

# A Study to Assess the Prevalence of Skin Injuries Related to the Use of Personal Protective Equipment (PPE) in COVID-19 Areas among the Nursing Staffs in Selected Hospital, Gurugram, Haryana

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**Running Title:** Prevalence of Skin Injuries Related to use of PPE in COVID-19 areas among Nursing Staffs

**Abstract:** ***Objective:** To investigate the prevalence of skin injuries related to use of PPE in COVID-19 areas among the Nursing staff. **Approach:** A cross-sectional survey was conducted for understanding skin injuries among nursing staff working in COVID-19 area in Fortis Memorial Research Institute, Gurugram. Participants voluntarily answered and submitted the questionnaire. The questionnaire items included demographic data, skin injury types, and anatomical sites. **Results:** Out of 72 nursing staffs working in COVID-19 areas, 55 respondent's data were collected and validated. The overall prevalence of skin injuries was 64.5% among the nursing staffs. The device-related pressure injuries (DRPI) was 72.2% and moisture-associated skin damage (MASD) was 49.0%. 12.7% of the nursing staffs were affected with at least one episode of contact-dermatitis. **Conclusion:** The skin injuries among nursing staff are serious, with insufficient prevention and treatment. A step-by step guide to prevent PPE related skin injury must be formulated in the organization.*

**Keywords:** Skin Injury, Personal Protective Equipment (PPE), Nursing Staff, COVID-19;

## 1. Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness<sup>1</sup>

Skin injuries among health care workers wearing personal protective equipment (PPE) are prevalent and as much as half are going untreated, according to a new article published in *Advances in Wound Care*. As many as 80% of the workers reported that different skin injuries damaged their health and increased the risk of infection, investigators reported.<sup>2</sup>

Gloves, masks, goggles, protective clothing and coveralls, rubber boots and shoe covers are frequently used to protect medical staff from infection by the virus. However, their prolonged contact, mechanical pressure and repeated frictions may cause skin injury and diseases. In addition, protective products often contain rubber, plastic and other organic components, which may cause allergic dermatitis in susceptible individuals.<sup>3</sup>

### 1.1 Need for the Study

A study was conducted online for understanding skin injuries among medical staff fighting COVID-19 on February 2020. Participants voluntarily answered and

submitted the questionnaire with a cell phone. The researchers found the overall prevalence of skin injuries was 42.8 per cent with three types of PPE-related skin injuries: device-related pressure injuries, moist associated skin damage and skin tear.<sup>4</sup>

A study was conducted on the prevalence of adverse skin reactions to PPE among healthcare workers in Singapore during the SARS outbreak. Healthcare staff in the National Skin Centre and Tan Tock Seng Hospital were surveyed using questionnaires. 307 staff who used masks regularly reported acne (59.6%), facial itch (51.4%), and rash (35.8%) from N95 mask use. 64 (21.4%) of the 299 who used gloves regularly reported dry skin (73.4%), itch (56.3%), and rash (37.5%). The use of PPE is associated with high rates of adverse skin reactions.<sup>5</sup>

So the Investigator, felt the need to identify the prevalence of skin injuries related to use of PPE among nursing staffs in the COVID-19 area.

## 1.2 Research Methodology

### Research Approach

In present study the researcher has used cross-sectional survey approach as it is considered most suitable for the study

### Research Design

Quantitative- Survey design was adopted for the study

### Population

Population under study was nursing staffs working in COVID-19 area.

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**Settings**

The present study was conducted in Fortis Memorial Research Institute, (FMRI) Gurugram, Haryana

**Sampling Procedure**

In this study nursing staffs working in COVID -19 area were selected using random sampling technique

**Sample**

The sample of present study were staff nurses working in COVID-19 area in selected hospital of Gurugram, Haryana

**Research Setting**

The study was conducted in Fortis Memorial Research Institute (FMRI), Gurugram, Haryana. In the present study the population consisted of staff nurses who were working in COVID-19 area during the time of data collection

**Selection and Development of Tools**

The tools were prepared on the basis of the objectives of the study. The instruments in this study were:

**Part I:** Demographic data

**Part II:** Structured questionnaire to assess the Prevalence of skin injuries related to PPE in COVID-19 area

**Data Collection Process**

In order to conduct research study in Fortis Memorial Research Institute, permission was obtained from the Chief of Nursing of the hospital. The data, time and place was informed to the nursing staffs and the time scheduled is fixed. The Purpose of the study was explained and confidentiality of the nursing staffs was assured and consent was obtained. A Structured questionnaires consists of two parts were administered to 55 nursing staffs during 6<sup>th</sup> July 2020 to 14<sup>th</sup> July 2020. All the respondents cooperated with the investigator during the data collection process, which was terminated after thanking the respondents for their cooperation.

