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# CLINICAL EVALUATION AND PATCH TESTING IN HAND ECZEMA

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**Abstract**

**Background:** Due to its widespread etiology, protracted cause, remissions and exacerbations, resistance to therapy, and unique anatomical features of the palmer skin, hand eczema is a common and frequently painful skin disorder. Presumably the nineteenth century saw the first description of it. It is a common issue that affects people in a variety of professions. Hand eczema is likely to appear in between 2% and 10% of people at some point in their lives. The majority of hand eczema cases have a multifactorial etiology, in which the eczema is triggered and maintained by exogenous variables in people who are predisposed to such processes because of endogenous factors. The proper therapy of hand eczema requires the identification and avoidance of external competitors. A trusted technique for identifying allergic contact dermatitis is patch testing. To confirm the diagnosis, patients with a history and clinical picture consistent with contact dermatitis are re-exposed to potential allergens under controlled circumstances.

**Aim:** To assess the clinical profile of hand eczema in the patient, to perform a patch test in relevant cases, and to find out the most common sensitizers in them.

**Material and Method**: This cross-sectional investigation was conducted in the dermatology department. A total of 100 people with hand eczema visited the dermatology department's outpatient clinic. After receiving informed consent, each patient's complete medical history—including their occupation, the length of their complaints, pruritus, their history of personal or occupational chemical exposure, their history of atopy, recurrences, aggravating factors, and their treatment history—was recorded in the proforma. The ultimate diagnosis, course of treatment, and specific examination findings with regard to the morphology and region of involvement were also recorded. Prior to doing the patch test, each patient received thorough instruction on patch testing.

**Results:** Out of 100 patients, major occupations among them were housewives 27 (27%), followed by masons 22 (22%), farmers 10 (10%), mechanics 7 (7%), students 5 (5%), software engineers 6 (6%). Hyperkeratotic palmar eczema was the most common morphology observed in 53 of the patients (53%) followed by 19 fingertip eczema (19%), 11 discoid eczema (11%), 7 wear and tear dermatitis (7%), 5 pompholyx (5%), 5 recurrent focal palmer peeling (5%). Nickel was the most common allergen in our study 27 (27%) followed by potassium dichromate 10 (10%), parthenium 6 (6%), cobalt and nickel 3(3%), fragrance mix, formaldehyde and black rubber mix showed positive reaction in two patients each

**Conclusion:** In our study, patients with hand eczema tended to be between the ages of 21 and 60. Hand eczema is more likely to appear among mechanics, housewives, masons, and farmers. The most prevalent morphological kind of eczema was hyperkeratotic palmar eczema, which was followed by fingertip eczema. Nickel patch test positivity was most frequently noted, particularly

among housewives. The most prevalent allergy among masons is cement made with potassium dichromate. The majority of patients with pompholyx have a history of atopy. This particular variety of hand dermatoses may be made worse by the workplace.

**Keywords**: Hand eczema, Morphological type, Patch test, Allergens, Occupation, Nickel, Potassium Bichromate.

## Introduction

When dermatitis is referred to as hand eczema, it signifies that other body parts are only very slightly affected.[1] Exogenous or endogenous factors may be to blame. The etiology of the majority of cases is multifactorial and includes allergic contact dermatitis. Because it is challenging to distinguish between irritating and chronic allergic hand eczema, a patch test is a crucial diagnostic tool for locating the allergens that are causing the eczema, which can be emotionally and physically debilitating.[2] The management and treatment of hand eczema therefore requires the identification and avoidance of external allergens. Using allergens suspended in a medium at non-irritant concentration, patch testing can simulate allergic contact dermatitis in a clinical environment. The only scientific study to support the diagnosis of allergic contact dermatitis is the patch test.[3]

Hand eczema is a common chronic, uncomfortable condition that can affect people in a variety of professions. Hand eczema is a common condition that affects between 2 and 10% of people at some point in their lives. It is one of the most prevalent occupational skin disorders and makes up 9–35% of all occupational diseases. Hand eczema can be present in up to 80% of occupational contact dermatitis cases.[4] It is one of the three most prevalent disorders at work. Skin disease patients have a similar level of physical and mental suffering as those who suffer from other chronic illnesses like migraine and multiple sclerosis. 18% of people exhibit signs of clinical depression.[5]

Additionally, hands are affected by 20% to 35% of all dermatitis cases. With 9% to 35% of all occupational disorders and up to 80% or more of all occupational contact dermatitis, it appears to be the most prevalent occupational skin condition.[6] Females are more commonly involved than males (2:1),[7] possibly because of increased exposure to wet work and household chemicals. It is now even more crucial to identify the precise etiology of the disease and employ the best preventive and therapeutic approaches because of how complex and industrialized the 21st century environment has become. At least 2,800 of the more than 6 million chemicals now present in the environment have been noted to exhibit contact-sensitizing characteristics.[8]

