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Original Research Article

A study of profile of contact dermatitis in housewives with reference to vegetables, soaps and detergents

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ABSTRACT

Background: Contact dermatitis in housewives is a common dermatological problem as almost all housewives have to handle vegetables, fruits, soaps and detergents. The purpose of this project was to study etiologic profile of contact dermatitis occurring in housewives.
Methods: One hundred housewives, clinically diagnosed as having contact dermatitis, were randomly selected for the study. Each patient was then subjected to patch testing using the Indian standard battery and certain indigenously prepared antigens i.e. vegetables, soaps and detergents. The first reading was taken 60 minutes with second reading at 96 hours. Reading equal to or more than 1+ was considered to be a positive test.
Results: Majority patients were in the age group of 20-30 years. Morphological diagnosis was wear and tear dermatitis in 43%, discoid eczema (19%), fingertip eczema (16%), hyperkeratotic (15%) and pompholyx (7%). Nickel sulphate was found to be the commonest allergen (19%) followed by para-phenylenediamine (8%), fragnance mix (7%), Balsam of Peru (6%), parthenium (6%) and cobalt (5%). Amongst vegetables, the commonest culprit was garlic. Allergic reaction to detergents was positive in 13% patients. Forty-four percent of the cases tested positive to the suspected allergen whereas 31% patients tested positive for allergens not initially suspected of causing contact dermatitis in them.
Conclusions: Thus patch testing is an important tool in establishing the cause of allergic contact dermatitis of the hands in housewives in whom the hand eczema is multifactorial. This enables the correct etiological diagnosis and proper management of housewives with hand dermatitis.

Keywords: Contact dermatitis, Hand eczema, Patch test

INTRODUCTION

The term 'allergie' was first coined by the scientist von Pirquet in 1906.[1] Allergic sensitization of the skin was first proved experimentally by Bloch and Steiner-Woerlich using Primula extract on humans. Generally, there are two types of dermatitis caused by substances coming in contact with the skin. These are primary irritant dermatitis and allergic contact dermatitis.[2] It is estimated that 20-35% of all dermatitis affects the hands.[3] In most surveys, hand eczema has been reported to occur more frequently in females, in a ratio of approximately 2:1.[4] Almost all housewives have to handle vegetables, fruits, soaps and detergents and thus CD in housewives is a common dermatological problem.

Patch test is a non-invasive diagnostic procedure used to identify the cause of CD. This test consists of the application of the standard series of antigens in a standardized vehicle to the normal skin and reading the

results after 48-72 hours as per the criteria laid down by the International Contact Dermatitis Research Group (ICDRG).

The purpose of this project was to study the morphological patterns and etiologic profile of CD occurring in housewives using the Indian Standard Series by some indigenously prepared antigens.

Aims and objectives

- Study the clinical pattern of contact dermatitis
- Correlate the different morphological patterns with the allergen by carrying out patch tests.

METHODS

One hundred housewives, clinically diagnosed as having contact dermatitis and attending the dermatology outpatient department of a tertiary care hospital in North India, were randomly selected for the study conducted between January 2009 to December 2009. These patients were then carefully screened for any acute stage of allergic disorders such as acute phase of contact dermatitis, generalized eczema or urticaria at the time of application of patch tests and such patients were excluded from the study. The patients were asked to stop the intake of systemic drugs such as oral steroids and antihistamines 3 days prior to patch test.

In each patient, a detailed history was taken regarding the symptoms like itching, burning sensation, formation of vesicles, oozing, fissuring etc. Also history regarding the time of onset, duration, seasonal variation, sites of involvement and precipitating factors like washing clothes and utensils with soaps and detergents and cutting vegetables etc. was recorded. Any history of atopic diathesis in the patient was also taken.

Similarly, a thorough examination was performed with special reference to the sites affected, clinical type of dermatitis and morphology of lesions.

Each patient was then subjected to patch testing using the Indian Standard Battery developed by CODFI (Contact and Occupational Dermatoses Forum of India) and certain indigenously prepared antigens i.e. vegetables, soaps and detergents.

