



Failure of titer of contact hypersensitivity to correlate with clinical severity and therapeutic response in contact dermatitis caused by *Parthenium*

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ABSTRACT

Background: The titer of contact hypersensitivity (TCH) has been used to determine the degree of contact hypersensitivity in patients with contact dermatitis. The values have been found to vary in different individuals and also in the same individual at different times apparently due to the varying severity of the disease. We evaluated the correlation of TCH with disease severity and therapeutic response in patients of contact dermatitis caused by the plant *Parthenium hysterophorus*. **Methods:** Forty-two patients, 30 (71.4%) males and 12 (28.6%) females, aged between 30-75 years, having air-borne contact dermatitis to *Parthenium hysterophorus* for 0.5-20 years were included in the study. The disease severity and TCH at baseline were recorded in all the patients. They were treated with azathioprine and followed up every month for 4-69 months. The TCH was repeated every 3 months and the last recorded TCH value was taken for analysis in each patient. **Results:** The baseline clinical severity score (CSS) varied from 10-80 (mean \pm SD: 35.47 \pm 19.41) in these patients. It ranged from 10-30 in 22 (52.4%) patients, from 31-50 in 14 (33.3%) patients, and was more than 50 in 6 (14.3%) patients. The baseline TCH to *Parthenium* was undiluted (UD) in 2 (4.8%), 1:10 in 15 (35.7%), 1:100 in 20 (47.6%), and 1:1000 in 5 (11.9%) patients respectively. At the end of the study, the clinical severity of the disease decreased in most of the patients. The CSS came down to 0 in 31 patients, to 10-20, and to 50 in 4 patients each, but remained stable in three patients who had baseline CSS from 20-40. The overall mean CSS came down from 35.47 \pm 19.41 to 4.76 \pm 9.43 ($p = 0.002$). However, there was no significant change in the TCH levels over time ($p = 0.153$). The last TCH value was negative in 2 (4.8%) patients, undiluted in 5 (11.9%), 1:10 in 10 (23.8%), 1:100 in 18 (42.9%), and 1:1000 in 7 (16.7%) patients. There was no change in the TCH values in 16 (38.1%) patients while it increased or decreased by 1-2 dilutions in 12 (28.6%) patients each. **Conclusions:** We therefore conclude that the TCH does not correlate with the clinical severity of contact dermatitis or response to treatment.

KEY WORDS: Titer of contact hypersensitivity, *Parthenium* dermatitis

INTRODUCTION

Parthenium dermatitis is an immunoinflammatory disease caused by the plant *Parthenium hysterophorus*.

The disease occurs in individuals who get sensitized to the plant. It usually manifests as itchy, erythematous papules and plaques on exposed areas of the body like the face, including the upper eyelids, sides of neck, 'V'

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of upper chest, flexures of forearms, and cubital and popliteal fossae. Some patients may present with lesions like photosensitive lichenoid eruption or lichenified plaques confined to flexural sites.^{1,2}

Patch testing with a *Parthenium* extract can confirm the diagnosis. Patch testing with serial dilutions of the standardized *Parthenium* extract can also determine the degree of contact hypersensitivity.³ The highest dilution of the antigen extract that produces a positive patch test reaction is known as the titer of contact hypersensitivity (TCH). The TCH has been found to be a reliable indicator of the degree of contact hypersensitivity and the results have been shown to be reproducible.⁴ It has been seen that the TCH varies in different patients and also in the same patient at different times with the varying severity of the disease due to fluctuations in the immune status of the individual. In the present study we evaluated whether the TCH correlates with the clinical severity of the disease and the response to treatment.

