

Short communication

Comparison of standard and modified SPT method

Background: The aim of our study was to compare clinical significance and economical factors of commonly used standard skin prick tests (SPT) method with new, modified and more handy way of performing SPT.

Methods: Twenty-one subjects [with an average age of 23 years ($SD \pm 2.72$)] with known sensitivity to examined allergen extracts were tested with histamine, negative control solution and standard allergen extracts (Allergopharma, Reinbeck, Germany). SPT were applied to the volar surface of randomly assigned forearm with two methods: standard technique using lancet needle to prick the epidermis under small drop of extract and tested method using lancet needle which was dipped in extract before prick. In this method all extracts were placed in marked, small, plastic chambers.

Results: Mean wheal to histamine was 5.49 (standard method) and 5.01 (modified method). There was no statistical difference between the standard and modified method for size of wheal to histamine ($P = 0.654$) and to allergen extracts ($n = 36$, $P = 0.824$, Wilcoxon test). Economical analysis revealed that examined SPT technique is cheaper than standard method.

Conclusion: Examined method may be considered to be an alternative for performing SPT as it is safe, cheaper and more convenient than standard technique. Summary statement: Comparison of standard and modified SPT method revealed the new method to be more economical.

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In recent years, skin prick tests (SPT) has become the basic and very commonly used method for the diagnosis of factors responsible for allergic reactions. SPT method is fast, safe and its positive results have a strong correlation with clinical symptoms (1). In an attempt to reduce the variability of SPT and facilitate performing skin tests, many puncture devices have been proposed by different investigators (2–7).

The ideal skin testing method should be easy to use, provide uniform penetration of skin, provide consistent skin responses, be disposable and minimize the amount of antigen extract used. Recently, because of drastic rise in the number of cases of allergic diseases, the economical factor in performing SPT has become very important. Many practitioners use one lancet for multiple skin pricks with several allergens in one patient, in an attempt to reduce costs. It was revealed that there is statistically significant rise in the number of false-positive reactions when using one lancet for multiple skin pricks (8). In addition, the operator must avoid self-induced needle sticks when wiping the needle between pricks.

The aim of our study was to compare (two methods of SPT) with regards to clinical significance, practical and economical factors. First is the standard technique using lancet needle to prick the epidermis under small drop of extract (one lancet for one prick), and then the tested

method using lancet needle which was dipped in extract before the prick.

Material and methods

The study group consisted of 21 volunteers (16 men, five women) between 20–32 years of age (mean 23 years) with known sensitivity to examined allergen extracts. None had taken antihistamines for 2 weeks prior to the study. Standardization of the method was in line with the position papers of EAACI (9, 10).

Tests were performed with single use prick test metal lancets with 1 mm long point (Pohl, Hohenlockstedt, Germany), specially designed for SPT (11). Standard allergen extracts were provided by Allergopharma (Reinbek, Germany). Positive control was: 10 mg/ml histamine (Allergopharma). As negative control 50% glycerosaline solution was used. SPT were applied simultaneously to the randomly assigned volar surface of forearms, standard method on one forearm and modified method on another. Each prick was doubled (two columns on each forearm). Columns consisted of, in sequence: histamine, placebo, two different allergen extracts (18 subjects) or one allergen extract (three subjects).

In standard method, the needle was passed through the drop of extract at a 90° angle. In modified method lancet was dipped in extract before the prick. In examined method, all extracts were placed in 96-well plates (Nunc, Roskilde, Denmark) – 60 µl in each well. All wells were precisely marked. Skin tests were read and measured by the same operator exactly 15 min after placement by outlining with a felt-tipped pen and transferring the outline to a permanent record with transparent tape. Wheal sizes

were measured as the mean of the longest diameter and mid-point perpendicular diameter.

In economical analysis we checked what is the consumption of allergen extracts and how many SPT we were able to perform from the same amount of allergen extract in both methods.