Inclusion criteria

Inclusion criteria were housewives; patients clinically diagnosed as having contact dermatitis excluding other dermatoses like tinea, psoriasis etc; patients willing to undergo patch testing.

Exclusion criteria

Exclusion criteria were patients in acute stage, patients on immunosuppressants, pregnant patients, patients not willing to undergo patch test in order to eliminate other potential allergens, women who were engaged in any professional work, whether at home or outside, were excluded from the study.

Consent

Written informed consent was obtained from all participating patients.

Test material

Test material comprised of CODFI approved Indian Standard Battery of antigens composed of 20 allergens as following:

Vaseline, Balsam of Peru, formaldehyde 2%, mercaptobenzothiazole, potassium dichromate, nickel sulphate, cobalt sulphate, colophony, epoxy resin 1%, parabens mix, paraphenylenediamine, parthenium, neomycin sulphate, benzocaine, wool alcohol, chlorocresol, fragrance mix, thiuram mix, nitrofurazone, black rubber mix.

Method of patch testing

The standard textbook methodology of patch testing was followed. The details are:

Patch test unit- Finn Chamber

Patch test unit is made from microporous tape (15 ^{x} 15 cm) and aluminium patch test chambers. These have 9mm internal diameter and a depth of 0.7mm and volume of 43 ml. Twenty such chambers were placed facing up with a distance of 2 cm from the centre of each other in four columns on microporous tape. Indian Standard Battery of allergens and indigenously prepared antigens were used. Allergens were stored in refrigerator at 4-8°C.

Application on the skin

Top of the patch test units were marked 1-10 and 11-20 and so forth. 2-3 mm length of each allergen ointment was placed in the centre of each chamber.

Indigenous antigens

Indigenous antigens were prepared in the following concentration for testing housewives:

- Soaps and detergents were used as 1% aqueous solution in the form of antigen impregnated discs.
- Garlic was used as an antigen impregnated disc in a concentration of 10 gm extracted in 10 ml water.
- Juice of other vegetables like onion, ginger, tomato etc. was also used in the form of antigen impregnated discs.

Preparation of antigen impregnated discs

A sheet of Whatmann no. 3 filter paper, 10cm in diameter was soaked in an excess quantity of the standard extract in a petri dish for 30 min and then allowed to hang in the air until the paper sheet was completely dry. One cm^2 strips were cut from the central part, discarding a minimum 1cm wide peripheral strip on all sides. The antigen impregnated discs thus obtained were stored in plastic containers at room temperature for further use for patch tests.

Application on the skin

The test units prepared were stuck on the upper back of the patient in vertical rows in the paravertebral position. The patches were applied to the back starting from the bottom to the top and each chamber was pressed gently.

After applying the tests the following instructions were given to each patient:

- To leave the patches in place for 48 hours.
- Not to wet the back or take bath
- To avoid oral drugs like antihistamines and corticosteroids
- To avoid strenuous exercise
- To avoid wearing synthetic clothes

Time of reading

The patches were removed 48 hours after their application. The first reading was taken 60 minutes after removing the patches. A second reading was taken at 96 hours to confirm the presence of allergic reaction.

Recording of the reading

- Negative
?+ Doubtful reaction, faint erythema only
+ Weak positive reaction; palpable erythema, infiltration, possible papules
++ Strongly positive reaction; erythema, infiltration, papules, vesicles
+++ Extreme positive reaction; intense erythema and infiltration and coalescing vesicles

IR Irritant reaction of different types

Reading equal to or more than 1+ was considered to be a positive test. All the observations were recorded in a proforma which was subjected to statistical analysis at the end including mean, range, frequency.

RESULTS

The age of patients ranged from 20 to 78 years. The majority of the patients i.e. 36% were in the age group of 20-30 years. The duration of the dermatitis varied from 15 days to 25 years. The mean duration was 2.87 years. However, the most commonly observed duration was up to 1 year. This was seen in 47% cases and was followed by a duration of more than 4 years as seen in 20% patients which was found to be statistically significant.

