

Incidence Of Irritant Contact Dermatitis Due to Hand Sanitizer Overuse and Excessive Hand Washing in Health Care Workers in NICU

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ABSTRACT

Aim: To prove a relationship between the development of irritant contact dermatitis and overuse of hand sanitizer and excessive handwashing in healthcare workers working in the NICU.

Methods and Materials: A direct observational study was conducted for a duration of six months between July 2022 to December 2022 including all health workers (consultants, resident doctors, and nurses) posted in the NICU, and other visitors were excluded from the study. Out of the total 42 participants. 10 were male and 32 were female. Ethical approval was taken from NKP SIMS Lata Mangeshkar hospital and the research center.

Results: 16 (38.09%) participants 10 Resident doctors, and 6 nurses developed mild symptoms (Dry skin and itching), 2 (4.76%) participants 1 Resident doctor, and 1 nurse developed moderate symptoms, 2 (4.76%) participants 1 Resident doctors, and 1 nurse developed Severe (Blisters) symptoms, and 22 (52.38) participants 8 consultants, 6 Resident doctors, and 8 nurses did not have any symptoms.

Conclusion: From this prospective cohort study, we can successfully conclude that a direct correlation is present between the excessive use of alcohol-based sanitizers and detergent-based hand soaps and the development of irritant contact dermatitis in the healthcare workers posted in the NICU.

KEYWORDS: handwashing, counselling, and guidance.

1. INTRODUCTION

Irritant contact dermatitis (ICD) is among the most common dermatological manifestations and one of the primary causes of occupational skin diseases. ¹ ICD manifests as trivial symptoms like irritation, itching, and psychological consequences which have a detrimental effect on the quality of life as well as work productivity. The following study aims to prove a relationship between the overuse of hand sanitizers and

the practice of hand washing with the development of irritant contact dermatitis in resident doctors and the staff posted in the NICU. Contact dermatitis is of two types- the first, irritant contact dermatitis is described as a non-specific response of the skin to direct chemical damage that releases mediators of inflammation from epidermal cells. A case of allergic contact dermatitis is a delayed (type 4) hypersensitivity reaction to exogenous contact antigens. Immunological responses are due to the interaction of cytokines and T cells. ² In the case of ICD, the manifestations are due to prolonged and repeated exposure to substances that chemically abrade, physically irritate and/ or damage the superficial layer of skin leading to lesions that are well-circumscribed with a parched or scalded appearance. These lesions resolve spontaneously when the offending agent, in this case, the soaps used for hand washing or the hand sanitizers is removed. The susceptibility to these irritants varies with every individual, however, given significant exposure, anyone can develop ICD. ³ Hand hygiene products damage the skin by causing denaturation of stratum corneum proteins, changes in intercellular lipids (either depletion or reorganization of lipid moieties), decreased corneocyte cohesion, and decreased stratum corneum water-binding capacity. Among these, the main concern is the depletion of the lipid barrier that may be consequent to contact with lipid-emulsifying detergents and lipid-dissolving alcohols. Frequent handwashing leads to the progressive depletion of surface lipids resulting in deeper action of detergents into the superficial skin layers. During dry seasons and in individuals with dry skin, this lipid depletion occurs more quickly. ⁴ By means of this prospective cohort study, a possible correlation is expected to be made regarding the hand washing practices and the use of hand sanitizers in doctors and the staff of NICU.

Contact dermatitis accounts for 95% of occupational skin disorders. Irritant contact dermatitis is often caused by cumulative exposure to weak irritants, accounting for 80% of all cases of contact dermatitis. Irritant contact dermatitis can co-exist with atopic dermatitis and allergic contact dermatitis. Patients with atopic dermatitis and allergic contact dermatitis may have a lower inflammatory threshold for developing irritant contact dermatitis. Therefore, it needs to be distinguished from lesions of atopic dermatitis and allergic contact dermatitis. ⁵ When irritant contact dermatitis lesions occur after exposure to a substance (even in small concentrations), effects may accumulate due to repeated influence commonly leading to chronic skin damage and skin lesions. It is also important that in irritant contact dermatitis, occlusion decreases the skin barrier function and significantly enhances the irritant-induced barrier-damaging effects. Also, according to research data, in irritant-exposed fields the natural moisturizing factor values were significantly decreased compared to non-exposed fields, indicating that occlusion enhanced decrease in the natural moisturizing factor. ⁶ The most common skin irritant is wet work followed by soaps, detergents, solvents, and oils. Wet work has been defined as-

1. Exposure of skin to liquid for > 2 h per day
2. Use of occlusive gloves for > 2 h per day or change of gloves > 20 times per day
3. Frequent hand washing > 20 times per day or use of hand disinfectants > 20 times per day⁷

