

# Cutaneous impact of surgical mask versus N 95 mask during covid-19 pandemic: Incidence of dermatological side effects and response of topical methylprednisolone aceponate (MPA) treatment to associated contact dermatitis

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## Abstract

**Objective** To compare the incidence of cutaneous hazards of surgical mask versus N 95 mask in health care providers during covid-19 pandemic and response of topical methylprednisolone aceponate (MPA) to associated contact dermatitis.

**Place and Duration of Study** Outpatient Dermatology Department of DHQ Teaching Hospital, Sargodha Medical College, Sargodha during month of April 2020.

**Methods** Total 300 participant who use surgical masks or N95 for more than 10 days during duty hours were interviewed in order to fill a pre-designed proforma regarding cutaneous impact of using mask versus N95 masks. Side effects were noted like increased localized general sweating, localized acne (folliculitis), localized itching and burning, redness (erythema), contact dermatitis on face, dryness at contact area, behind the ear dermatitis (retro-auricular dermatitis) and frictional hyperpigmentation. The data was tabulated and analyzed by descriptive analysis on SPSS 20. Patients with active contact dermatitis were prescribed topical methylprednisolone aceponate (MPA) 0.1 w/w twice daily and asked to revisit after one week to access response of treatment.

**Results** Use of N95 masks was associated with 25(16.67%) localized general sweating, 11(7.33%) localized acne (folliculitis), 10(6.67%) redness (erythema), 5(3.33%) contact dermatitis on face and 2 (1.33%) frictional hyperpigmentation which was more as compared to surgical masks. Participants with contact dermatitis were prescribed anti histamines and topical methylprednisolone aceponate (MPA) 0.1% w/w twice daily for one week. On revisit after one week, out of 28 participants, 19(67.85%) had more than 50% improvement in their symptoms.

**Conclusion** Use of N95 masks are associated with more cutaneous side effects as compared to use of surgical masks. In addition, topical methylprednisolone aceponate (MPA) is an effective treatment for patients with contact dermatitis caused by prolonged use of these masks.

## Key words

Surgical masks; N95 masks; cutaneous; dermatitis; methylprednisolone aceponate (MPA).

## **Introduction**

World Health Organization (WHO) on 11<sup>th</sup> March, 2020 affirmed novel 2019 coronavirus disease (COVID-19) as pandemic after the documentation of more than 118 000 cases in 114 countries globally.<sup>1</sup> Healthcare workers handling COVID-19 patients are among those at maximum hazard of illness<sup>2</sup> as they were throughout the severe acute respiratory disease (SARS) in 2003 pandemic where 21% (1706/8096) of worldwide cases were healthcare workers.<sup>3</sup> An initial report showed that out of 138 admitted patients for COVID-19 in Wuhan, China in January 2020 about 29% (40/138) were healthcare workers who were infected in the hospital.<sup>4</sup> Although the mode of spread of COVID-19 is not yet fully identified, but according to World Health Organization (WHO) scientific brief on 27<sup>th</sup> March 2020, spread of the COVID-19 virus is through direct transmission from the infected people and indirect transmission through surfaces in the immediate areas or things used by the infected person.<sup>5</sup> Masks are considered protective as they limit disease transmission by asymptomatic carriers<sup>6</sup> who may be a major carrier of transmission of COVID-19. Various investigational reports suggest that masks may both guard the wearer from developing various infections or spreading infection. Medical masks (i.e., surgical masks and N95 respirators) used by healthcare providers defend against various respiratory infection when studied in multiple metanalysis.<sup>7</sup>

Worldwide, recent suggestions to protect healthcare providers against COVID-19 are contradictory. For instance, European Centre for

Disease and Prevention (ECDC) and U.S Centers for Disease Control and Prevention (CDC) advise the N95 masks for non-aerosol-generating daily care of patients with COVID<sup>8</sup> whereas simple medical masks are advocated by the Italian Society of Interventional Cardiology (GISE).<sup>9</sup> During 2020 pandemic the absence of adequate personal protective equipment which include simple medical masks and N95 respirators have been widely narrated.<sup>10</sup>