Amongst all the patients, 86% had both hands affected while only 14% cases showed unilateral involvement. Of these, most patients showed involvement of the right hand i.e. the dominant hand. The clinical pattern of hand eczema is shown as follows:

- Palmar pattern (palms, palmar surface of fingers, finger eczema spreading onto the palms): seen in 63%.
- Dorsal pattern (dorsa of hands, dorsa of hands and dorsal surfaces of fingers, finger eczema spreading onto the dorsa): 16%.
- Fingers only: 19%.
- Entire hand: 2%.

The distribution of subjects according to morphological patterns is shown in Table 1. There was significant proportion of the patients showing wear and tear dermatitis type of pattern as is shown by the p-value of 0.004389 which is significant.

Table 1: Distribution of subjects according to morphological patterns of contact dermatitis in housewives.

Morphological pattern	n	%
Discoid eczema	19	19.00
Wear and tear dermatitis	43	43.00
Hyperkeratotic palmar eczema	15	15.00
Fingertip eczema	16	16.00
Pompholyx	7	7.00
Total	100	100

P=0.004389.

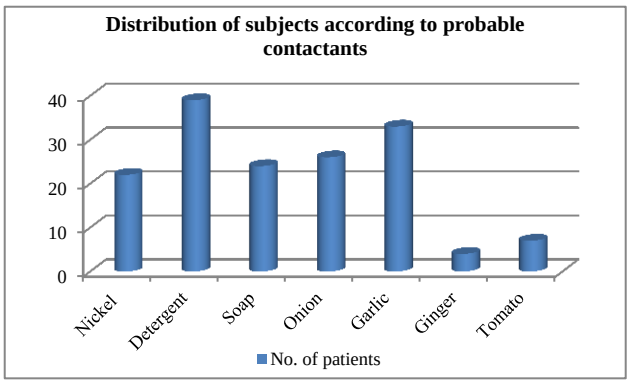

Figure 1: Distribution of subjects according to probable contactants.

Various type of skin lesions were observed in patients of hand eczema in our study. The commonest lesion was dry scaly skin seen in 69% patients and was closely followed by fissuring in 65% patients and erythema in 63% cases.

Oozing was present in 13% of the subjects and 11% patients had either vesicles or papulovesicles. One patient each showed development of edema and lichenification.

The distribution of subjects according to probable contactants is shown in Figure 1. Forty four percent patients showed a positive patch test reaction to the suspected probable contactant. Thirty one percent of the patients were found to have reactivity to an unrelated allergen and 25% subjects did not show any positive patch test reaction.

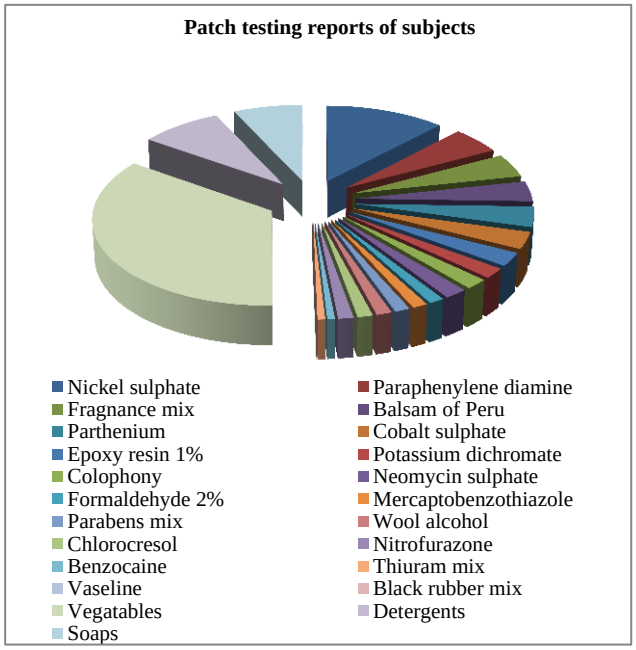

Figure 2: Patch testing results of the study population.

The patch testing results of the study population is depicted in Figure 2. Amongst the Indian Standard Battery allergens, nickel sulphate was the commonest allergen with 19 patients showing a positive patch test reaction to nickel. Eight subjects showed positivity to para-phenylenediamine and 7 patients showed positive reactions to fragnance mix. Two patients tested positive to formaldehyde, mercaptobenzothiazole, parabens mix, wool alcohol, chlorcresol and nitrofurazone. Thiuram mix and benzocaine were the allergens in 1% patient each.