Depending on the nature of the job, a significant number of occupational groups are susceptible to hand eczema through contact with numerous allergens and irritants. One such group at a higher risk of occupational hand eczema/dermatitis is healthcare workers and professionals. This can be due to extended wet labor, which has been shown to double the incidence of hand dermatitis compared to dry office work and frequently requires hand cleaning procedures necessary in hospital work to prevent nosocomial infections.[9,10]

The etiology of hand eczema is diverse and may be endogenous or external. Exogenous hand eczema can be a combination of both allergic and irritating contact dermatitis. It is thought that irritant contact dermatitis occurs more frequently than allergic contact dermatitis. Women are twice as likely as males to develop hand eczema, probably as a result of more contact to moist jobs and household pollutants. Another factor might be the high frequency of atopic dermatitis in females. [11,12]

The patch test, a biological test, serves as a crucial diagnostic tool for locating the allergen or allergens that are causing eczema. In the skin of the target organ, a patch test serves as both a screening test and a provocation test. Numerous studies have shown that, in addition to these environmental factors, some intrinsic factors (such as atopic dermatitis) also increase this population's propensity for hand eczema. It has been discovered that atopy increases this sensitivity as a result of underlying immune system and skin barrier abnormalities.[13] This study was conducted to identify the allergens showing positive reactions in patch tests in patients with hand eczema.

## Material and Methods

This cross-sectional investigation was conducted in the dermatology department. A total of 100 people with hand eczema visited the dermatology department's outpatient clinic. After receiving informed consent, each patient's complete medical history—including their occupation, the length of their complaints, pruritus, their history of personal or occupational chemical exposure, their history of atopy, recurrences, aggravating factors, and their treatment history—was recorded in the proforma. The ultimate diagnosis, course of treatment, and specific examination findings with regard to the morphology and region of involvement were also recorded. Prior to doing the patch test, each patient received thorough instruction on patch testing. In order to gather the necessary information, a questionnaire was created with questions about demographic factors (age, sex, and place of residence), job title, daily work hours, if wet work was performed, and contact with gloves, disinfectants, sanitizers, and tools. Atopy/atopic dermatitis history and the presence of any skin changes on the hands were among the additional inquiries.

**Inclusion criteria**:

- The patients having hand eczema for at least 4-week duration aged more than 18 years and both sexes who give valid informed consent were included in the study

**Exclusion criteria:**

- Patients with concurrent fungal, bacterial infections, psoriasis, lichen planus, and other hand-specific dermatoses, patients with widespread eczema in other parts of the body, pregnant women, lactating mothers, history of any associated systemic disease, and patients with a history of excessive alcohol consumption were all excluded from the study.

**Grading**

- negative reaction.
- ?: Doubtful reaction, faintly macular erythema only.
- +: weak (non-vesicular) positive reaction, erythema, infiltration, possibly papules.
- ++: strong (vesicular) positive reaction, erythema, infiltration, papules, and vesicles.
- +++: extreme positive reaction, bullous reaction.
- IR: irritant reaction

**Statistical Analysis**

Statistical analysis was done using SPSS version 22.0 was used to analyze the data. To compare the proportions Chi-square test was applied. If any expected cell frequency is less than five, Fisher's exact test was used to calculate the p-value.

**Result: -**

Out of 100 patients, major occupations among them were housewives 27 (27%), followed by masons 22 (22%), farmers 10 (10%), mechanics 7 (7%), students 5 (5%), software engineers 6 (5%).

**Table 1: Occupation of the study group**

| Occupation | N | % |
|---|---|---|
| Housewife | 27 | 27 |
| Mason | 22 | 22 |
| Farmer | 10 | 10 |
| Mechanic | 7 | 7 |
| Student | 5 | 5 |
| Teacher | 4 | 4 |
| Hotel worker | 3 | 3 |
| Housekeeping staff | 2 | 2 |
| Software engineer | 6 | 6 |
| Plumber/electrician/welder | 5 | 5 |
| Staff Nurse | 3 | 3 |
| Printing work | 3 | 3 |
| Others | 3 | 3 |
| **Total** | 100 | 100.0 |

**Table 2: Morphological patterns of hand eczema**

| Morphological diagnosis | N | % |
|---|---|---|
| Hyperkeratotic hand eczema | 53 | 53 |
| Fingertip eczema | 19 | 19 |
| Discoid eczema | 11 | 11 |
| Wear and tear dermatitis | 7 | 7 |
| Recurrent focal palmar peeling | 5 | 5 |
| Pompholyx | 5 | 5 |
| **Total** | 100 | 100.0 |

Hyperkeratotic palmar eczema was the most common morphology observed in 53 of the patients (51.8%) followed by 19 fingertip eczema (19.1%), 11 discoid eczema (11.8%), 7 wear and tear dermatitis (8.2%), 5 pompholyx (4.5%), 5 recurrent focal palmer peeling (4.5%).