Irritant contact dermatitis is often found on the hands of healthcare workers and is generally caused by frequent hand washing, gloves, aggressive disinfectants, or

detergents. Alcohols have only a marginal irritation potential, although they may cause a burning sensation on pre-irritated skin. A burning sensation when using alcohol, therefore, suggests that the skin barrier is already damaged.⁸

2. AIM AND OBJECTIVE

To prove a relationship between the development of irritant contact dermatitis and overuse of hand sanitizer and excessive handwashing in healthcare workers working in the NICU. A direct observational study was conducted for a duration of six months between July 2022 to December 2022 including all health workers (consultants, resident doctors, and nurses) posted in NICU and other visitors were excluded from the study. Out of the total 42 participants, 10 were male and 32 were female.

3. METHODS

A prospective cohort study of 42 health workers posted in the NICU was carried out, out of which 9 showed signs and symptoms of irritant contact dermatitis. The signs and symptoms include extreme itching, redness, blisters, swelling, dry skin, and a host of other trivial symptoms. These symptoms occurred showed a positive correlation with excessive use of both, hand sanitizer as well as hand soap used for washing hands in the NICU. The health workers that were posted in the NICU showed relief from the abovementioned symptoms when they stopped the frequent use of hand sanitizers and hand soap.

COLLECTION OF DATA

A thorough study was conducted which consisted of closely monitoring the behaviors of 42 individuals who were posted in the NICU, between July 2022 to December 2022 in Lata Mangeshkar Hospital, Nagpur. The resident doctors washed their hands using a detergent-based soap an average of once every 10 minutes, that is once after checking one patient in the NICU. Similarly, they used the hand sanitizer once every 10 mins after washing their hands before the examination of the patient. Therefore, on average, the doctors washed their hands and used the sanitizer around 50-70 times a day.

ETHICAL STATEMENT

Ethical clearance was obtained from an ethical review board NKPSIMS & LMH & Research Centre, Nagpur. The case file information was identified during data collection and was coded.

STATISTICAL TECHNIQUES USED:

The obtained data will be statistically analysed by applying descriptive (Average, percentile, mean,) of the significance of mean differences in terms of various variables. We will enter all data and further Statistical Analysis will be done with the help of SPSS-24 software.

4. RESULTS

Table No. I-

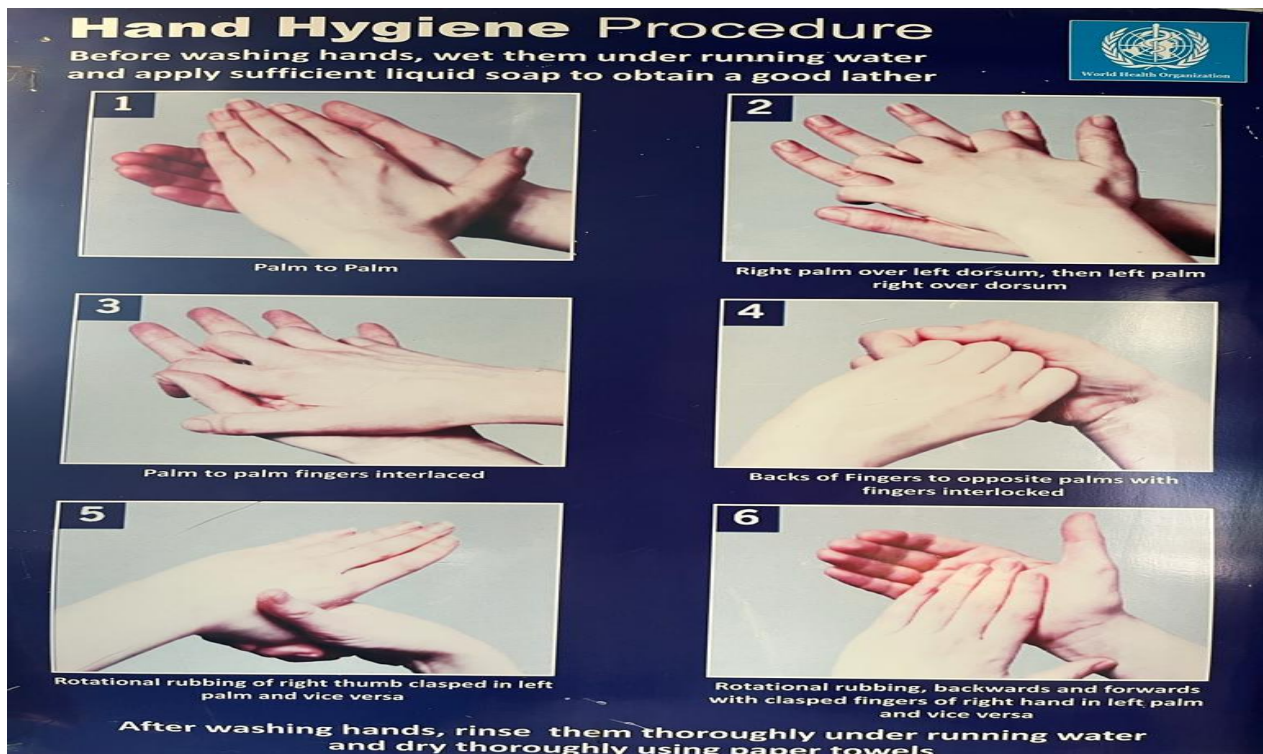
		NO OF PARTICIPANTS
GENDER	MALE	10 (23.80%)
	FEMALE	32 (76.19%)
	TOTAL	42
PARTICIPANTS		NUMBER
	CONSULTANTS	8 (19%)
	RESIDENT DOCTORS	18 (42.8%)
	NURSES	16 (38%)

