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CLINICO-EPIDEMIOLOGICAL AND ETIOLOGICAL PROFILE OF HAND AND FOOT DERMATITIS

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Abstract

Background: Hand and feet serves as the common site for allergic contact dermatitis since they are the principal organs of function. The study explores the epidemiological patterns, etiological factors, occupational relationships, psychological stress, clinical presentations, complications, systemic diseases, patch testing, and impact assessment using a dermatological life quality index. Cross sectional observational study was conducted in the Department of Dermatology, Madras Medical College & Rajiv Gandhi Government General Hospital. Newly diagnosed patients with hand and foot dermatitis attending Occupational and Contact Dermatoses OPD during the study period was included in the study. Patch testing readings and Interpretation was per ICDRG. The mean age of the study participants was 39.14 ± 14.06 years. The mean duration of disease was 14.73 ± 20.49. Age distribution, demonstrates the increased prevalence (24%) of hand and foot dermatitis in the age group 21-30 years and 41-50 years. A significant majority of participants reported involvement of the hands (82%) and feet (72%). The most frequently reported agents causing eczematous eruptions are plants (22%) and detergents (18%). Patch Test Result distribution were Black Rubber Mix is 2.0%, Fragrance Mix is 8.0%, Neomycin is 8.0%, Nickel Sulphate is 14.0%, and Paraben Mix is 2.0%. Paraphenylene Diamine is 2.0%, Parthenium is 24.0%, Potassium Dichromate is 18.0%, Nil is 22.0%. The mean Dermatology Life Quality Index was 8.96 ± 3.39. **Conclusion**: The study highlights the significant impact of occupational exposure and allergens on the prevalence of eczema, particularly among unskilled laborers. It underscores the need for protective measures and awareness of common triggers to improve patient outcomes.

Key words: *Dermatology Life Quality Index, hand and foot dermatitis*

Introduction

Hand and foot eczema is a morphological term indicating the eczematous reaction involving hand and/or foot region. Hand and feet serves as the common site for allergic contact dermatitis since they are the principal organs of function. Hand and Foot eczema constitutes about 30% cases of eczema. Isolated Hand eczema carries a lifetime risk of about 2 to 10% and it constitutes the major socioeconomic burden accounting to 9 – 35 percent of occupational contact dermatoses in which 5 to 10% cases are found to be chronic and therapy resistant.[1] Prevalence of foot eczema is not known due to inadequate studies on epidemiology, therefore the socioeconomic impact cannot be made

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out.[1]

Prevalence of hand and foot eczema is on the higher side in females attributing to the hormonal factors, atopy, household/occupational exposure to sensitizers and irritants, whereas male has increased predisposition to foot eczema due to higher degree of occupational exposure with cement, parthenium, nickel, etc.[2] United States Consensus states that half of the hand and foot eczema cases are due to allergic and irritant contact dermatitis.

Aims and Objectives

The study aims to investigate the epidemiological pattern, etiological factors, relationship between occupation, flare-ups, psychological stress, clinical presentations, complications, association with systemic diseases, patch testing, and impact assessment using a dermatological life quality index.

Materials and Methods

Study design: Cross sectional observational study

Study Centre: Department of Dermatology, Madras Medical College & Rajiv Gandhi, Government General Hospital,Chennai- 3.

Study Period: The study was conducted for a period of 1.5 years from March 2020 to August 2021 after obtaining approval from Institutional Ethical Committee.

Study population: Newly diagnosed patients with hand and foot dermatitis attending Occupational and Contact Dermatoses OPD during the study period.

SAMPLE SIZE: 50

Inclusion Criteria

- Patients with hand and foot dermatitis attending Occupational and Contact Dermatoses OPD
- Patients who give consent to participate in the study and follow up.

Exclusion Criteria

- Patients less than 18 years of age.
- Pregnant women
- Patients on systemic steroids more than 15mg.
- Patients who are not willing to participate in the study.
- Patients with dermatophyte or candidal infections over hand and foot diagnosed clinically or by positive skin scraping for fungus on potassium hydroxide preparation.
- Patients with palmoplantar psoriasis, psoriatic lesions elsewhere and/or psoriatic nail involvement.

