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Adverse skin reactions of personal protective equipment on health care workers against COVID -19

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Abstract

The coronavirus outbreak, which was first detected in China, has infected people in 185 countries. COVID-19 is a pneumonia-like disease caused by a new coronavirus, named SARS-CoV-2, that is similar to the virus that causes Severe Acute Respiratory Syndrome (SARS Coronavirus disease 2019 (COVID-19). To study the prevalence of adverse reactions of wearing PPE among healthcare workers in Karnataka India during the Covid -19 outbreak. Twenty-one-day observation were made on twenty laboratory health workers and observed hazardous skin effect on health workers wearing PPE long hours during the working period. Long hour wearing of PPE in our study found respiratory complications, sweating and skin damage. Adequate dermatological knowledge of PPE use and design and extensive comprehensive training is important in risk of a pandemic outbreak.

Keywords: Coronavirus, Covid -19, Personal Protective Equipment, Transmission

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Introduction

Coronaviruses are important human and animal pathogens. Coronaviruses are a large family of enveloped, non-segmental, positive sensed single-stranded RNA Viruses measures around 120 diameters [1]. Novel coronavirus (SARSCOV-2) is currently causing a severe outbreak of disease (termed COVID -19) in China and multiple other countries, threatening to cause global pandemic [2,3]. In humans, single-stranded RNA CoVs mostly causes respiratory and gastrointestinal symptoms. Clinical manifestations range from mild flu-like symptoms to more severe disease such as bronchitis pneumonia, severe acute respiratory distress syndrome, multi-organ failure and even leads to death [4]. This is the third extremely pathogenic human coronavirus which has emerged recently after severe acute respiratory syndrome (SARS). The World Health Organisation (WHO) has declared the COVID-19 outbreak as a global pandemic. Research Studies on corona have suggested that COVID-19 can have high transmission rates with the average infected person able to spread the disease to two or three other individuals [5]. Worldwide, as millions of people stay at home to minimize transmission of severe acute respiratory syndrome coronavirus -2, Health care workers are at an especially high risk of catching the coronavirus, because of their prolonged exposure to confirmed Covid -19 patients. Personal protective equipment plays a crucial role in the prevention of transmission of infection in the health care setting

Aims & Objectives

To study the prevalence of adverse reactions of wearing PPE among healthcare workers in Karnataka India during the Covid -19 outbreak.

Materials and Methods

The study was carried out on twenty health workers of civil hospital Belgaum Karnataka state India. The study was started from 15th March 2020 to 6th May 2020. Observations were made up to twenty-one days. Before the observational study, all the health workers were undergoing a comprehensive training program. They learnt how to don (put on) and doff (take off) PPE, limitations of PPE, proper care, maintenance, and disposal of PPE. PPE kit includes gloves, medical masks, goggles or a face shield, and gowns. In our study, we observed hazardous skin effect on health workers wearing PPE long hours during the working period.

Results

Personal protective equipment (PPE) has been essential to protecting healthcare workers from the novel coronavirus. Still, it presents its own set of challenges to their health, notably respiratory complications, sweating and skin damage associated with prolonged use of PPE. During our study, we found significant effects on health workers wearing long period PPE kit they were:

1. Wearing mask problems: Out of twenty, fourteen health worker developed skin damage by wearing a mask for long hours in a laboratory. Enhanced use of the mask can cause redness maceration erythema papule scaling, and even colour changes in prolonged use cases particularly on the bridge of the nose and top of the cheeks, and the belt of the mask causes pain on the auricular cartilage. Most of the health worker in our study complained breathlessness, burning, stinging, itching acne and even dermatitis over the face (Fig 1g).

2. Wearing gloves: Most of the laboratory health worker complained irritant contact dermatitis, allergic contact dermatitis, contact urticaria hyperhydration of skin, maceration erosion and eczema type of symptoms. (Fig 1a, c, d & h) (Table 1).

3. Face shield: Significantly a smaller number of (6/20) health worker developed skin rash acne and redness sweating over the forehead region due to compression of the belt on the forehead for a long period in a laboratory. In most of the health worker we observed glare fogging and impaired vision during working in a laboratory.

