

# OBSERVATIONAL STUDY

## Occupational skin diseases among institutional housekeeping personnel in a government hospital

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**Background:** Occupational dermatoses are among the most commonly encountered occupational-related diseases worldwide, with housekeeping personnel among those at high risk. Disease impact to the individual and public health includes prolonged absences and unemployment leading to decreased quality of life.

**Objectives:** We determined the point prevalence, types, and effects on quality of life of occupational skin diseases among institutional housekeeping personnel in a selected government hospital.

**Methods:** A single-center, cross-sectional study was utilized. A total of 91 respondents participated in the study. A self-administered, validated questionnaire was used to inquire about skin symptoms, work history and exposures, glove use, and effect on quality of life. All respondents with self-reported symptoms of eczema underwent dermatologic evaluation and ancillary procedure/s including patch testing was performed for indicated cases.

**Results:** Prevalence of occupational dermatoses was 62%. The most common diagnosis was allergic contact dermatitis (56%). Most of the respondents reported itching and redness, which was mainly located on the hands (64%). Clinical findings showed a predominance of papules (48%), plaques (44%), and scales (37%). Detergent (powder and liquid) and latex gloves were the most common self-identified sensitizers. The most common contact allergen identified by patch test was nickel (34%,  $p=0.000$ ) and potassium dichromate (14%,  $p=0.009$ ). A total of 32% reported that their dermatologic symptoms affected their quality of life, especially their sleep (45%) during the past 12 months. Conclusion: Contact dermatitis is the most common occupational dermatosis among institutional housekeeping personnel. Self-reporting of eczema and skin symptoms strengthens the diagnosis of contact dermatitis which affects quality of life. The results of this study are an essential aid in the planning and implementation of guidelines by appropriate government and private agencies for occupational health and safety in the study population.

*Keywords: occupational skin disease, environmental and contact dermatitis, allergic contact dermatitis, institutional housekeeping personnel, patch test*

### INTRODUCTION

Occupational disease is defined as “any disease contracted as a result of an exposure to risk factors arising from work activity”.<sup>1</sup> Main elements include: “(1) causal relationship between exposure in a specific working environment or work activity and a specific disease; and (2) the fact that a disease occurs among a group of exposed persons with a frequency above the average morbidity of the rest of the population”.<sup>1</sup> Criteria for evaluation of occupational diseases are based on critical review of presented evidence and include the following: strength of association, consistency, specificity, temporality, biological gradient and plausibility, coherence, and interventional studies.<sup>1</sup>

Occupational skin diseases (OSDs) are among the most commonly encountered occupational-related diseases comprising 25% of cases worldwide.<sup>2</sup> Studies have confirmed the high prevalence of work-related dermatitis in housekeeping personnel as compared to other occupations.<sup>3,4</sup> Occupational risk exposure

is especially relevant in the hospital setting where housekeeping personnel are exposed to unique occupational hazards: biological, physical, chemical, ergonomic, and safety hazards.<sup>3,5</sup> A review of epidemiologic literature also revealed that dermatologic diseases ranked the 2<sup>nd</sup> most common in this group, as they are prone to developing a wide range of occupational skin diseases due to exposure to cleaning agents and latex.<sup>6</sup>

Of the OSDs, the most common are the occupational contact dermatitis (OCDs), both irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD), comprising up to 90-95% of identified cases.<sup>2,7</sup> It is often difficult to clinically distinguish between ICD and ACD but clues would be the absence of vesiculation (unless the irritants are very strong to produce the lesions), excessive burning rather than itching, and no spreading beyond the area of contact with continued exposure for ICD. Patch testing is recommended in suspected cases of recurrent ICD in order to exclude an allergic cause. It shows a type IV hypersensitivity reaction where development of a patch of eczema is observed clinically on the exposed area of a previously sensitized patient. Patch test reading is done at 48 and 72 hours after application.<sup>8,9,10</sup> The mainstay of treatment for both ICD and ACD is identification and avoidance of the potential allergen or irritant.