Methodology

Proper consent was taken from the patient assuring confidentiality. Detailed clinical history including basic demographic details and occupational details was taken. History of presenting complaints, onset/ duration/ progression/ course of illness/aggravating factors/history of allergy to metal or food/ h/o drug allergy /any previous history of atopy/ any previous treatment history/ occupational history/family history of atopy/co-morbidities and personal history were taken. General Examination and DLQI was assessed. Dermatological examination- as follows.Site of involvement, Distribution and Morphology

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Investigations

Patch testing- Readings and Interpretation as per ICDRG

It was done on upper back of patients (preferred site) using Indian standard battery series. Allergen was placed on Finn chambers present on adhesive tapes and was applied over the upper back. The test area was marked. The patient was advised not to exercise, rub or wet the test area and not to expose to sunlight. Readings was taken after 48 hours and was recorded.

Treatment was given and patients were followed up for recurrence.

Ethical Clearance

Institutional ethical committee of Madras medical college & RGGGH reviewed the study proposal for ethical consideration and approval of the committee was obtained prior to the study**.**

Statistical Analysis

The collected data were analysed with IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp). To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.

Results

Table 1: Basic Details of the study population

Basic Details	Frequency	Percentage
Age category		
11 to 20 years	6	12%
21 – 30 years	12	24%
31 - 40 years	8	16%
41 - 50 years	12	24%
51 - 60 years	10	20%
Above 60 years	2	4%
Gender		
Female	26	52%
Male	24	48%
Area of resident		
Rural	24	48%
Urban	26	52%
Occupation Details		
Beautician	1	2%
Clerk	1	2%
Cook	2	4%
Doctor	4	8%
Farmer	3	6%
Flower Vendor	6	12%
Gardener	2	4%
Housewife	6	12%
IT Professional	4	8%
Mason	8	16%
Nurse	1	2%

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Painter	1	2%
Plumber	1	2%
Sanitation Worker	1	2%
Security	3	6%
Student	6	12%
Total	**50**	**100%**

The above table, titled age distribution, demonstrates the increased prevalence (24%) of hand and foot dermatitis in the age group 21-30 years and 41-50 years, indicating the exposure of various allergens and irritants in the working population. This was followed by 20.0% in the age group 51-60 years and 16.0% in the age group 31-40 years. Gender distribution indicated the nearly equal prevalence of dermatitis in the general population at about 52.0% for females and 48.0% for males. Prevalence of dermatitis was slightly more in Urban (52.0%) than Rural (48.0%) due to widely distributed allergens and irritants in the environment and due to globalization. occupation distribution showed the highest prevalence among the masons with the percentage of 16% followed by Flower Vendor (12.0%), House wives (12%) and students (12.0%). The lower prevalence was noted among the Doctors (8.0%), IT Professional (8.0%),, Farmer (6.0%), Security (6.0%), Cook (4.0%), Gardener (4.0%), beautician (2.0%), Clerk (2.0%), Nurse(2.0%), Painter (2.0%), Plumber (2.0%) and Sanitation Worker (2.0%) in the descending order.

Table 2: Distribution of diseases and various symptoms associated with hand and foot dermatitis among the study participant

Details	**Frequency**	**Percentage**
Distribution of disease		
Hand	41	82 %
Foot	36	72 %
Symptoms		
Pain	27	54 %
Oozing	36	72 %
Scaling	38	76 %
Fissuring	22	44 %
Thickening of Skin	12	24 %
Erythema	26	52 %
Vesicles	34	68 %
Lichenification	14	28 %
Total	**50**	**100 %**

This table provides a clear overview of the prevalence of various symptoms associated with hand and foot dermatitis among the study participants, highlighting the most common manifestations of the condition. A significant majority of participants reported involvement of the hands (82%) and feet (72%). Common Symptoms like Oozing (72%), scaling (76%), and vesicles (68%) were frequently observed. Pain was reported by 54% of participants, while erythema was noted in 52%. Thickening of the skin (24%) and lichenification (28%) were less frequently reported.