Out of 100 patients, a total of 55 patients were found to have positive patch test reactions to vegetables. Of these, 31 (56.36%) were allergic to garlic. The rest of the details are depicted in Figure 3.

The patients were also patch tested using commonly used laundry detergents which included 3 powder detergents and 2 bars. Of the 13 patients who were found to be allergic to detergents, 4 were allergic to vim bar, 3 patients tested positive to nirma washing powder and surf excel each. Refer to figure 4 for further details.

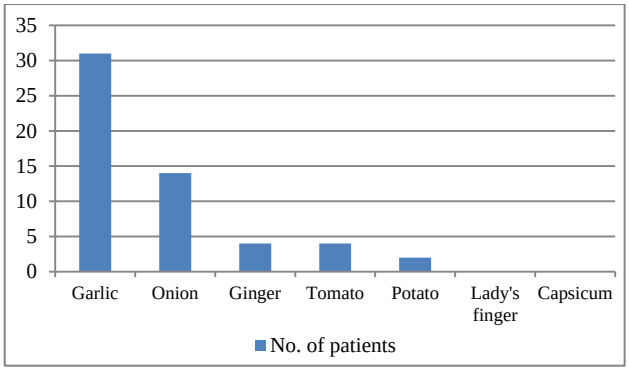

Figure 3: Distribution of patients according to sensitivity to vegetables.

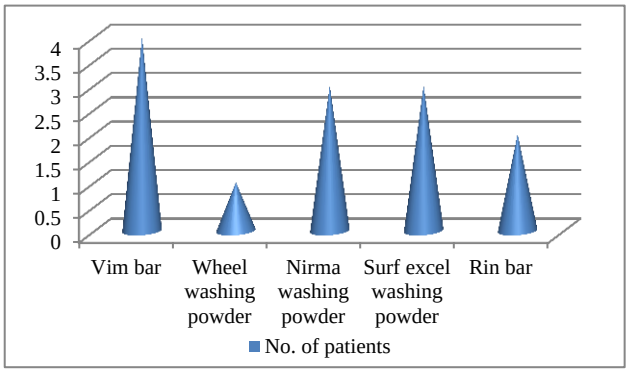

Figure 4: Distribution of subjects according to sensitivity to detergents.

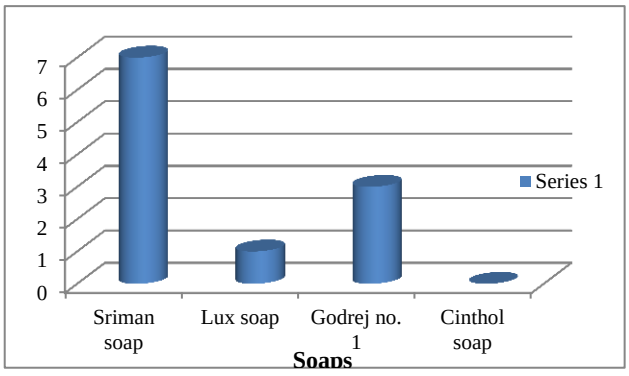

Figure 5: Sensitivity pattern of the study population according to common soaps.

Eleven patients tested positive to soaps. As shown in figure 5, 7 patients were found to be positive to Sriman soap, 1 patient was allergic to Lux soap and 3 cases were allergic to Godrej no. 1 soap. None of tested individuals tested positive to Cinthol soap (Figure 5).

The maximum number of patients with discoid eczema showed positivity to nickel sulphate (26.32%), garlic and onion (26.32% each). Out of the 43 patients showing a wear and tear dermatitis pattern of contact dermatitis, maximum number showed positive patch test reaction to garlic (25.58%) and the next highest positivity was to

detergents (16.28%). Amongst the patients with hyperkeratotic palmar eczema pattern, 33% showed patch test positivity to garlic and nickel sulphate each. Allergic reaction to garlic was found in 50% subjects with fingertip eczema. Garlic and nickel sensitivities were responsible for 28.57% each of the pompholyx type of hand eczema.