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It is important to have a broad understanding of the environmental workplace where the exposure may have come from, as various factors are involved in the development of occupational contact dermatitis. Thus, public health in the form of prevention through health education and occupational protection measures is crucial.<sup>10</sup> Local and international epidemiologic studies on occupational skin diseases utilize questionnaires as a tool to screen and monitor occupational skin diseases in a population or workplace. The Nordic Occupational Skin Questionnaire (NOSQ-2002) was designed from a compilation of existing questionnaires and study protocols such as the Finnish Touhilampi questionnaire, Copenhagen Allergy Study 1990 and 1998, Swedish studies by Birgita Meding and coworkers, and the Danish Work Environment Cohort Study. The NOSQ-2002 has been compiled in English and can be translated according to established guidelines.<sup>11,12</sup>

Occupational skin diseases have significant socioeconomic and personal impact due to prolonged absences from work and unemployment leading to a decreased quality of life. Lushniak in 2004 identified three factors of OSDs: 1) occupational skin diseases are common; 2) they often have a poor prognosis; and 3) they result in a noteworthy economic impact for society and for an individual.<sup>7</sup> Perceptions of affected workers are also a contributing factor to the burden and persistence of these diseases. A qualitative study in 2012 where patients with contact dermatitis were asked to participate in semi-structured guided interviews showed that a majority had perceived barriers on skin protection and rejected personal accountability for the disease.<sup>13</sup> These studies reflect underreporting and show that there are still gaps in the prevention of occupational related diseases.

This study aimed to determine the point prevalence, types, and effects on quality of life of occupational skin diseases among institutional housekeeping personnel in a selected government hospital in the Philippines. This is the first dermatologic prevalence survey among institutional housekeeping personnel in the identified government hospital. The results of this study will greatly contribute to the literature on occupational and environmental medicine in the country as well as provide a starting point for improving public health measures for the prevention of environmental and occupational-related skin diseases and the promotion of safety measures among health-related institutions in the country.

## METHODOLOGY

This was a cross-sectional study conducted at the East Avenue Medical Center (EAMC) Philcare Manpower Services Unit (PMSU) among institutional housekeeping personnel from June to August 2015 using a self-administered questionnaire. The adjusted sample size was computed using random sampling to compute for estimation of proportion at  $n = 86$ , with 50% frequency, 95% confidence interval, and a design effect of 1. Inclusion criteria were all institutional housekeeping personnel and those with self-reported dermatological signs and symptoms during the past 12 months. The protocol was reviewed and approved by the Institutional Ethics Review Board (IERB) of the EAMC prior to study conduct. Informed consent was obtained prior to study participation.

Demographic data and environmental and occupational characteristics were gathered from all participants using a Patient

Demographic and Occupational Questionnaire. Questions were formulated based on the workplace characteristics of the target population working in the local institution and on the Nordic Occupational Skin Questionnaire.<sup>14</sup> Pre-testing was done on a sub-population of the institutional housekeeping personnel to ensure similar characteristics and environmental and occupational exposures. The questionnaire was revised as needed to ensure communicability and clarity to the respondents. Proper translation procedures were followed based on the guidelines developed by the Nordic Occupational Skin Questionnaire.<sup>11</sup>

All respondents reporting dermatological signs and symptoms were scheduled for evaluation at the Dermatology Out-Patient Department of EAMC, which included a complete dermatological history and cutaneous examination. Diagnostic tests were done as deemed necessary based on the clinical findings. Potassium hydroxide examination (KOH) was performed to detect fungal infection, while patch testing was performed on patients suspected to have contact dermatitis. The European Standard Patch Test Series with 29 allergens was used. Test patches were removed and test areas assessed on days 2, 4, and 7. Test results were interpreted based on the International Contact Dermatitis Research Group (ICDRG) scoring system.<sup>8,10</sup>

Input and descriptive analyses of data were performed using Microsoft Excel. Study forms were validated and double-encoded to ensure accuracy of data. Chi-square tests and Fisher-exact tests were used for testing and associations of results. A “statistically significant” finding refers to  $p < 0.05$  in two tailed tests.

## RESULTS

A total of 91 respondents participated in the study. The average age was 33 years ( $SD=9$ ), with age range from 18 – 57 years. A significant majority were males (58%) and single (58%). Most of the respondents (89%) worked solely as institutional housekeeping personnel, while 10 out of 91 (11%;  $p=0.000$ ) reported other jobs as laundry washer (3), carpenter (1), cook (1), food delivery person (1), gardener (1), electrician (1), massage therapist (1), motor agent/dealer (1), and painter (1). The most assigned work area was the wards (50%) (Figure 1). The average work duration was 1 year, ranging from 1 to 180 months while the average work duration per day was 8 hours ( $SD=3$ ), ranging from 3 – 12 hours.