**Plan for Data Analysis**

Data were planned to be analyzed on the basis of objectives

- 1) Baseline proforma would be analyzed in terms of frequency and percentage
- 2) Prevalence of skin injuries related to PPE would be analyzed in terms of frequency and percentage

**2. Results**

Analysis and interpretation of the data collected from 55 nursing staffs was done based on the objective of the study using descriptive statistics

**2.1 Organizational of findings**

The data was analyzed and presented under the following headings:

**Section I: Sample Characteristics**

**Section II:** Significance of the prevalence of skin injury related to personal protective equipment (PPE) in COVID-19 area among the nursing staff

**Section: I**

**Table 1:** Frequency and Percentage distribution of sample characteristics, N= 55

S.No	Demographic Variables	Frequency (f)	Percentage %
<b>1</b>	<b>Gender</b>		
1.1	Male	16	29.1%
1.2	Female	<b>39</b>	<b>70.9%</b>
<b>2</b>	<b>Professional Qualification</b>		
2.1	G.N.M	<b>25</b>	<b>45.5%</b>
2.2	P.B.Sc Nursing	2	3.6%
2.3	B.Sc Nursing	<b>27</b>	<b>49.1%</b>
2.4	M.Sc Nursing	1	1.8%
<b>3</b>	<b>Years of Experience</b>		
3.1	0-1 year	17	30.9%
3.2	1-2 years	12	21.8%
3.3	2-3 years	5	9.1%
3.4	More than 3 years	<b>21</b>	<b>38.2%</b>
<b>4</b>	<b>COVID-19 Work Area</b>		
4.1	COVID-19 ICU	<b>35</b>	<b>63.6%</b>
4.2	COVID-19 Ward	20	36.4%
<b>5</b>	<b>Exposure to COVID-19 Nursing Management Training</b>		
5.1	Yes	<b>51</b>	<b>92.7%</b>
5.2	No	4	7.27%

Data presented in the table 1 reveals the following:

- 1) Gender**  
Majority of the staffs (70.9%) were female staffs, whereas (29.1%) were male staffs
- 2) Professional Qualification**  
Majority of the staffs are B.Sc. Nursing (49%) and GNM (45.5%)
- 3) Years of Experience**  
It is evident that (69.1 %) of staffs posted in COVID area have experience range from one year to more than 3 years of clinical experience
- 4) COVID-19 Area**  
Out of 55 staffs (63.6%) were from COVID-19 ICU and (36.4%) from COVID-19 Ward area
- 5) Exposure to COVID-19 Nursing Management training**  
Majority of Staffs (92.7%) were trained in COVID-19 nursing management training whereas (7.27%) is not trained

**Section II:** Significance of the prevalence of skin injury related to personal protective equipment (PPE) in COVID-19 area among the nursing staff

**Table 2:** Frequency and Percentage distribution of Prevalence of skin injury related to personal protective equipment (PPE) in COVID-19 area among the nursing staff, N=55

Prevalence of Skin Injury related to PPE in COVID-19 area among Nursing Staffs			
S.No	Particulars	Frequency (f)	Percentage %
<b>1</b>	<b>Comfortability on donning PPE in COVID-19 area</b>		
1.1	Extremely Comfortable	1	1.8%
1.2	Comfortable	15	27.2%
1.3	Not Comfortable	<b>34</b>	<b>61.8%</b>
1.4	Extremely Not Comfortable	5	9.0%
<b>2</b>	<b>Profuse Sweating</b>		
2.1	Always	15	27.2%
2.2	Sometimes	<b>32</b>	<b>58.1%</b>

2.3	Rarely	8	14.5%
2.4	Never	0	0.0%
<b>3</b>	<b>Mouth Ulcer</b>		
3.1	Yes	<b>11</b>	<b>20.0%</b>
3.2	No	44	80.0%
<b>4</b>	<b>Moisture- Associated Skin Damage (MASD)</b>		
<b>4.1</b>	<b>Maceration due to Goggles</b>		
4.1.1	Yes	<b>31</b>	<b>56.3%</b>
4.1.2	No	24	43.6%
<b>4.2</b>	<b>Area of Maceration due to Goggles</b>		
4.2.1	Fore Head region	6	10.9%
4.2.2	Lower Orbital region	9	16.3%
4.2.3	Nasal Bridge	<b>16</b>	<b>29.0%</b>
<b>4.3</b>	<b>Maceration in hands due to Gloves</b>		
4.3.1	Yes	<b>23</b>	<b>41.8%</b>
4.3.2	No	32	58.1%
<b>5</b>	<b>Device Related Pressure Injury (DRPI): N95 Mask</b>		
<b>5.1</b>	<b>Redness in Nasal bridge</b>		
5.1.1	Yes	<b>51</b>	<b>92.7%</b>
5.1.2	No	4	7.2%
<b>5.2</b>	<b>Skin Peel in the Nasal bridge</b>		
5.2.1	Yes	<b>34</b>	<b>61.8%</b>
5.2.2	No	21	38.1%
<b>5.3</b>	<b>Redness in the back of the Pinna</b>		
5.3.1	Yes	<b>43</b>	<b>78.1%</b>
5.3.2	No	12	21.8%
<b>6</b>	<b>Device Related Pressure Injury (DRPI): Gloves</b>		
<b>6.1</b>	<b>Redness in the hands</b>		
6.1.1	Yes	<b>31</b>	<b>56.3%</b>
6.1.2	No	24	43.6%
<b>6.2</b>	<b>Dermatitis in the hands</b>		
6.2.1	Yes	<b>6</b>	<b>10.9%</b>
6.2.2	No	49	89.0%
<b>7</b>	<b>Shower within one hour post completion of the shift</b>		
7.1	Yes	<b>45</b>	<b>81.8%</b>
7.2	No	10	18.1%
<b>8</b>	<b>At least one episode of dermatitis during the duty tenure</b>		
8.1	Yes	<b>7</b>	<b>12.7%</b>
8.2	No	48	87.2%