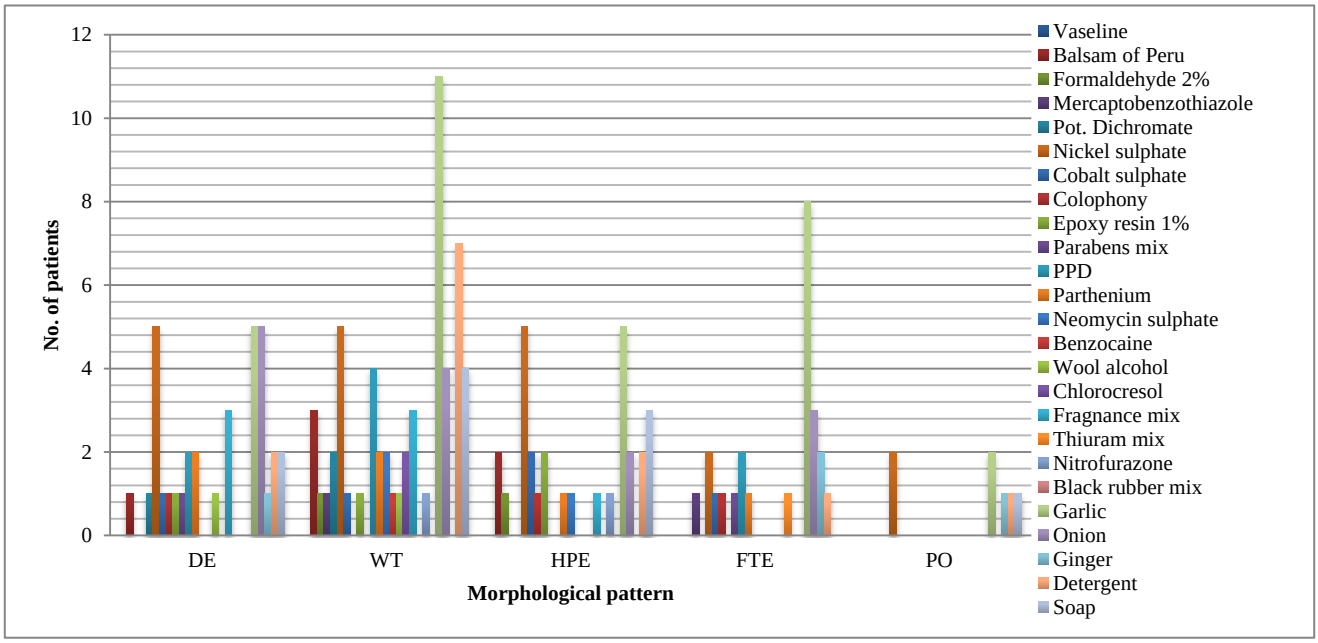

Figure 6: Relationship between morphological pattern and the positivity to probable contactants.

Figure 6 shows the relationship between morphological pattern and the positivity to probable contactants. Out of the 19 patients with discoid eczema, 9 (47.37%) patients showed a positive correlation with the probable contactant whereas 7 (36.84%) subjects showed positivity to an unrelated antigen. Amongst 16 patients with fingertip eczema, 8 (50%) cases showed a positive correlation while 3 (18.75%) had patch test positivity to an unrelated antigen. Eleven patients (73.33%) depicted a positivity to the suspected antigen amongst the hyperkeratotic palmar eczema group and amongst the 7 patients with pompholyx type of hand eczema. With wear and tear eczema, the patch test positivity to the suspected allergen was 30.23% whereas 34.88% of such patients tested positive to an unrelated allergen.

DISCUSSION

Contact dermatitis accounts for 90% of all occupational dermatoses and in 80% of the cases, it impairs a worker's hands. Direct contact with the offending agent is the usual mode of production of the dermatitis, but other mechanisms may be involved.