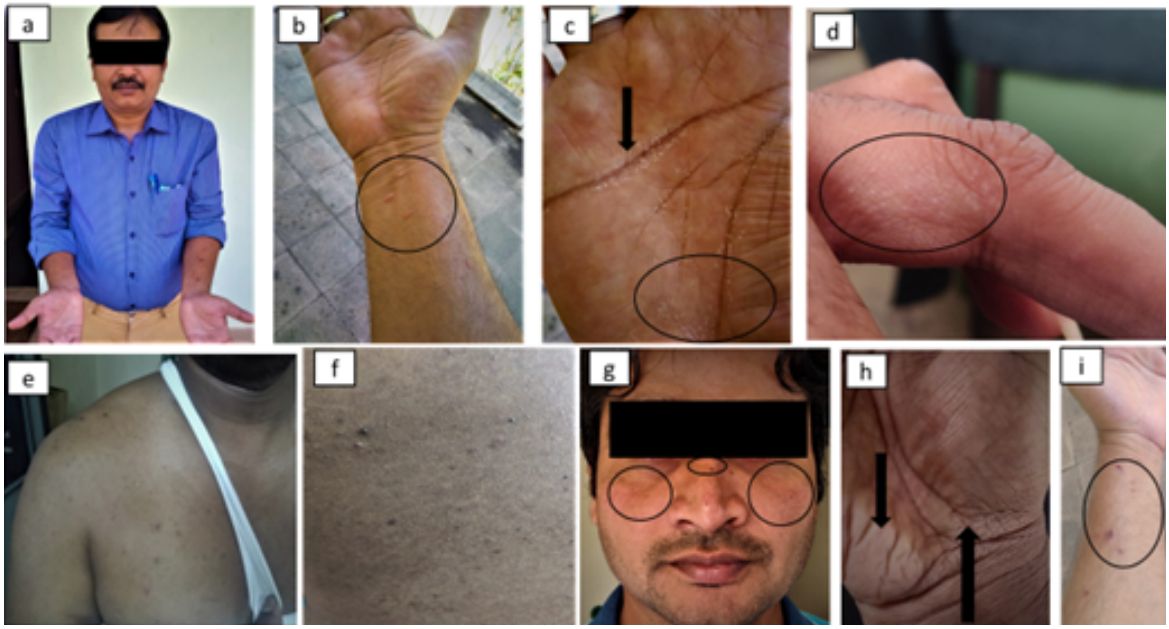

Fig 1a-i. Shows the skin problem of Health care workers, working in the civil hospital Covid-19 laboratory

4. Wearing gown: Most of the health worker developed heavy sweating, skin rashes, acne particularly on the front and back of the chest, pain, Itching, prickling, and fungal infection after wearing PPE gown for a long hour (Fig 1b, e f & i) (Table 1).

Table 1. Shows the skin problem of Health care workers, working in the civil hospital Covid-19 laboratory

PPE Kit	Health worker (n=20)	Skin effect
Mask	14/20	Ear Pain Sweating skin rash, breathlessness
Goggle	10/20	Sweating, nose pad and temple markings
Gloves	17/20	Skin rashes. Maceration, and erosion
Face shield	6/20	Sweating, Impaired vision, glare, fogging
Protective Gowns	18/20	Sweating, heat, skin infection

Discussion

For COVID -19 exposure, PPE is specialized protective equipment used to prevent contact with hazardous substances. Its use is an integral part of infection control and prevention measures that protect workers from exposure to blood, body fluids, and other potentially infectious materials [6].

PPE such as gowns, gloves, masks, and goggles provide physical barriers that prevent the hands, skin, clothing, eyes, nose, and mouth from coming in contact with infectious agents. Plays a prominent role in ensuring overall health and safety of health workers, by reducing exposure to the transmission of COVID-19 [7].

Masks play an essential role in the fight against the COVID-19 pandemic, especially for health workers. Masks should be good quality and designed with advanced technology to seal around the nose and mouth to achieve a very close facial fit and very efficient filtration of air born particles to reduce the chance of breathlessness and other skin infection [8].

Gloves are a very important component of personal protective equipment and act as a protective barrier to prevent the possible transmission of Covid-19 for health care workers. Sweat can make wearing gloves uncomfortable and even lead to skin problems that make the issue worse. When skin is exposed to sweat for a prolonged time, it weakens and becomes more vulnerable; the moist environment is the perfect breeding ground for bacteria and fungus [9]. To avoid such type of complication health worker should change the gloves after every one hour may prevent skin infection.

Face shields are an essential protective barrier for the facial area and associated mucous membranes from airborne body fluids (blood, saliva, bronchial secretions, vomit etc.) expelled as a result of various physiological processes (vomiting, coughing, sneezing, etc.) and medical, dental, and veterinary procedures (suctioning the airway, placing nasogastric tubes, obstetrical procedures, surgery, dental procedures, etc.) [10]. Face shields should be efficacious and must fit snugly to afford an excellent seal to the forehead and should cover the complete area of face and chin to prevent slippage of the device. Face shields should be selected that have visors treated for anti-glare, anti-static, and anti-fogging properties.

PPE gown is a most important barrier to prevent transmission of a pandemic outbreak of COVID -19 by blocking the transmission of contaminants from blood, body fluids, or respiratory secretions and it is essential for frontline health care workers [11]. PPE should be of good quality and waterproof to reduce the chance of skin infection. Effective use of PPE includes properly removing and disposing of contaminated PPE to prevent exposing both the wearer and other people to infection.

Conclusion

The use of personal protective equipment (PPE) is an important strategy to protect healthcare personnel from contamination and to prevent the spread of pathogens to subsequent patients. Adequate dermatological knowledge of PPE use and design and extensive comprehensive training is important in risk of a pandemic outbreak.

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