Medical masks are a vital part of personal protective equipment whose sole purpose is to avoid the spread of droplet respiratory infections. These masks shield the mouth as well as nose of the wearer to prevent diffusion of various respiratory viruses and bacteria.<sup>11</sup> There are two main varieties of masks used commonly by health care providers, the surgical masks or face masks and N95 respirators. Difference in these masks are according to the size and type of infectious particles they are capable of filtering. Face masks are applied more commonly for respiratory viruses and bacteria that are transmitted through droplets travelling short distances through coughing or sneezing. These surgical masks are usually face masks which fit loosely and prevent the user from dispersing droplets infection as well as inhibit hand-to-face spread. N95 respirators is distinctive as it blocks 95% of airborne elements. They are closely-fitted and avoid inhalation of tiny infectious particles.<sup>12</sup> N95 respirator are specially recommended for disease like tuberculosis, measles and chickenpox. Some conditions in which N95 respirators cannot be used due to improper fitting is by individuals with excess facial hair or by children due to small faces. In these circumstances, a special respirator called a powered air-purifying respirator may be used instead.<sup>13</sup>

Masks and respirators are used by health care providers for extended period of time especially

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in background of COVID-19 pandemic. Prolonged use of these mask leads to prolonged breathing into a mask. This creates a hot and moist environment inside the mask near face, which leads to the formation of excessive sweat, oil and bacteria. In addition, these face masks are occlusive preventing fresh air entry leading to a further disastrous situation.<sup>14</sup> So, the skin under mask becomes a perfect site for cutaneous complications.

### Methodology

This retrospective study was conducted at DHQ teaching Hospital, Sargodha Medical College Sargodha during the month of April 2020. Before initiation of the study institutional review board permission was obtained. The participants were ensured of privacy and secrecy and verbal informed consent was taken from each participant. Total 300 participant who use surgical masks or N95 for more than 10 days during duty hours were interviewed in order to fill a pre-designed proforma regarding cutaneous impact of using mask versus N95 masks. Participants with previous history of acne, contact dermatitis or and other skin disease were excluded.

Information was gathered regarding age, gender and side effects participants using surgical masks or N95. Side effects were noted like increased localized sweating, localized acne (folliculitis), localized itching and burning, redness (erythema), contact dermatitis on face, dryness at contact area, behind the ear dermatitis (retro-auricular dermatitis) and frictional hyperpigmentation. The data was tabulated and analyzed by descriptive analysis. Patients with active contact dermatitis were prescribed topical methylprednisolone aceponate (MPA) 0.1 w/w twice daily and asked to revisit after one week to access response of treatment.

### Results

**Table 1** elaborates different dermatological side effects of use of surgical versus N95 masks.

There were total 300 participants (both male and female) in this study. In **Figure 1**, participant's gender stratification is given.

Participants with contact dermatitis were prescribed topical methylprednisolone aceponate (MPA) and response was noted **Table 2**.

### Discussion

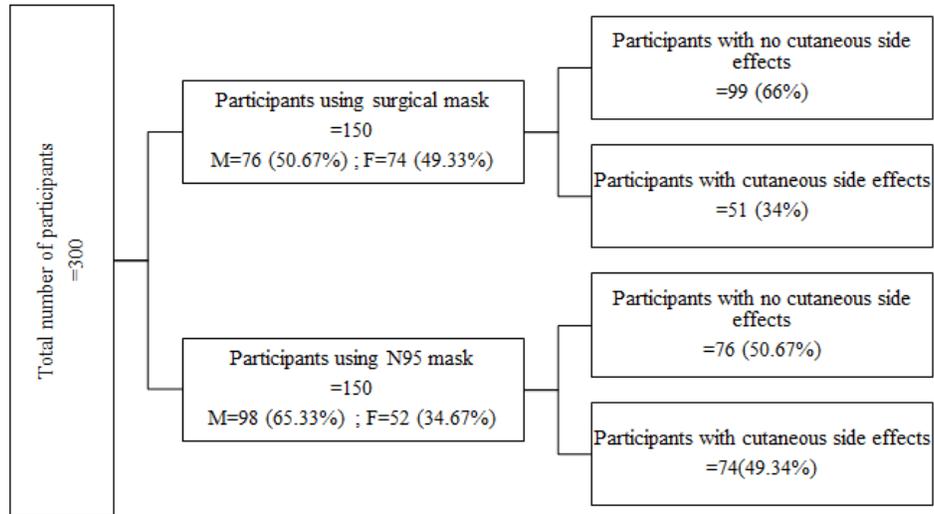
The coronavirus disease 2019 (COVID-19) pandemic changed lives of health care providers as this lead to use of personal protective equipment (PPE) including surgical masks and N95 masks. Surgical masks also known as medical masks and face masks were used extensively for protection against air borne particles including infectious agents even before this pandemic.