METHODS

Forty-two patients having air-borne contact dermatitis to *Parthenium hysterophorus* were included in the study. The diagnosis was confirmed in each patient by patch testing with *Parthenium* extract prepared by using the method described by Pasricha and Singh.⁵ The disease severity in each patient was recorded at baseline and then at 4-week intervals. The recording was done on a 10-point scale with 3 points each given for itching (0 - no itching, 1 - mild, 2 - moderate, and 3 - severe itching) and morphology of the lesion (0 - no lesions, 1 - papules, 2 - plaques, and 3 - lichenified plaques), and 4 points for areas involved (1 - only face, 2 - face, neck and hands, 3 - all exposed sites and flexures, and 4 - erythroderma). The total score (a + b + c) was multiplied by 10 to get a total clinical severity score (CSS) of 100. The baseline TCH was determined in all patients using the antigen-impregnated-discs prepared by the method described by Pasricha et al, having 10-fold dilutions (undiluted to 1:10,000) of the *Parthenium* extract.^{1,5}

After a detailed clinical and laboratory evaluation the patients were treated with azathioprine using three

different dosage schedules: i) 50 mg orally twice daily, ii) 50 mg twice daily and 300 mg once every 4 weeks orally, and iii) 50 mg once daily and 300 mg once every 4 weeks orally.^{6,7} They were followed up every month for a varying period of 4 months to 69 months to determine any change in the clinical severity score in response to therapy and the TCH was checked every 3 months to determine the changes in TCH values. To assess the changes in CSS and TCH over a period of follow-up, the Wilcoxon rank sign test was used. The results were considered significant at 5% level of significance.

RESULTS

The 42 patients with airborne contact dermatitis to *Parthenium hysterophorus* consisted of 30 males and 12 females aged between 30 and 75 years (mean \pm SD: 44.1 \pm 10.19 years). They had their disease since 6 months to 20 years (mean \pm SD: 6.4 \pm 4.5 and median: 5.0).

The details of their clinical profile, CSS and TCH are shown in Table 1. The baseline clinical severity score (CSS) varied from 10-80 (mean \pm SD: 35.47 \pm 19.41) in these patients. It ranged from 10-30 in 22 (52.4%) patients, from 31-50 in 14 (33.3%) patients, and was more than 50 in 6 (14.3%) patients.

The baseline TCH to *Parthenium* was undiluted (UD) in 2 (4.8%); 1:10 in 15 (35.7%); 1:100 in 20 (47.6%) and 1:1000 in 5 (11.9%) patients respectively. The patients were treated with azathioprine and followed up every month for 4-69 months. TCH was repeated every 3 months in each patient.

At the end of the study, the clinical severity of the disease decreased in most of the patients. The CSS came down to 0 in 31 patients, 10-20 and 50 in 4 patients each but remained stable in 3 patients who had CSS between 20 and 40 (Table 2). The overall mean CSS came down from 35.47 \pm 19.41 to 4.76 \pm 9.43 ($p = 0.002$).

However, there was no significant change in the TCH levels over time ($p = 0.153$). The last TCH value was



Table 1: Clinical profile, pre-treatment and post-treatment CSS and TCH of the patients

S.No	Age/Sex	Duration of disease (in years)	Duration of treatment (in months)	Pre-treatment CSS	Post-treatment CSS	Baseline TCH	Final TCH
1.	32/M	5	24	60	0	1:100	-ve
2.	58/M	2	36	60	30	1:10	UD
3.	35/F	4	12	80	20	1:100	1:1000
4.	60/M	8	58	20	0	1:10	1:1000
5.	45/M	1.5	48	10	0	1:100	1:100
6.	44/M	6	26	80	0	1:100	1:100
7.	50/F	14	42	40	0	1:10	1:10
8.	32/F	5	60	40	0	1:100	1:10
9.	50/M	10	5	30	0	1:10	1:10
10.	43/M	12	9	30	0	1:100	1:100
11.	32/F	4	33	40	0	1:10	1:1000
12.	35/M	2	42	20	0	1:100	1:10
13.	43/M	15	69	40	0	1:10	1:100
14.	40/F	2	30	40	0	1:10	UD
15.	50/M	5	20	40	0	1:100	UD
16.	40/F	6	48	40	10	1:100	1:100
17.	60/M	0.5	42	30	0	1:1000	1:10
18.	45/M	2.5	6	40	20	1:100	1:100
19.	40/M	3	42	80	0	1:100	1:100
20.	51/M	4	8	30	0	1:10	1:100
21.	34/M	0.5	9	30	0	1:10	1:10
22.	35/M	8	36	50	0	1:100	1:100
23.	62/M	10	19	40	0	1:100	1:100
24.	35/M	1	12	10	0	UD	1:10
25.	45/F	7	6	30	0	UD	UD
26.	31/M	9	36	10	0	1:100	1:1000
27.	75/M	5	52	20	0	1:1000	1:100
28.	30/M	7	6	40	0	1:100	1:10
29.	53/M	11	24	30	0	1:100	1:100
30.	42/M	2	4	80	10	1:10	1:100
31.	37/F	20	46	20	10	1:100	1:100
32.	35/M	5	32	30	0	1:100	1:1000
33.	50/M	4	10	20	20	1:1000	1:1000
34.	40/M	3	15	50	10	1:100	1:10
35.	41/F	13	36	20	0	1:10	UD
36.	35/M	5	27	10	0	1:100	1:10
37.	35/F	8	36	40	40	1:10	-ve
38.	45/M	3	6	20	10	1:1000	1:100
39.	46/M	2.5	16	20	0	1:10	1:100
40.	46/F	9	4	20	20	1:10	1:100
41.	52/M	15	20	40	0	1:1000	1:1000
42.	62/F	8	14	10	0	1:10	1:100