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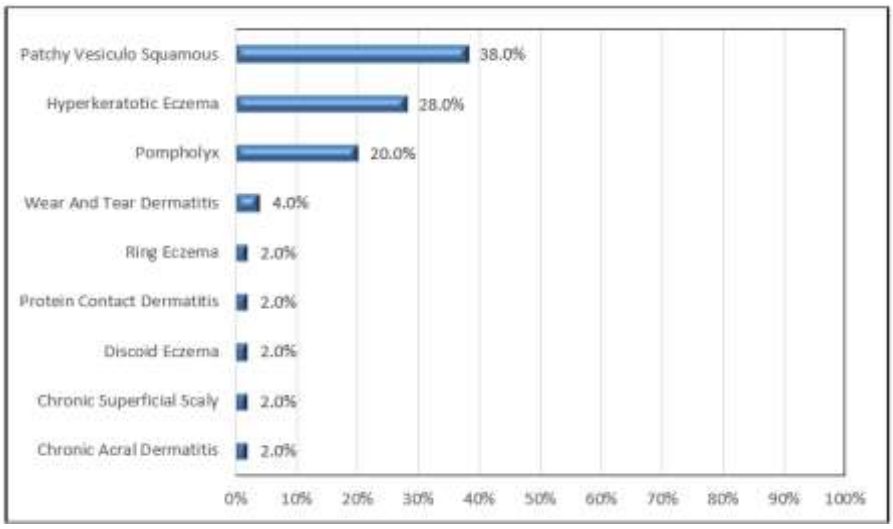

Figure 1: Bar diagram shows Distribution of Morphological Pattern of the disease (N =50)

The above diagram with Morphological Pattern distribution illustrated the Patchy **i**Vesiculo Squamous as the most common presentation with the percentage of 38.0%; followed by Hyperkeratotic Eczema is 28.0% and pompholyx being the third with the percentage of 20%. The other variants have the least percentage as follows: Chronic Acral Dermatitis (2.0%), Chronic Superficial Scaly dermatitis (2.0%), Discoid Eczema (2.0%), Protein Contact Dermatitis (2.0%), Ring Eczema (2.0%) and Wear And Tear Dermatitis is (4.0%).

Table 3: Distribution of agents in causing eczematous eruption

Agents In Causing Eczematous Eruption	Frequency	Percentage
Detergent	9	18 %
Cement	8	16 %
Plants	11	22 %
Vegetables	8	16 %
Gloves	1	2 %
Hair Dye	2	4 %
Sanitizer	2	4 %
Toe Ring	1	2 %
Topical Medicament	1	2 %
Wrist Watch	2	4 %
Total	50	100 %

The most frequently reported agents causing eczematous eruptions are plants (22%) and detergents (18%). Agents such as gloves, toe rings, topical medicaments, and wrist watches were reported with lower frequencies (2% each). The data indicates a variety of potential irritants and allergens, highlighting the importance of identifying specific triggers in affected individuals.

Table 4: Distribution of Patch Test Result

Patch Test Result	Frequency	Percentage
Black Rubber Mix	1	2.0 %
Fragrance Mix	4	8.0 %

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Neomycin	4	8.0 %
Nickel Sulphate	7	14.0 %
Paraben Mix	1	2.0 %
Paraphenylene Diamine	1	2.0 %
Parthenium	12	24.0 %
Potassium Dichromate	9	18.0 %
Nil	11	22.0 %
Total	**50**	**100.0 %**

The above table shows Patch Test Result distribution were Black Rubber Mix is 2.0%, Fragrance Mix is 8.0%, Neomycin is 8.0%, Nickel Sulphate is 14.0%, Paraben Mix is 2.0%. Paraphenylene Diamine is 2.0%, Parthenium is 24.0%, Potassium Dichromate is 18.0%, Nil is 22.0%.