Results

Mean wheal to histamine was 5.49 mm obtained with standard method and 5.01 mm with modified method (Fig. 1). The coefficient of variation (CV) for histamine in standard method was 12.9% and 22% in modified method. Mean wheals sizes to allergen extracts obtained with both methods are presented in Table 1. There was no statistical difference between the standard and modified method for size of wheal to histamine and to allergen extracts ($P = 0.654$, $P = 0.824$ respectively, Wilcoxon test). We observed positive results to saline in two patients examined with standard method and in one patient with modified method.

Economical analysis (Table 2) revealed that modified method is cheaper than standard SPT because of smaller consumption of allergen extracts.

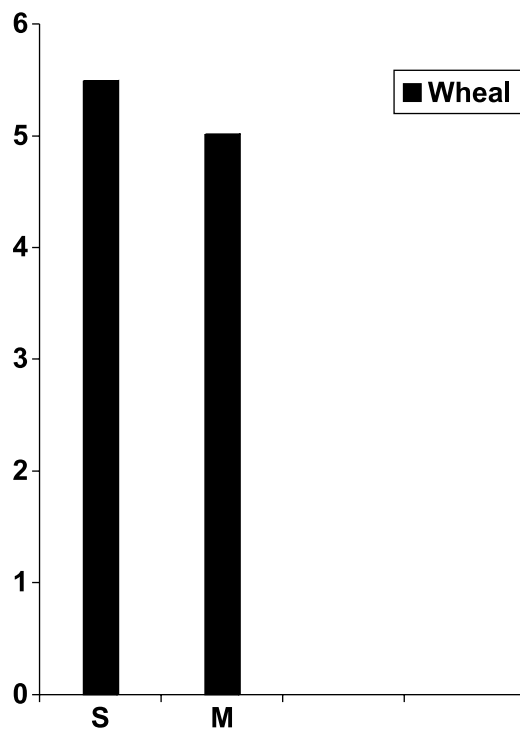


Figure 1. Mean wheal responses to histamine for S-standard and M-modified method of SPT.

Table 1. Mean wheal sizes obtained with standard and modified method. Results are expressed in mean $\pm$ SD

Allergen extract	Standard method	Modified method
Grass and cereals ($n = 12$)	11.5 ± 3.9	10.9 ± 2.5
Weeds ($n = 4$)	10.8 ± 7.0	10.7 ± 7.2
Early blossom trees ($n = 5$)	7.7 ± 2.2	8.1 ± 2.5
Cat and dog dander ($n = 7$)	7.3 ± 1.9	7.2 ± 1.7
Dermatophagoides ($n = 2$)	9.1 ± 0.53	9.3 ± 2.1

Table 2. Economical analysis of standard and modified SPT method

	Standard method	Modified method
Number of pricks from 60 μ l of allergen extract	15*	36
The price of allergen extract used for 100 pricks†	1.28	0.53
The price of allergen extract necessary to examine a group of 1000 patients‡	153.6	63.6

* 4.08 μ l – mean volume of one drop calculated as a mean from 70 droplets.

† 3 ml (one bottle) of allergen extract (Allergopharma) costs 9.6.

‡ 12 pricks for one set in each patient.

Discussion

The aim of our study was to evaluate modified method of performing SPT by comparing it with standard technique. The main disadvantages of the standard technique involve time and the difficulty in placing the droplets on the skin and keeping them from running together during the prick puncture process. This is especially noticeable when testing small children.

In modified method, the operator is able to apply antigen and penetrate the skin in a single step which saves the time of application. After use, lancet needle is discarded so that there are no concerns about operator safety in needle cleaning before each prick and allergen transmission in 'multiple test' method (one lancet–multiple pricks) which is recently often used in an attempt to reduce cost.

Consumption of allergen extracts is more than two times lower in modified method compared with standard technique. Economical analysis (Table 2) revealed that the tested method is cheaper which may lead to significant reduction of costs of performing SPT.

The results of this study indicate that examined method may be considered as an alternative for performing SPT as it is safe, cheaper and more convenient than standard technique. Studies involving small children would be helpful in determining the role and usefulness of this new method in this particular age group.

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