Among the respondents, 31 out of 91 (34%;  $p=0.000$ ) reported eczema located on the hands (20, 64%,  $p=0.000$ ), arms (8, 26%), face (3, 10%), feet (3, 10%), legs (2, 6%), neck (1, 3%), and trunk (1, 3%) (Figure 2). Out of the 31 who reported eczema, 7 (23%;  $p=0.000$ ) noted worsening of eczema after contact with liquid and powder detergent (6, 86%), gloves (1), detergent soap (1), silver watch (1), efficascent oil (1), and perfume (1) (Figure 3). At least one dermatological symptom was reported by 37 out of 91 respondents (41%;  $p=0.005$ ). The most common symptom was itching (35%;  $p=0.000$ ) followed by redness (23%;  $p=0.000$ ) (Table 1). Half of the respondents reported improvement in eczema when they were away from their normal work (during longer rest periods such as weekends, for instance).

A total of 83 respondents (91%;  $p=0.000$ ) used protective gloves at work. The most common type of gloves used was

latex (69%;  $p=0.000$ ) (Table 2). Out of those who used gloves, 21 (25%;  $p=0.000$ ) experienced skin symptoms. Of the 21, 10 (48%;  $p=0.758$ ) changed glove type or stopped using gloves at an average of 3 months (1 day to 36 months). More than half of the respondents were in charge of cleaning agents (78%), wet work (71%), soil waste or other dirt (71%), and dust (69%). A significant majority carried out their tasks for less than 30 minutes except those handling cleaning agents to which most respondents were exposed for more than 2 hours (Table 3). A total of 29 respondents (32%;  $p=0.005$ ) reported that eczema had affected their quality of life during the past 12 months, especially their sleep (13, 45%), their job in terms of lost workdays or change of job (7 of 29, 24%), their financial status (7, 24%), social activities (7, 24%), mood (7, 24%), travel (6, 21%), housework (5, 17%), close personal relations (1, 3%), and sports and similar activities (1, 3%).

Cutaneous examination was done on 37 (41%;  $p=0.012$ ) respondents, 10 of which (27%) were lost to follow-up. The most common dermatologic signs were papules (48%) followed by plaques (44%) and scales (37%) (Table 4). Prevalence of occupational dermatoses was 62%. A significant majority was diagnosed with ACD (15, 56%) (Table 5). Patch testing was done in 29 respondents (32%;  $p=0.000$ ). However, 13 of 29 (45%;  $p=0.431$ ) were lost to follow-up. The most common allergen based on patch test after 42 and 72 hours was nickel (II) sulfatohexahydrate (28%, 34%;  $p=0.000$ ) (Table 6 and Figure 4).

## DISCUSSION

### *Demographic Data*

A majority of the respondents in the study were males and single. Other studies have cited variations on the demographic profile involving housekeeping personnel. In a study on workers including housekeeping personnel in 2012, most of the respondents were females (73%). Those with occupational dermatoses, however, were males (64%).<sup>14</sup> In another cross-sectional study of hospital housekeeping personnel, females outnumbered the male respondents.<sup>15</sup>

### *Self-reported Eczema and Allergens*

This study revealed 34% with self-reported eczema. The most common reported location was on the hands. In a study conducted in Spain in 2012, 28% of professional cleaners reported hand dermatitis as compared to 18% of the comparison population.<sup>16</sup> This is in line with a study by Kurpiewska et al. which revealed 64% of hospital cleaners reported work-related skin problems induced by cleaning agents and wet work with the latter defined as "skin exposed to liquids longer than 2 hours per day or very frequent washing of the hands (>20 times per day or less if the cleaning procedure is more aggressive)".<sup>17</sup> The most common self-reported allergen in this study was liquid and powder detergent. This is similar to a study conducted on workers with occupational contact dermatitis where the highest reported exposure was to cleaning agents (78%).<sup>14</sup> These findings reflect studies in literature where contact allergens or irritants such as soaps or toxic agents are the most common cause of hand eczema.<sup>18</sup>

### *Self-reported Symptoms*

The most common self-reported symptom in this study

was itching (35%;  $p=0.000$ ). This is consistent with both local and international studies. In the local setting, a few studies have been done on occupational skin diseases. A cross-sectional study revealed hand eczema prevalence of 34% among Manila-based dentists, with itching as the most frequently reported symptom.<sup>19</sup> In an epidemiological review done in 2009, the most common self-reported symptom was also itching.<sup>6</sup>