Table 5: Descriptive Statistics-Age, Duration, DLQI

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
AGE (YEARS)	50	15	62	39.14	14.063
DURATION	50	2	72	14.72	20.493
DLQI	50	4	16	8.96	3.398

The mean age of the study participants was 39.14 ± 14.06 years. The minimum age observed was 15 years and the maximum age observed was 62 years. The mean duration of disease was 14.73 ± 20.49. The minimum duration observed was 2 months and the maximum duration of disease observed was 72 months. The mean Dermatology Life Quality Index was 8.96 ± 3.39. The minimum DLQI observed was 4 and the maximum DLQI was 72.

Discussion

A total of 50 patients were included in the study group of which 48% were males and 52% were females. This is concordant with the study conducted by Prachi.V. Agarwal *et al.*[13], where the female affected were 68% and male about 32% attributing to the safety measures undertaken by the men. Female preponderance is attributed to womens' role in domestic cleaning, nursing and food preparation and as flower vendors whereas the increased awareness about occupational hazardous chemicals and personal protection measures slightly decreased the prevalence among men in the recent days. Our study has shown that the trend of eczematisation is increased in both sexes as compared to the studies done in the recent past.

The increased prevalence of hand and foot eczema was noted in 3rd and 5th decade followed by 6th decade. This is similar to the studies done by Charan *et al.*[14], and Agarwal *et al.*[15] as this group constituted the vulnerable group exposed to various domestic and occupational hazards. The mason included in the study has carried the highest percentage 16% followed by Flower Vendor (12.0%) and Housewives (12%). Mason was the most commonly affected occupational group, as in the study conducted by Sahana *et al.*[16] The patch test results confirmed the above finding as chromates was the frequently encountered allergen. Addition of ferrous sulphate to the cement has caused sharp decline in chromium sensitivity as reported in the western countries. The term Housewives'eczema has been termed since the incidence of eczema is so high and it is commonly chronic, recurrent and uncontrollable. Housewives have contributed to the bulk of the proportion of females owing to the unavoidable frequent exposure to various irritants and allergens.[17]

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Juvenile plantar dermatoses and atopic eczema are commonly encountered eczema in students. New onset or exacerbated occupational hand eczema has increased significantly among the healthcare workers during the covid pandemic due to increased hand hygiene measures and personal protective equipments. The results have correlated with study conducted by Dogan *et al.* where the hand eczema has increased 1.85 fold compared to the pre-COVID times.[18]

Pruritus was invariably present in our study group and similar to other studies, it was the predominant symptom. The variations in studies have been attributed to the various patterns of occupation and allergen exposure. These symptoms resulted in significant morbidity impairing the quality of life. Raghu *et al.* [22] reported 97 % pruritus which is almost smilar to the present study. Kishore NB *et al.* reported 40 % pain in there study which is almost comparable to the present study findings. The high prevalence of pruritus and the significant presence of pain underscore the burden of HE on patients' quality of life, necessitating effective management strategies. Hand and foot were affected together in 54% of the study group. Isolated Hand involvement was found in 28% and foot in 18% patients respectively. Study conducted by Agarwal *et al.*,[15] observed that hand and foot were affected in 47% and 45% respectively. Both hand and foot were involved in 8 % patients. Overall, Hand was found affected in 82% patients whereas foot was involved in 72% of our study group. These variations are due to different patterns in epidemiology and patients attending tertiary care center.[75]

Patchy vesiculo-squamous was the most common type of eczema, similar to the observations by Kishore NB *et al.* **[19]**, followed by hyperkeratotic eczema. Raghu *et al.* **[12]** had observed hyperkeratotic eczema as the commonest type in his study. These variations were reflections of inherent susceptibility, chronicity of the illness, occupation, nature of allergen and personal& occupational protection measures.[19,22]

Pompholyx has been observed in patients with history of atopy. Pompholyx, being an endogenous eczema, has commonly occurred in younger patients. The prevalence of pompholyx has been observed at a higher percentage compared to the study conducted by Kishore NB *et al.*[19]

Protein contact dermatitis and chronic acral dermatitis have been reported in our study as compared to other 2 studies.

Wear and tear dermatitis were found in housewives commonly as they were more prone to contact with various chemicals, detergents, cosmetics, bleaches and other substances which might act as allergens or irritants. In addition, trauma and constant rubbing has added to the insult furthermore.