The Present study shows out of the total health workers (participants) posted in NICU in a rotation period of 3 months in a duration of 6 months is 42. Out of 42 participants, 10 (23.8%) are male, and female participants 32 (76.19%). Out of the total participants, consultants were 8(19%), Resident doctors 18(42.8%), Nurses 16(38%) for a duration of 6 months.

Table No. II-

SEVERITY LEVEL	CONSULTANTS	RESIDENT DOCTORS	NURSES	Total
MILD (DRY SKIN, ITCHING)	0	10	6	16 (38.09%)
MODERATE	0	1	1	2 (4.76%)
SEVERE(BLISTERS)	0	1	1	2 (4.76%)
NONE	8	6	8	22 (52.38%)

The resident doctors washed their hands using a detergent-based soap an average of once every 10 minutes, that is once after checking one patient in NICU, total no of admission in 20 in NICU. therefore, on average, the doctors washed their hands and used the sanitizer around 30 times/2 rounds and 60 times/3 rounds out of which 16 (38.09%) participants 10 Resident doctors, and 6 nurses developed mild symptoms (Dry skin and itching), 2 (4.76%) participants 1 Resident doctors, and 1 nurse developed moderate symptoms, 2 (4.76%) participants 1 Resident doctors, and 1 nurse developed Severe (Blisters) symptoms, and 22 (52.38) participants 8 consultants, 6 Resident doctors, and 8 nurses did not have any symptoms.

Figure I. WHO hand Hygiene Procedure ⁹

5. DISCUSSION

The result of this study clearly represents a positive correlation in the incidence of irritant contact dermatitis in the staff posted in the NICU which can be directly linked to the overuse of alcohol-based hand sanitizers and hand washes used in the NICU. This study closely monitored the behaviors of resident doctors, nurses, and consultants in the NICU who made a record of their hand hygiene habits. The sanitizer, used in Lata Mangeshkar Hospital, has the active ingredient of propanol and mecetronium ethyl sulphate which causes damage to the skin by causing denaturation of stratum corneum proteins, changes in intercellular lipids (either depletion or reorganization of lipid moieties), decreased corneocyte cohesion and decreased stratum corneum water-binding capacity. The detergent-based hand soaps cause the depletion of the lipid barrier that may be consequent to contact with lipid-emulsifying detergents. These products chemically abrade and physically irritate and cause damage to the superficial layer, thus, causing irritant contact dermatitis. The ICD manifests as a host of trivial symptoms such as redness, itching, pain, and blisters which cause significant irritation and a decrease in work productivity as well as the quality of life. However, there is no alternative available when working in the NICU as complete asepsis is of prime importance when handling babies in the neonatal intensive care unit. The doctors and nurses that developed symptoms of irritant contact dermatitis used a combination of emollients and moisturizers to get relief from the symptoms. However, the best way to get relief is to stop the use of the offending agent, in this case, hand sanitizers and/or hand washes.

6. CONCLUSION

From this prospective cohort study, we can successfully conclude that a direct correlation is present between the excessive use of alcohol-based sanitizers and detergent-based hand soaps and the development of irritant contact dermatitis in the healthcare workers posted in the NICU.

7. LIMITATIONS

The results of our study are not without limitations. The Current Study was administered within a single hospital setting in an urban area and thus may not be generalizable to other facilities.

8. **FINANCIAL SUPPORT AND SPONSORSHIP-** The authors have indicated they have no financial relationships relevant to this article to disclose.

9. **CONFLICT OF INTEREST-** The authors declare that they have no conflict of interest.

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