthma exacerbation severity and interrater reliability of manual pulsus paradoxus measurement



Pulsus paradoxus (PP) represents an exaggeration of the normal fluctuation of left ventricular stroke volume and systolic blood pressure during the respiratory cycle.¹ This physiologic phenomenon was first described by Lower in 1669 and the term *pulsus paradoxus* first applied by Kussmaul in 1873.² Pulsus paradoxus measurement is recommended to identify or assess the severity of acute asthma exacerbations, tension pneumothorax, cardiac tamponade, and other potentially life-threatening disorders.³

Although the traditional definition of PP is systolic blood pressure variation greater than 10 mmHg, we have demonstrated that healthy adults frequently have greater levels of variation.⁴ In addition, manual PP measurement using a stethoscope and sphygmomanometer is difficult in the presence of tachycardia,

tachypnea, or noisy clinical environments and, further, may be subjective. We sought to determine in pediatric patients with acute asthma exacerbations (1) The extent to which manually measured PP predicts acute asthma exacerbation severity measured using the validated Acute Asthma Intensity Research Score (AAIRS)⁵; and (2) the interrater reliability of manually measured PP among clinicians.

We conducted an observational study of participants aged 5 to 17 years with doctor-diagnosed asthma who presented to our urban, academic children's hospital emergency department with acute asthma exacerbations. Using methods described in our previous reports,^{4,5} pretreatment AAIRS was calculated and a minimum of 3 PP measurements were performed in the right arm, using a Welch Allyn 767 sphygmomanometer (Welch Allyn, Skaneateles Falls, NY) and electronic stethoscope (Thinklabs One, San Diego, CA). High-fidelity audio was fed from the stethoscope to a high-resolution digital video camera (Blackmagic Design, Fremont, CA) that simultaneously recorded the sphygmomanometer dial. One

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