Suman and Reddy in their study have shown that housewives form the largest group of patients with occupational hand eczema.[5] This is because of the variety of agents that they come in contact with which may act either as irritants or allergens such as vegetables, soaps, detergents, in addition to the trauma of rubbing and scrubbing.[6]

In the present study, it was shown that all age groups can develop hand eczema. However, the majority of the patients were in the age group of 20-30 years which formed 36% of the study population. In his study, Bajaj observed that most of the cases of hand eczema (47.3%) occurred between the ages of 21-40 years.[7] Also, Calnan et al found majority (42%) patients of hand dermatitis occurred between 20-39 years.[8] This may be because the capacity for sensitization is less in extremes of age and also may be due to the decreased occupational exposure to various allergens.

The duration of dermatitis in the present study ranged from less than a month to more than 20 years. However, the most common (47%) duration was up to 1 year. The chronicity of this condition may be attributed to the inability to identify the causative allergen or that multiple allergens may be responsible for hand eczema in housewives. In the present study, it was observed that 86% of the patients had bilateral involvement of the hands. Similarly, Kumar et al had observed that 77.71% of patients with hand eczema had involvement of both hands.[9]

The majority of the patients in this study i.e. 63% were found to have a palmar pattern of involvement followed

by fingers only pattern (19%) and the dorsal pattern (16%). The entire hand was involved in only 2% study subjects. In a study by Minocha et al it was noticed that housewives accounted for the majority of the cases with palmar pattern of hand eczema which can be explained on the basis of their coming in contact with agents of wide variety during day to day routines of household work of cooking, washing, cleansing and milking, feeding of animals particularly by women of rural background in India.[10] The observations of the present study are in accordance with the study of Cronin, where also, the palmar pattern was observed to be the commonest.[11] However, Cronin found the entire hand involvement to be commoner than the finger only pattern.[11] This can be attributed to the fact that our study subjects i.e. housewives hold vegetables between their fingers for peeling and slicing, thus exposing their fingers only to the juices of raw vegatables.

Sixty nine percent of patients in the present study presented with dry scaly skin and 65% subjects had fissuring. Suman and Reddy also found dry scaly skin to be the commonest skin lesion accounting for 91% patients.[5] The findings of our study are also in accordance with the study done by Kishore et al who observed that majority of the patients presented with fissuring.[6]

In this study, it was found that 75% of the patients had patch test positivity to various allergens. In the past, patch testing has yielded positive results ranging from 50% to 92.5%.[12] Also, Bajaj et al found 80.28% patch test positivity.[7]

Nineteen percent of the patients tested positive for nickel. This is in accordance with the observations of Minocha et al who found nickel to the commonest sensitizer among metals in housewives due to exposure to utensils, door hands and knobs etc.[10] Similarly, Sharma et al also reported nickel to be the most common sensitizing metal.[12] Also other studies in the past have shown that nickel is the commonest metal causing sensitization among housewives.[13-15]

Paraphenylenediamine is a very strong sensitizer and a common contact allergen in hair dyes. Pasricha has shown positive patch test with PPD in 42% cases and 40% with hair dyes.[16] Similarly, Dogra et al showed 35% sensitivity with PPD in hair dyes.[17] In another study by Dogra et al, 45% subjects of hair dye dermatitis developed reaction to PPD.[18] In the present study, PPD was responsible for allergic sensitization in 8% of the housewives.

Fragnance mix allergy formed a significant cause of contact dermatitis in a study by Narendra et al as in the present study and this is because more and more people are now using perfumes and cosmetics.[19]

Balsam of Peru was also found to be a cause of allergic sensitization among housewives in this study as was observed in the study by Lodi et al.[20] Dogra et al also observed that Balsam of Peru was the second most common allergen in their study, the incidence being 22.5%.[18] In this study it was elucidated that reactions to balsam of Peru occur due to the primary sensitization to perfumes, other cosmetics, over the counter medications, flavouring agents, paints, soaps and detergents which is very common in housewives.

In the study by Bajaj et al in the past, it was seen that 7.1% of the patients tested positive with parthenium of which only 0.03% of the patients presented with hand dermatitis.[21] In the present study, however, it was found that parthenium positivity was seen in 6% cases of hand dermatitis. This can be explained by the fact that the majority of patients in the present study came from a rural background and thus the opportunity for exposure to parthenium from the fields was greater.