**Table 3: Patch test results in the study group.**

| Patch test result | N | % |
|---|---|---|
| Negative | 40 | 40 |
| Nickel | 27 | 27 |
| Potassium dichromate | 10 | 10 |
| Parthenium | 6 | 6 |
| Cobalt, Nickel | 3 | 3 |
| Fragrance mix | 2 | 2 |
| Formaldehyde | 2 | 2 |
| PPD | 3 | 3 |
| Black rubber mix | 2 | 2 |
| Epoxy resin | 1 | 1 |
| Cobalt | 1 | 1 |
| Balsam of Peru | 1 | 1 |
| Neomycin | 1 | 1 |
| Mercaptobenzothiazole | 1 | 1 |
| **Total** | 100 | 100.0 |

Nickel was the most common allergen in our study 27 (27.3%) followed by potassium dichromate 10 (10.9%), parthenium 6 (6.4%), cobalt and nickel 3(2.7%), fragrance mix, formaldehyde and black rubber mix showed positive reaction in two patients each (totaling to 5.4%). Epoxy resin, balsm of Peru, cobalt, neomycin, and mercaptobenzothiazole showed positive reactions in one patient each (totaling to 3.6%).

**Discussion**

In addition to a more significant percentage of other occupational groups, hand eczema affects a sizeable section of the global population overall. The degree and length of exposure to numerous triggers, as well as the existence or lack of underlying innate susceptibility, all affect the prevalence and clinical patterns in distinct professional groups. Due of its socioeconomic effects, which have a direct impact on the patient's quality of life, it has grown in importance as a significant occupational dermatosis over time. [14,15]

The Indian study by **Kishore et al., 2005**[16] reported the commonest occupational group among females was the housewives, as in our study. This may be because of the increased risk of contact with a variety of agents during household chores like cooking, cleansing, and washing, which may act as irritants or allergens in addition to the trauma of rubbing and scrubbing. In other studies, done by **Suman et al. 2003[17] and Laxmisha et al.2008**[18] a higher percentage of masons similar to our study was reported this might be due to the growth of the construction industry in our region.

In the study by **Kishore et al., 2005**[16] the positive patch test was seen in 82% of the patients, and Potassium dichromate was the most common sensitizer testing positive in 26% of the patients while nickel was the next most common testing positive in 18% of the patients. A study by **Kaur and Sharma 1987**[19] in Chandigarh found that 53.1% of the patients with hand eczema were sensitive to metals. Of these, nickel, cobalt, and chromate sensitivity were seen in 40.6%, 31.2%, and 21.8% of patients respectively. Nickel sulfate was also the commonest sensitizer in various international studies.

Nickel as an important causative factor in hand eczema has also been reported in earlier studies done by **Bajaj et al 2007**[20], **Peltonen L 1979**[21], and **Menne et al. 1992**[22] Nickel are present in objects such as door knobs, bags, and umbrellas, and paper pins, and clips, etc. Sweat, soaps, or detergents can all leach it out of stainless-steel utensils. Patients who had a clinically relevant positive patch test showed improved symptoms when they avoided the allergen or antigen (for example, bichromate in the case of laborers and construction workers), but when they were exposed again, their clinical characteristics worsened. They were unable to shift jobs or occupations because of their dire financial situation.

As expected given their higher exposure to allergens when compared to the general population, housewives, farmers, drivers, mechanics, and engineers frequently get allergic hand eczemas. Numerous research produced similar results.[23-24] This section of the population may have a higher prevalence of hand eczema due to increased exposure to damp work, detergent use, and jewelry wearing. Positive patch test results for nickel, cobalt, and PPD among individuals with a history of detergent exposure demonstrate that detergents are a significant source of sensitization.[25] Lipid-soluble chemicals are often applied to water in wet work vocations to provide the cleaning effect. Lipids inside cells are washed away by these substances. The loss of lipids causes structural and physiochemical changes in the skin, which appear to make cutaneous irritation easier to experience.[26] High frequency of atopic dermatitis among women may also contribute.

One of the most upsetting dermatological problems among professionals is hand eczema. Even though we saw a lower level of patch test positivity in our patients with positive antigens, clinical relevance was high. The Indian standard series of patch tests proved to be highly helpful. This finding shows that patients'

symptoms can improve when they avoid specific relevant allergens. In order to lower the prevalence and incidence of this disease, efforts should be made to reorganize working conditions in those industries where personnel are prone to hand eczemas.

**Conclusion:**

In our study, patients with hand eczema tended to be between the ages of 21 and 60. Hand eczema is more likely to appear among mechanics, housewives, masons, and farmers. The most prevalent morphological kind of eczema was hyperkeratotic palmar eczema, which was followed by fingertip eczema. Nickel patch test positivity was most frequently noted, particularly among housewives. The most prevalent allergy among masons is cement made with potassium dichromate. The majority of patients with pompholyx have a history of atopy. This particular variety of hand dermatoses may be made worse by the workplace. Therefore, a thorough clinical evaluation, patch testing, and prompt therapy can help these professionals feel better. Additionally, effective counseling of workplace prevention measures can aid in lowering the prevalence of hand eczema and hence the related morbidity in those who have it.

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