**Table 1** Cutaneous side effects in participants using surgical and N95 masks (n=300).

| <i>Cutaneous side effects in participants</i> | <i>Using Surgical mask n(%)</i> | <i>Using N95 mask n(%)</i> |
|---|---------------------------------|----------------------------|
| Excessive sweating                            | 15 (10%)                        | 25(16.67%)                 |
| Folliculitis                                  | 9 (6%)                          | 11 (7.33%)                 |
| Itching and burning                           | 3 (2%)                          | 3 (2%)                     |
| Erythema                                      | 5 (3.33%)                       | 10(6.67%)                  |
| Contact dermatitis on face                    | 12 (8%)                         | 16 (10.67%)                |
| Dryness                                       | 5 (3.33%)                       | 5(3.33%)                   |
| Contact dermatitis retro-auricular            | 2 (1.33%)                       | 2 (1.33%)                  |
| Frictional                                    | 0 (0%)                          | 2 (1.33%)                  |
| No complaints                                 | 99 (66%)                        | 76 (50.67%)                |
| hyperpigmentation                             |                                 |                            |

**Table 2** Response of topical methylprednisolone aceponate (MPA) in patients with associated contact dermatitis (n=28).

|   |         |
|---|---------|
| Total patients with contact dermatitis      | 28      |
| >50% improvement of symptoms after one week | 19      |
| % of patients with >50% response            | 67.85 % |



**Figure 1** Gender stratification of participants using surgical mask or N95 masks (n=300).



**Figure 2** Cutaneous side effect of use of N95 mask.

Use of N95 masks reached a drastic increase after COVID-19 spread worldwide.<sup>15</sup> N95 masks are considered more efficient than surgical masks as they prevent entry of minute particles even viruses like covid-19, chicken pox and measles.<sup>15</sup> Most N95 masks have also an aluminum foil near nose area for enhanced protection. The aluminum foil plus the closely fitted N95 masks lead to increase humidity and raised temperature inside the mask, making a suitable media for growth of bacteria. All this precedents to multiple cutaneous problems on skin underneath.<sup>16</sup> As these masks are used for prolonged periods by health care providers, more dermatological adverse effects are reported

in these individuals.

In our study, we prepared a proforma to different complaints of healthcare providers using surgical versus N95 masks for more than 10 days during their duty hours. Use of N95 masks was associated with 25 (16.67%) localized general sweating, 11 (7.33%) localized acne (folliculitis), 10 (6.67%) redness (erythema), 5 (3.33%) contact dermatitis on face and 2 (1.33%) frictional hyperpigmentation which was more as compared to surgical masks. Similarly from 1<sup>st</sup> April to 30<sup>th</sup> April 2020, 14 patients reported itching, redness, scaling especially in the retro auricular region related to use of ear

loop face masks.<sup>14</sup> Comparable outcomes were registered in Chengdu city in an online survey where 198 of 404 (49.0%) respondents reported cutaneous reactions by prolonged use of N95.<sup>16</sup>

Contact dermatitis was reported in 28 participants wearing either surgical or N95 masks. They were prescribed anti histamines and topical methylprednisolone aceponate (MPA) 0.1%w/w twice daily for one week. On revisit after one week, 19 (67.85%) had more than 50% improvement in their symptoms. This implicates that topical low potency corticosteroid is an effective treatment for this condition.

### Conclusion

Use of N95 masks are associated with more cutaneous side effects as compared to use of surgical masks. In addition, topical methylprednisolone aceponate (MPA) is an effective treatment for patients with contact dermatitis caused by prolonged use of these masks.

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