

EFFECTS OF PERSONAL PROTECTIVE EQUIPMENT ON HUMAN SKIN

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ABSTRACT

Skin is considered as the protective covering for whole body. It is the most outer and largest organ covering almost 1.6sqmeter area in an average adult male and 1.43sqmeter area in an average adult female and being outermost it comes directly in contact with environmental hazards. In the year 2019 there is an abrupt increase the use of personal protective equipment's due to emerging of highly contagious novel corona virus infection but due to excessive use of PPE's the skin affects more vigorously. The prolong use of PPE's causes serious adverse effects on skin. The common adverse effect is itching, burning, erythema, papules, eczema, acne, allergic contact dermatitis, maceration to the skin, urticaria, xerosis and over hydration. Many research papers and review articles were studied and then the information is compiled here to exactly focus on the main issue behind such skin related conditions.

KEYWORDS: PPE, acne, eczema, burning, corona virus.**INTRODUCTION**

A novel coronavirus nominated as 2019-nCoV. At the end of 2019 it was emerged in Wuhan city of China. Upto 24 January 2020, at least 830 cases had been diagnosed in nine countries these are China, Thailand, South Korea, Japan, Taiwan, Singapore, Vietnam, Nepal, and US.^[1] The epidemic was declared a Public Health Emergency of International Concern by the World Health Organization on 30 January 2020. At 14 February 2020 Forty-nine thousand fifty-three laboratories inveterate the cases of COVID-19 with 1,381 death. The cases started being reported from 8th December 2019, including several patients working or living in the local Huanan Seafood Wholesale Market.^[2] India reported the first case of COVID-19 at 30 January 2020 in Kerala and within a few weeks, COVID-19 spread to 27 states and 7 union territories in India.^[3] Personal protective equipment has become an important and affecting subject during the current coronavirus (COVID -19) epidemic. The healthcare workers required to use personal protective equipment (PPE) such as masks, goggles, and protective clothing for long periods. However, PPE may cause a series of skin problems due to long-term sealing, friction, and pressure.^[4]

PERSONAL PROTECTIVE EQUIPMENT: PPE refers to the wearable personal items that are used to avoid or reduce accidental injuries and minimize occupational hazards at work. When harmful factors and

the possibility of accidents cannot be eliminated or effectively reduced in the working environment, PPE becomes the main protective measure for primary prevention.^[5] The generalized hand-cleaning and prolonged wearing of personal protective equipment (PPE) has exponentially increased the problem of adverse skin events.^[6] PPE may causes serious skin problems due to long-term sealing, friction and pressure, physical strain (dehydration, heat, and exhaustion), and emotional problems, such as physical isolation, fear about infections. PPE include items such as gloves, safety glasses and shoe covers, earplugs or muffs, hard hats, face cover, masks or respirators, coveralls, vests and full bodysuits. The guidelines issued by GoI on the rational use of PPE kits for COVID-19 focuses on using gloves, coverall or gowns, goggles, N95 masks, shoe covers, triple-layer medical masks and headcovers based on the risk assessment.^[7] a Chinese study reported a prevalence of 97% of skin damage related to prevention measures among health workers.^[8]

TYPES OF PPE

1. **Standard PPE-** face shields, goggles, mask, gloves, coverall/gowns (with or without aprons), head cover/surgical cap, and shoe cover.
2. **Customized PPE-** Customized PPE is recommended by CDC when the healthcare systems become stressed and enters the contingency mode.^[9]

Most Common Adverse Effects of PPE On Skin

Contact dermatitis, acne and eczema were the most frequent disorders, itching and burning the most common symptoms and erythema and papules the most frequent signs. The most frequently damaged anatomical regions were the nasal bridge (67.22%), the cheeks (66.9%) and the hands (62.6%). Soap and water (56.4%), gloves (47.5%), sanitizers (38.6%) and masks (20.8%) were the most frequent culprit agents.^[10]

Effects of PPE Use on skin

- Up to 99% of PPE-related cutaneous reactions are due to gloves because prolonged use can lead to allergic contact dermatitis, overhydration, and subsequent skin maceration and erosion. Prolonged goggle wear has led to urticaria, pressure injury, contact dermatitis, and acne vulgaris in health care workers.^[11]
- One study reported that 59.6% of health care workers who regularly used N95 masks during the severe acute respiratory syndrome (SARS) pandemic developed facial acne, whereas 35.8% of health care workers developed a facial rash from either irritant contact dermatitis or allergic contact dermatitis.^[12]
- Goggles, have been used routinely to protect HCWs against highly infectious diseases related to exposure to contaminated body fluids. Other dermatologic side-effects such as pressure injury, contact dermatitis, urticaria, xerosis and aggravation of underlying dermatosis might occur due to the impairment of the skin integrity during mechanical trauma of goggles. A study by Lan *et al.* revealed that 87.9% of HCWs, who were wearing goggles for more than 6 hours, developed skin reactions on their nasal bridge. Skin reactions such as acne, ACD, and irritant contact dermatitis.^[13]
- Wearing gowns and coveralls may cause heat stress and dehydration.^[14]
- Gloves and protective boots are mostly made of waterproof materials with poor air permeability such as rubber and plastic for a long period of time. When the skin of the hands and feet is left in an air-impermeable atmosphere it decreased the sweat evaporation and the skin is prone to impregnation and eczema. Also, the hot and humid environment is responsible for fungal reproduction and tinea of the feet and hands. In addition to wearing gloves and hand hygiene is also important for chemical and biological defence. Recurrent washing damages the skin barrier and is partially responsible for dryness, itching, and eczema of the hands and feet. Furthermore, repeated contact with irritants such as disinfectants and gloves can cause contact dermatitis with erythema, pimples, pimples, exudation, or erosion. One study reported that 52% of medical staff with hand eczema wash their hands more than 10 times per day.^[15] Long-term disinfectant use also influences the microbiota and changes the immune microenvironment on the skin surface, resulting in

conditions such as eczema, fungal infection, bacterial infection, and allergic dermatitis.^[16]

CONCLUSION

This article showed various adverse effects of PPEs on skin and also summarise the causes of skin damage caused by various equipment's which are being used by various health workers during the pandemic of Covid-19 to protect themselves from the infection of highly contagious novel corona virus. The main aim of this review article is to peoples to understand the causes behind abrupt increase in skin infection and also it is supposed that this paper will helps the all-front-line workers, medical staff to protect their skin in better way and to give much importance along with immunity to their skin also.

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