Table 2: CSS and TCH at baseline and post-treatment

	No. of patients	CSS	No. of patients	TCH values
Baseline	0	<10	2	UD
	22	10-30	15	1:10
	14	30-50	20	1:100
	6	50-80	5	1:1000
Post-treatment	31	0	2	-ve
	4	10-20	5	UD
	4	50	10	1:10
	3	No change	18	1:100
			7	1:1000

negative in 2 (4.8%) patients, undiluted in 5 (11.9%), 1:10 in 10 (23.8%), 1:100 in 18 (42.9%), and 1:1000 in 7 (16.7%) patients (Table 2). There was no change in the TCH values of 16 (38.1%) patients while it increased or

decreased by 1-2 dilutions in 12 (28.6%) patients each. Out of the 12 patients who had an increase in TCH values, the increase was by one dilution in 10 patients and by 2 dilutions in the other 2 patients. Of the 12 patients who had a decrease in TCH values, the decrease was by one dilution in 9 patients and by 2 dilutions in 3 patients.

The TCH values did not correlate with the clinical severity of the disease, i.e. some of the patients who had severe clinical disease had the baseline TCH as low as undiluted while some patients with minimal or no clinically active disease had the TCH as high as 1:1000 (Table 1).





DISCUSSION

Parthenium dermatitis is a cell-mediated immune injury to the skin caused by activated lymphocytes in patients sensitized to the weed *Parthenium*. The TCH has been used as a measure to determine the degree of contact hypersensitivity in these patients. We studied whether TCH correlates with disease severity and the response to treatment in 42 patients.

We found that after treatment the CSS decreased to 0 in 31 patients, improved by 80 -90% in 4 patients and by 50% in another 4 patients, but there was no corresponding change in their TCH values. The TCH increased in 12 patients in spite of the CSS coming down to 0 or decreasing remarkably. On the other hand there was only a marginal decrease in the TCH (by 1-2 dilutions) in 12 patients whose CSS decreased to 0 or near 0. In 2 patients the TCH became negative; in one of them the CSS too became 0 but in the other there was no change in the CSS. The TCH did not change in 16 patients in spite of the CSS coming down to 0 in 12 of them and its improving by 50-75% in 3 of them.

In our study we have found that the TCH remained more or less the same in individual patients except for some occasional minor variations. It appears that the TCH is independent of the clinical severity of disease in *Parthenium* dermatitis, unlike in some humoral antibody-mediated diseases where the titers of serum antibodies correlate with the disease severity and response to treatment. We have thus demonstrated that

the TCH does not correlate with the severity of the disease, nor is it significantly affected by the treatment or duration of immunosuppressive therapy used during the post-remission period. On the contrary, we found that all 4 patients treated for a maximum duration of 4 years showed a rise in their final TCH by one dilution.

We therefore conclude that the TCH seems to be of no value in assessing the clinical severity of the disease or response to treatment since it does not correlate with them. It largely remains the same irrespective of changes in the clinical activity of the disease and/or duration of treatment.

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