### *Task Related Exposures and Glove Use*

A study by Holness and Kudla describing the workplace characteristics, exposures, and prevention practices of workers being assessed with OCD showed that the highest reported exposure in the workplace is to cleaning agents (78%), with glove use more common among workers exposed to wet work (97%). Only 25% of those workers reported training related to glove use, revealing some gaps in occupational health and safety training and practices.<sup>14</sup> This is also reflected in this study as some respondents reported lack of glove use despite knowledge of safety training and practices. Bathe et al. also reported that perceived barriers on skin protection and rejected personal accountability were among the identified reasons for not using gloves.<sup>13</sup>

### *Dermatological Signs*

The most common dermatologic signs in this study were papules (48%) followed by plaques (44%) and scales (37%). Signs and symptoms of contact dermatitis include pruritus, erythema, edema, and vesicles. Plaques also occur especially on chronic areas of contact with lichenification, hyperkeratosis, and fissures.<sup>8</sup>

### *Effect on Quality of Life*

Most of the respondents in this study reported that occupational disease affected their quality of life, especially their sleep. In a study by Hutchings et al., patients with occupational contact dermatitis reported that their symptoms and feelings were most affected while leisure activities were least affected.<sup>20</sup>

### *Dermatological Diagnoses*

In this study, the prevalence of occupational dermatoses was 62% and the most common diagnosis was ACD (56%). Studies in literature state that ICD is the most common type of contact dermatitis.<sup>21</sup> In a study by Nettis et al., both types have been shown to be work-related among those in a healthcare setting (44.4% were work-related ICD, while 16.5% were ACD).<sup>22</sup> The diagnosis of ICD is clinical with the exclusion of ACD through patch testing. This study used patch testing to confirm ACD among suspected cases. Furthermore, workers in the healthcare setting are more likely to have work-related ACD as compared to other population groups<sup>23</sup>

### *Identified Allergens Among Patch Tested Respondents*

The most common identified allergen by patch test (after 42 and 72 hours) in this study was nickel (II) sulfatohexahydrate (28%, 34%;  $p=0.000$ ) followed by potassium dichromate then

thiuram mix. Studies have also shown these allergens to be highly prevalent in the hospital setting. Nickel is found not only in metal industries but also in hospitals through electrical wiring, dyes, paint, and wallpapers. Potassium dichromate can also be found in fabrics, wood preservatives, glues, and most especially in detergents. Cobalt is usually found in nickel-plated objects, which is why it is found to be present in those with nickel sensitivity.<sup>6</sup> A cross-sectional study on hospital housekeeping personnel in an international setting revealed the top 3 allergens to be nickel, potassium dichromate, and cobalt.<sup>15</sup>

The study was limited to estimating the point prevalence of occupational skin diseases in the target population. Observation bias was present but minimized through standardization of the questionnaire, as well as patient clinical interview and record of clinical findings, diagnostic results, and diagnosis. The results of this study are limited to institutional housekeeping personnel in the identified government hospital and cannot be generalized to other populations and settings.

We propose the results of this study to be forwarded to the Philcare Manpower Services Unit and the Quality Management Office of the aforementioned hospital, as well as the Occupational Safety and Health Center of the Philippine Department of Labor and Employment (DOLE) as a step towards planning and implementation of standards and guidelines for occupational

health and safety in the study population. Further studies could also be done regarding the knowledge, attitudes, and practices of housekeeping personnel to reveal gaps in safety and prevention practices.

## CONCLUSION

Contact dermatitis remains the most common occupational dermatosis among institutional housekeeping personnel which affects their quality of life. The most common identified allergen remains to be nickel (II) sulfate hexahydrate. Baseline research on occupational dermatoses is essential towards improving environmental and occupational research in the Philippines. Findings from this study may be considered when drafting standards and guidelines for occupational health and safety of hospital housekeeping personnel.