Data presented in the table 2 reveals the following:

**1) Comfortability on donning PPE in COVID-19 area**

Majority of the staffs were not comfortable (61.8%) and extremely not comfortable (9.0%) with donning of PPE. Astonishingly, most of the not comfortable an extremely not comfortable were female staffs (87.1%)

**2) Profuse Sweating**

It is evident that nursing staff (27.2%) sweat always in the full cover PPE and (58.1%) sweat sometimes during the duty hours

**3) Mouth Ulcer**

Particularly female staffs (20%) in COVID-19 area reported mouth Ulcers after started working in the COVID-19 area.

**4) Moisture- Associated Skin Damage (MASD)**

- Nursing Staffs (56.3%) reported maceration due to goggles particularly in Nasal Bridge (29.0%), Lower orbital region (16.3%) and Fore-head (10.9%).
- Maceration in hand due to use of gloves reported (41.8%) among the nursing staffs. Among prevalence of MASD, (70.3%) of the nursing staffs were females

**5) Device Related Pressure Injury (DRPI): N95 mask**

- On the contrary to MASD, nursing staff reported redness in the nasal bridge (92.7%), Skin Peel in Nasal

Bridge (61.8%) and redness in the back of the Pinna (78.1%).

- Similarly, DRPI has also affected most of the female staff (78.4%) working in COVID-19 area.

**6) Device Related Pressure Injury (DRPI): Gloves**

Nursing staff reported Redness in the hands (56.3%) and contact- dermatitis (10.9%) due to continuous wearing of gloves in the COVID-19 area. Interestingly, DRPI due to wearing gloves affects Male nurses (72.03%) rather than female nurses (27.07%)

**7) Episode of Contact- dermatitis:**

At least on episode of contact-dermatitis (12.75%) is witnessed in nursing staffs, especially (90%) of the staffs who missed their shower within one hour post completion of their duty.

### 3. Discussion

The aim of the study to assess the prevalence of skin injuries related to the use of personal protective equipment (PPE) in COVID-19 area among the nursing staffs.

**Section I:**

In the present study majority of the staffs (70.9%) were female staffs and It is evident that (69.1 %) of staffs posted in COVID area have experience range from one year to more than 3 years of clinical experience. Moreover, Nursing Staffs (92.7%) were trained in COVID-19 nursing management.

**Section II:**

In the present study, Majority of the nursing staffs (70.8%) were extremely not comfortable and not comfortable. (58.1%) of the staffs sweat sometimes during the duty hours with full cover PPE with accessories. Astonishingly, most of the not comfortable an extremely not comfortable were female staffs (87.1%). Moisture associated skin damage (MASD) prevalence (49.5 %) due to goggles and gloves. Device related pressure injury (DRPI) prevalence (92.7%) due to N95mask, (56.3%) due to gloves and (12.75%) had at least one episode of contact- dermatitis.

Among prevalence of MASD, (70.3%) of the nursing staffs were females. Similarly, DRPI due to N95 mask has also affected most of the female staff (78.4%) working in COVID-19 area. Interestingly, DRPI due to wearing gloves affects Male nurses (72.03%).

The findings are supported by the study showed. The overall prevalence of skin injuries was 42.8% with three types of device-related pressure injuries, moisture-associated skin damage, and skin tear. Co-skin injuries and multiple location injuries were 27.4% and 76.8%, respectively. Only 17.7% of respondents took prevention and 45.0% of skin injuries were treated.<sup>4</sup>

### 4. Summary

The findings present study helped the investigator to prove that there is a high prevalence to skin injury related to the use of personal protective equipment (PPE) in COVID-19 areas among the nursing staffs particularly to the female population working in the COVID-19 area.

## 5. Conclusion

The main purpose of the study is to assess the prevalence of skin injury related to the use of personal protective equipment (PPE) in COVID-19 areas among the nursing staffs.

In the present study, it was revealed that Moisture associated skin damage (MASD) 56.3% and 41.8% due to goggles and gloves respectively. Device related pressure injury (DRPI) due to N95 mask was 92.7% and 56.3% due to gloves. At least one episode of contact- dermatitis is reported in 12.75% staffs.

Among prevalence of MASD, (70.3%) of the nursing staffs were females. Similarly, DRPI has also affected most of the female staff (78.4%) working in COVID-19 area. Interestingly, DRPI due to wearing gloves affects Male nurses (72.03%).

The study concludes that there is high prevalence of skin injuries related to the use of personal protective equipment (PPE) in COVID-19 areas among the nursing staffs.

## 6. Declaration

We have no known conflict of interest to disclose.

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