In the present study, it was observed that cobalt was another allergen causing allergic sensitivity among housewives, but not very commonly. This is in contrast to the study by Davoudi et al, who found cobalt to be the second most common allergen after nickel.[22] This may be because they observed a very strong association between positive reactions to cobalt chloride and positive reactions to nickel among housewives which was not so in the present study. This is in accordance with the low degree of combined sensitivity shown by Hammershoy.[23]

Potassium dichromate was not found to a very common allergen (only 3% subjects) in our study. This is in contrast to the observations made by Laxmisha et al who found it to be the most common sensitizer.[24]

Colophony was seen to the cause of allergic sensitization in 3% patients in the present study, an observation similar to reported by Shenoi et al.[25] Dogra et al have observed that numerous cosmetic products used by housewives can be a source of colophony e.g. lipsticks, stick-on bindis, mascara.[26]

Neomycin was responsible for allergic contact dermatitis in 3% cases in our study in contrast to 8.5% patients seen in the study done by Shenoi et al.[25] This can be explained by the inclusion of patients with stasis dermatitis and other eczematous conditions in the previous studies. Also, because this is a tertiary care hospital, the cheaper topical agents with a high sensitizing potential e.g. neomycin are not commonly prescribed.

Two percent patients each showed positive patch test reactions to formaldehyde and parabens in the present study. Parabens, used as preservatives in foods, cosmetics and pharmaceutical preparations, serve as the sources of exposure for the housewives.

Amongst the indigenous antigens vegetables formed the largest group showing positive patch test reactions. This is in accordance with the findings of Singh and Singh.[27]

Among the vegetables the most common agent responsible for allergic sensitization was garlic (31% patients), similar to the findings of Sinha et al.[28] Garlic is widely appreciated as a spice and as a vegetable as well as an over-the-counter phytotherapeutic.[29] Diallyl disulfide, a low molecular weight garlic ingredient, is the main allergen in garlic responsible for contact dermatitis.

The next most common vegetable causing allergic sensitization in the present study was onion followed by ginger, tomato and potato. Minocha et al also observed that after garlic, onion was the commonest sensitizer (20%) which was followed by potato (18%), lady's finger (18%) and ginger (10%).[10] Similar findings were also obtained by Bajaj.[7]

In the past, various studies have demonstrated detergents to be a common cause of contact dermatitis among housewives.[7, 10] In the present study, 13% of the housewives showed positive patch test reactions to various laundry detergents. Of these, 46.15% of the patients showed positivity to detergent cakes or bars and 53.85% to detergent powders. Soaps and detergents are anionic surfactants and attack the horny layer of the skin and increase its permeability.[30] Detergents are, thus, a common cause for hand eczema in housewives.

In the present study, 11% of the subjects showed positive patch test reactions to various soaps. It was further seen that majority of the women with contact dermatitis to soaps and detergents presented with a wear and tear dermatitis pattern affecting mainly the palmar aspect of the fingers and the palms. This is in contrast to the observations of Bajaj and Pasricha and Kanwar who found the dorsae of hands to be most commonly affected amongst housewives with allergic contact dermatitis to soaps and detergents.[7,31]

We observed that of all the patients showing a wear and tear dermatitis pattern of contact dermatitis, the maximum number showed positive patch test reaction to garlic (25.58%) and the next highest positivity was to detergents (16.28%). Similarly, the maximum number of patients with discoid eczema showed positivity to nickel sulphate, garlic and onion (26.32% each). Thus it may not be always possible to correlate the clinical pattern of hand eczema and a single etiological agent responsible.

Of the 100 housewives tested, 75% showed a positive patch test reaction. Forty four percent of the cases tested positive to the suspected allergen whereas 31% patients tested positive for allergens not initially suspected of causing contact dermatitis in them. Thus patch testing is an important tool in establishing the cause of allergic contact dermatitis of the hands in housewives in whom the hand eczema is multifactorial. This enables the correct etiological diagnosis and proper management of housewives with hand dermatitis.

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