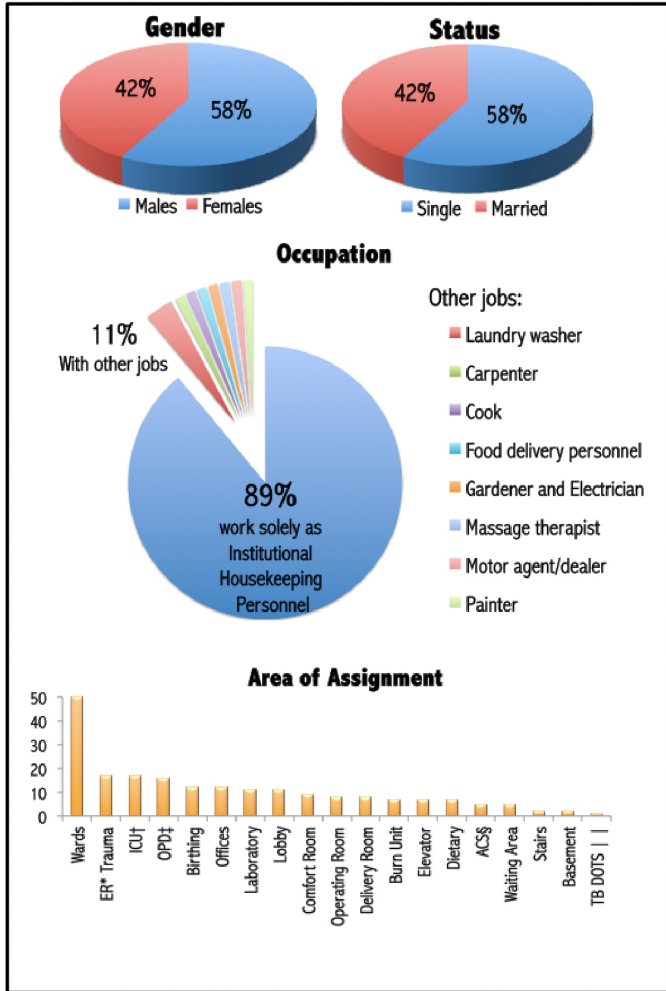
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\*Emergency Room, †Intensive Care Unit, ‡Out Patient Department, §Ambulatory Care Services, || Tuberculosis Direct Observed Treatment Services

Figure 1. Demographic Data of Institutional Housekeeping Personnel

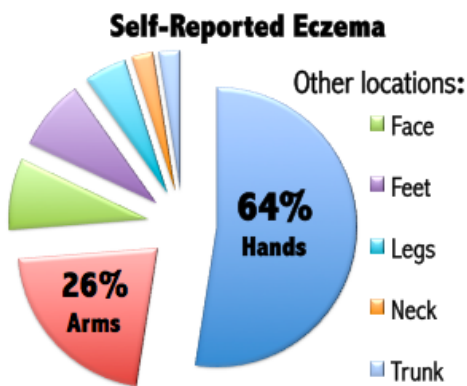


Figure 2. Location of Self-Reported Eczema

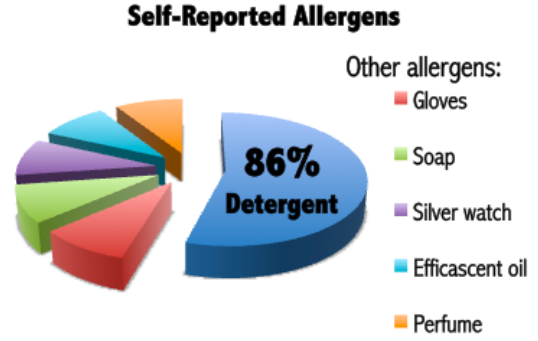


Figure 3. Self-Reported Allergens

Table 1. Self-reported Symptoms

Symptoms	Summary Statistic n=91	p-value
Itching	32 (35%)	0.000*
Redness	21 (23%)	
Burning or stinging	14 (15%)	
Papules	13 (14%)	
Dry skin with scaling/flaking	11 (12%)	
Wheals	10 (11%)	
Weeping or crusts	9 (10%)	
Fissures or cracks	8 (9%)	
Tiny water blisters (vesicles)	4 (4%)	
Aching or pain	2 (2%)	

\* Significant at 5% level

**Table 2.** Types of Gloves Used

Type of Gloves	Summary Statistic	p-value
<b>n=83</b>		
Latex	<b>57 (69%)</b>	<b>0.000*</b>
Synthetic Rubber (e.g., nitrile, neoprene, etc.)	31 (37%)	
Cotton underneath rubber or plastic	3 (4%)	
Plastic (e.g. vinyl, PVC, polyethylene)	2 (2%)	
Leather	1 (1%)	
Cloth	1 (1%)	

