

## TRICHOPHYTIN TEST IN DERMATOPHYTOSES

JAGDISH P. MEHTA, K. P. DEODHAR AND P. M. CHAPHEKAR

### Summary

Trichophytin test was carried out on patients suffering from dermatophytoses as well as on controls and it was correlated with mycological findings. Most of the patients gave positive trichophytin test. Immediate and delayed type of skin responses to trichophytin were noted. Immediate skin response to trichophytin was found to be associated with *T. rubrum* infection. Few laboratory workers developed allergic reaction to trichophytin, which was different than the usual positive response to trichophytin. It was felt that this test could be used as an immunological index of exposure to *T. rubrum* infection giving an idea of its endemicity.

### Introduction

Trichophytin reaction is the term used for cutaneous hypersensitivity to dermatophyte antigens injected intradermally in humans or experimental animals. Studies on hypersensitivity to dermatophytes started in 1902 when Neisser<sup>1</sup> prepared the dermoreactive principles 'trichophytin' from dermatophytes. Since then number of workers have prepared and used trichophytin to study the cutaneous hypersensitivity<sup>2,3</sup>. Both immediate and delayed type of skin response have been observed<sup>3,4</sup>.

In the present study a survey of trichophytin reactivity in subjects suspected to be suffering from dermatophytoses as well as in normals was made and it was correlated with mycological findings.

### Material and Methods

To study the development of cutaneous hypersensitivity to the fungal

product, in a commercially prepared fungal extract, 'trichophytin' manufactured by Hoechst Pharmaceutical was used. The extract was diluted fifty times by a diluent containing 5 ml. of liquid phenol in 100 ml. of sterile distilled water. Using sterile tuberculin syringe 0.1 ml of the sterile diluted extract was injected intradermally in the forearm of left hand as a test dose, while 0.1 ml. of sterile diluent was injected intradermally in the forearm of right hand as a control. The result of the test was read at three different intervals (i) after half an hour, (ii) after 24 hours and (iii) after 48-72 hours. Test arm was compared with that of control arm for interpreting the result. The formation of oedema on test arm and no such reaction on control arm was regarded as positive reaction. The size of the oedema was measured in millimeters.

The test was carried out on two different groups of subjects.

Group (1): It consisted of totally 206 patients, who were suspected of suffering from dermatophytoses. All of them were subjected to mycological

Department of Pathology and Bacteriology,  
L.T.M.M. College and L.T.M.G. Hospital,  
Sion, Bombay.

Request for reprints: Dr. Jagdish P. Mehta,  
12, Pritam Building, 70, Garodia Nagar,  
Bombay-400077.

Received for publication on 15-9-1975

examination by direct mount with 10% KOH as well as culture study. History and detailed information like age, sex etc. of each of them were recorded.

Group (2) : It consisted of 55 control persons.

**Observation**

In sensitized patients, the injection of trichophytin resulted in the formation of erythema and oedema. This reaction was considered as positive. Fig. 1 (page No. 91) shows such trichophytin reaction. The inner circle is drawn to indicate the area of oedema while the outer indicates the area of erythema. The oedema was 12 mm. to 20mm. in diameter, while erythema ranged from 15 mm. to 40 mm. in diameter. The reaction was accompanied by mild itching at the site of injection. The reaction subsided in 48 hours.

As seen in Table 1, 82.66% of patients who showed presence of fungi in direct examination and 30.13% of patients who were KOH-ve showed trichophytin reactivity, while it was observed in 90.01% of the cases which were culture positive and 29.63% of the cases which were culture negative. 80.09% of the total patients gave immediate positive reaction (Table 2). Table 3 correlates the causative agents to the types of trichophytin reaction.

TABLE 1

Correlation between Mycological Examination and Trichophytin Test

	Total	T. Test +ve No.	%	T. Test -ve
KOH +ve	173	143	82.66	30
KOH -ve	33	10	30.31	23
Culture +ve	152	137	90.01	15
Culture -ve	54	16	29.63	38

T -- Trichophytin.

TABLE 2  
Frequency of Different Types of Trichophytin Reaction in Patients

Type	Immediate	Within 24 Hours	Within 48 Hours	Total
No. of patients	165	31	10	206
Percentage	80.09	15.05	4.86	

**Discussion**

It is clear from the above findings that trichophytin test was positive in most of the cases which were positive either by KOH or by culture method. However, in few cases which were positive in mycological examination trichophytin test was negative. This could be due to the fact that the skin was not sensitized enough to give positive trichophytin test. In few cases which were negative either by KOH or culture method the trichophytin test was positive. In these the positive reaction indicates past dermatophytoses.