Atopic history was found in 40 % of our study patients as per Hanifin Rajka criteria where it was found in variable percentage as mentioned in the above table. Marius *et al.* observed that half of the study group had atopic hand eczema of vesicular/ hyperkeratotic eczematous morphology.[25]

Detergents, cement, plants like parthenium and vegetables like garlic, onion have been found to be the common triggering agents in our study. UP charan *et al.* observed that detergents and washing soaps were found to be the common triggering factor in about 60% patients and housewives were commonly affected at an earlier age due to exposure with various allergens and irritants.[14] Kaur & Sharma *et al.* demonstrated the metals like nickel, cobalt and detergents as the triggering agents.[14] Pasricha *et al.*[27] and Kanwar *et al.*[88] demonstrated vegetables as the triggering agent in 75.8% and 82.7% of housewives eczema cases respectively.

The percentage of patient achieved resolution on avoidance of allergens or irritant was found to be 66% wheras Agarwal *et al.*[15] observed that 32% of study group achieved

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improvement when they were not in contact with the allergen. The percentage was higher in our study compared to the studies done.

The present study has shown tbe Parthenium as the most common allergen detected in the patch test. This result is similar to that of Bajaj *et al.*,[82] where the allergen was detected in 14.5% cases, which was the highest among all, where it was the second most common in Shenoi SD *et al.*,[19,20,22] and Raghu *et al.* [22]

The second most common allergen in our study was Potassium dichromate whereas it was the predominant allergen in the study conducted by Kishore NB *et al.*, Raghu *et al.*, and Shenoi SD *et al.* Nickel sulphate, the third most common allergen in our study, has been reported as second common allergen in the above studies compared.[19,22]. Neomycin sulphate has been reported as the fourth common allergen which was the third common allergen in Kishore NB *et al.*, and Raghu *et al.*[19,22] Though the rest of allergens were positive variably, Parthenium, potassium dichromate and nickel sulphate were positive and were more common among the studies compared. Patch test was negative for allergens in 22 percent cases similar to the observations done by Kishore NB *et al.*,(28%) whereas Bajaj *et al.* demonstrated 40% negative patch tests[32].

Dermatological Life Quality Index: Mean DLQI in our study was found to be 8.96 with the standard deviation being at 3.398 similar to the observations by Charan *et al.*, 9.54 as the mean DLQI.[14] The limitation of the present study incorporated 50 patients and large sample size would have better statistical significance. There may be inter-observer variation in grading the patch test reading.

Conclusion

This study has shown that the trend of eczematisation was found to be nearly equal in both sexes with slight rise of female cases. This has been attributed to exposure to irritants and allergens in daily household chores and repeated minor trauma, whereas the males working as unskilled labours were the predominant group of cases. The increased prevalence of hand and foot eczema was observed in 3rd and 5th decade as these group constituted the economically productive proportion of the study group. Unskilled workers like mason were more prone to develop hand and foot eczema because of the lack of availability of personal protective measures. This has been correlated with the higher percentage of chromate positivity in patch tests. Pruritus was observed invariably in all patients and other symptoms in variable proportion. These symptoms have contributed to significant morbidity to the patients. Hand was more commonly affected compared to foot as compared to the previous studies. Patchy vesiculo-squamous was the most common type of eczematous pattern followed by hyperkeratotic eczema. Pompholyx has been commonly observed in patients with atopic eczema. Atopic history was found to be positive at a percentage comparable to previous studies. Detergents, cement, plants like parthenium and vegetables like garlic, onion have been found to be the common triggering agents in our study. The percentage of patients who achieved resolution on avoidance of allergens or irritant was found to be higher compared to previous studies. Relatively high degree of positivity was found in our patients and the Indian standard patch test series serves as a useful tool in diagnosing the allergen. Parthenium was the most common allergen detected in the patch test followed by Potassium dichromate and nickel sulphate. Allergic and irritant reaction to sanitation products was found to be on the rise, considering the prevailing pandemic era and the percentage of health care workers observed in our study. Mean DLQI in our study was 8.96, similar to the previous studies, denotingthe significant morbidity implied on the patients.

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