**Table 3.** Task Related Exposures

Tasks	n (%)	Less than 30 minutes	30 minutes to 2 hours	More than 2 hours	p-value
Cleaning agents	71 (78%)	23 (32%)	17 (24%)	31 (44%)	0.044*
Wet work	65 (71%)	30 (46%)	16 (25%)	19 (29%)	0.023*
Soil waste or other dirt	65 (71%)	27 (42%)	13 (20%)	25 (39%)	0.019*
Dust (wood dust, grinding dust, paper dust)	63 (69%)	26 (41%)	12 (19%)	25 (40%)	0.013*
Preparing food/handling food	38 (42%)	23 (60%)	12 (32%)	3 (8%)	0.000*
Plants	31 (34%)	22 (71%)	4 (13%)	5 (16%)	0.000*
Insects	25 (28%)	19 (76%)	3 (12%)	3 (12%)	0.000*
Solvents	24 (26%)	14 (58%)	5 (21%)	5 (21%)	0.006*
Oils, cutting fluids	22 (24%)	16 (73%)	4 (18%)	2 (9%)	0.000*
Sealants, putty, plaster, flooring agents, cement, etc.	18 (20%)	13 (14%)	2 (2%)	3 (3%)	0.000*
Paints, lacquers, coatings	17 (19%)	15 (88%)	-	2 (12%)	0.000*
Glues, adhesives	17 (19%)	15 (88%)	-	2 (12%)	0.000*

**Table 4.** Dermatological Signs on Cutaneous Examination

Signs	Summary Statistic	p-value
<b>n=27</b>		
Papules	13 (48%)	<b>0.000*</b>
Plaques	12 (44%)	
Scales	10 (37%)	
Dry Skin	8 (30%)	
Excoriations	8 (30%)	
Macules	3 (11%)	
Patches	3 (11%)	
Fissures	1 (4%)	

**Table 5.** Dermatological Diagnoses

Diagnosis	Summary Statistic	p-value
<b>n=27</b>		
<b>Occupational Dermatoses</b>		
Allergic Contact Dermatitis	15 (56%)	<b>0.000*</b>
Tinea corporis	1 (4%)	
<b>Non-Occupational Dermatoses</b>		
Insect Bite Dermatitis	3 (11%)	
Atopic Dermatitis	1 (4%)	
Melasma	1 (4%)	
Post-inflammatory hyperpigmentation	1 (4%)	
Seborrheic dermatitis	1 (4%)	
Syringoma	1 (4%)	
Tinea corporis	1 (4%)	
Xerosis	1 (4%)	

Table 6. Identified Allergens by Patch Test

Allergen	After 42 hours		After 72 hours	
	n (%)	p-value	n (%)	p-value
Nickel (II) sulfatehexahydrate	8 (28%)	0.000*	10 (34%)	0.000*
Potassium dichromate	3 (10%)	0.030*	4 (14%)	0.009*
Cobalt (II) chloridehexahydrate	3 (10%)	0.030*	2 (7%)	0.099
Thiuram mix	2 (7%)	0.099	3 (10%)	0.030*
Colophonium	2 (7%)	0.099	2 (7%)	0.099
Paraben mix	2 (7%)	0.099	2 (7%)	0.099
Sesquiterpene lactone mix	2 (7%)	0.099	1 (3%)	0.319
2-Methoxy-6-n-pentyl-4-benzoquinone	2 (7%)	0.099	1 (3%)	0.319
Neomycin sulfate	1 (3%)	0.319	-	-
Lanolin alcohol	1 (3%)	0.319	1 (3%)	0.319
4-tert Butylphenol formaldehyde resin	1 (3%)	0.319	1 (3%)	0.319
(PTBP)				
2-Mercaptobenzothiazole (MBT)	1 (3%)	0.319	1 (3%)	0.319
Fragrance mix I	1 (3%)	0.319	2 (7%)	0.099
Quarternium-15	1 (3%)	0.319	-	-
Budesonide	1 (3%)	0.319	-	-
Tixocortol-21-pivalate	1 (3%)	0.319	1 (3%)	0.319
MethyldibromoGlutaronitrile	1 (3%)	0.319	2 (7%)	0.099
Fragrance mix II	1 (3%)	0.319	2 (7%)	0.099
Methylisothiazolinone	1 (6%)	-	-	-
p-Phenylelenediamine (PPD)	-	-	1 (3%)	0.319
Benzocaine	-	-	-	-
Clioquinol	1 (3%)	0.319	-	-
N-isopropyl-N-phenyl-4-	-	-	-	-
phenylenediamine (iPPD)				
Mercapto mix	-	-	-	-
Epoxy resin, Bisphenol A	-	-	-	-
MyroxylonPereirae Resin	1 (3%)	0.319	2 (7%)	0.099
Formaldehyde	-	-	1 (3%)	0.319
Methylisothiazolinone +	-	-	1 (3%)	0.319
Methylchloroisothiazolinone				
Hydroxyisohexyl 3-Cyclohexene	-	-		
Carboxaldehyde				

\* Significant at 5% level



Figure 4. Extremely positive (+++) patch test result to Nickel (II) sulfatehexahydrate