Trichophytin reactivity had no relation to the duration of the disease. Almost all the patients were adults, so it was not possible to find any correlation between the age of patients and trichophytin reactivity. Lewis et al<sup>4</sup>, are of the opinion that this test is more reliable when used for children as false positive reaction increases with the age of the patient. Desai et al<sup>5</sup>, found that the incidence of positive reactions vary with the age of the suffering subjects, with the maximum in the post adolescent groups.

Analysis of the results shows that 80.09% of the total patients gave immediate +ve reactions, while 84.45% of the patients with T. rubrum infection gave immediate positive reaction (Table 2 and 3). Thus most of the patients gave immediate positive reaction. This is in agreement with the opinion of Desai et al<sup>5</sup>, Grappel et al<sup>2</sup> and Lewis et al<sup>4</sup>, that immediate positive reaction is associated with T. rubrum infection,

but it differs from the findings of Jones et al<sup>6</sup>, who did not find any specific association with *T. rubrum* infection and immediate trichophytin reaction.

TABLE 3  
Correlation between Organism Isolated and Trichophytin Test

Organism Isolated	Immediate	Within 24 Hours	Within 48 Hours	Total
<i>T. rubrum</i>	125 84.45%	20	3	148
<i>T. mentagrophytes</i>	1	2	—	3
<i>E. floccosum</i>	1	1	—	2

T — Trichophytin, E — Epidermophyton

Most of the patients who gave positive trichophytin reaction were suffering from *T. rubrum* infection, hence it is not possible to judge the nature of the reaction when the causative agent is other than *T. rubrum*.

Out of 55 control persons who were injected with trichophytin, only six showed positive reaction (Table 4). Out of these, four had suffered in the past from dermatophytoses while two were unable to give any such history.

TABLE 4  
Results of Trichophytin Test Carried out on Controls

Controls	T. Test +ve	T. Test -ve	Allergic Reaction
55	6	45	4

T — Trichophytin

However, four laboratory workers (from 55 control persons) developed allergic reaction to trichophytin (Fig 2. Page No. 91.) This reaction was different from normal reaction of oedema and induration in that it developed after 48–72 hours of injection and proceeded to form vesicles and pustules. In these patients the size of the reaction increased to a maximum four to five days after the injection and then slowly declined. The reaction subsided in about ten to fifteen days. It was not

accompanied by constitutional symptoms or lymphadenopathy. Out of these four subjects one had chronic ringworm infection.

This type of reaction was not due to the allergy to the diluent as no such reaction had developed when the diluent was injected intracutaneously on the control arm. The development of such reaction in only laboratory workers indicates that inhalation of fungal products in a high concentration is sufficient to produce allergisation of a high order in a sizable percentage of people.

Wood and Cruickshank<sup>3</sup> also reported this type of skin response in seven out of forty two reactors. In these patients the size of the reaction steadily increased to a maximum 5–7 days after injection and then slowly declined. They named this reaction as 'retarded reaction'. Somewhat similar type of skin response was also reported by Jones et al<sup>6</sup>, but their patients developed the reaction after seven to ten days and not after 48–72 hours. They described the reaction as a 'booster response'.

Other conclusions made from trichophytin test were in conformation with the findings of other workers<sup>3, 4, 5, 6</sup>.

The points of general agreements are as follows:—

- (a) A positive reaction to trichophytin is specific and is an evidence of present or past infection by a dermatophyte. It is not induced by bacteria or by other species of fungi.
- (b) A negative reaction to trichophytin does not rule out a diagnosis of a superficial fungal infection or of a prior infection, since the skin is not always sensitized enough to give positive reaction.

- (c) The test is not a substitute for a direct mount or culture method, but can be used as an immunological index of exposure to *T. rubrum* infection giving an idea of its endemicity.

#### Acknowledgment

We are grateful to Dr. V. N. Panse, the Dean of L. T. M. M. C. & L. T. M. G. Hospital, Bombay for his kind permission to publish this work. We are also thankful to Dr. V. R. Mehta, the Hon. Prof. of Derm. & Vener. L.T.M.M.C. & L.T.M.G.H., Bombay for referring us the patients.

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#### TRUE or FALSE?

5-Fluorocytosine (5-FC) is an effective drug against deep fungi of phialophora species, by virtue of the presence of enzymes which convert the drug to 5-Fluorouracil.

(Answer page No. 85)