

## Coronavirus disease-19 implications for a dermatologist: An Overview

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### ABSTRACT

Coronavirus disease of 2019 (COVID-19), since its beginning in Wuhan, China in December 2019 has rapidly spread across very nook and corner of this world. It has had a devastating effect, both due to its direct affection as well as the indirect misery brought onto the world in terms of financial hardships, in an unprecedented manner never witnessed by anyone of us before. Every single country is grappling to cope with the destruction brought about by this pandemic to keep its population as safe as possible. We, dermatologists, are also no exception, and have also been affected directly and/or indirectly. Thus, there is a pressing demand to equip the dermatologists with basic knowledge about this disease to blunt its ill effects on the speciality of dermatology. In this pursuit, almost every national dermatologists society has come out with guidelines to safeguard the interest of its members, as well as to keep its patients safe, while following the national guidelines issued by the respective governments. In this review, we have tried to address all COVID-19-related information we need to be aware of as a health-care professional, more so as a dermatologist. Beginning with the brief introduction of the disease: its agent, the clinical features, prevention, investigations, and management outline. We have also discussed the implications of COVID-19 in dermatology practice and given an overview of the dermatological manifestations reported from all over the world as well as witnessed by us, and also formulated basic guidelines for changes required to be made in the way dermatology practice is pursued during this pandemic.

### INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a viral infection caused by severe acute respiratory syndrome coronavirus Type-2 (SARS-CoV-2).<sup>1</sup> It was first reported from capital city of Wuhan in Hubei province of China in the end of year 2019.<sup>2</sup> And, since then in a short span of three months, it has spread to almost all the countries of the world, resulting in the ongoing 2019-20 coronavirus pandemic.<sup>3</sup> The World Health Organisation (WHO) declared it a Public Health Emergency of International Concern (PHEIC) on 30th January 2020<sup>4</sup> and a pandemic on 11th March 2020.<sup>3</sup> It is commonly characterized by fever, cough and difficulty in breathing.<sup>5</sup> Other

symptoms uncommonly associated with it include malaise, muscle pain, diarrhea, sore throat, loss of smell and abdominal pain.<sup>6, 7</sup> While, more than 90% of the cases report mild symptoms, around 10% require hospitalization, and some of which develop severe pneumonia and eventually multi organ failure, and have to be managed in Intensive Care Unit.<sup>8, 9</sup>

**Virus:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a novel severe acute respiratory syndrome coronavirus, basically a RNA virus closely related to the original SARS-CoV.<sup>10</sup>

**Transmission:** Its main mode of spread is through close contact and by the small droplets

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released into the air during coughing, sneezing and even talking by the infected individuals.<sup>11</sup>

**Incubation Period:** It typically takes around 5 days for the first symptom to manifest, but the period can vary from 2 to 14 days. The virus is most contagious when people are symptomatic.<sup>12</sup>

**Diagnosis:** Real-time reverse transcription polymerase chain reaction (rRT-PCR) from a nasopharyngeal swab is generally used as a standard diagnostic method.<sup>13</sup>

**Prevention:** The spread of infection can be prevented by taking certain measures including frequent hand washing, social distancing (maintaining physical distance from others, covering coughs and sneezes with a tissue or inner elbow and keeping unwashed hands away from the face. The use of masks by everyone, when outside is also believed to limit its spread and has been recommended by many countries.

**Management:** Current management basically involves symptomatic treatment, supportive care, isolation and certain experimental therapeutic measures.

**Pathophysiology:** Lungs are the most severely affected organs by COVID-19, because the virus enters the host cells via the enzyme ACE2, which is most abundantly found in the type II alveolar cells of the lungs. The virus uses a special surface glycoprotein called a “spike” (peplomer) to connect to ACE2 and gain entry in the host cell.<sup>14</sup> The virus also affects gastrointestinal organs as ACE2 is abundantly expressed in the glandular cells of gastric, duodenal and rectal epithelium as well as endothelial cells and enterocytes of the small intestines.<sup>15</sup>

Amongst its effects on cardiovascular system, It has been reported to cause acute injury to myocardium.<sup>16</sup> Acute myocardial injury has been

reported in 12% of infected people admitted in hospital<sup>17</sup>, and was more commonly found in critically ill patients.<sup>18</sup> Again, it could also be related to ACE2 receptors in the myocardial tissue.<sup>16</sup> Critically ill patients have been reported to have higher incidence of thrombosis (31%) and venous thromboembolism (25%), and its presence has been associated with poor prognosis.<sup>19,20</sup>

**Pathology:** Very less data is currently available about the microscopic changes occurring in various organs.<sup>21-22</sup> The main findings seen in the specimens obtained during autopsy are as follows:

- **Lungs:** Four types of viral pneumonia can be seen, based on the severity of lung involvement:
  - Minor pneumonia: Shows minor serous exudation, minor fibrin exudation
  - Mild pneumonia: Characterized by pulmonary oedema, pneumocyte hyperplasia, large atypical pneumocytes, interstitial inflammation with lymphocytic infiltration and multinucleated giant cell formation
  - Severe pneumonia: Diffuse alveolar damage (DAD) with diffuse alveolar exudates. DAD is the cause of acute respiratory distress syndrome (ARDS) and severe hypoxemia.
  - Healing pneumonia: organization of exudates in alveolar cavities and pulmonary interstitial fibrosis, plasmocytosis in BAL
- **Blood:** disseminated intravascular coagulation(DIC); leukoerythroblastic reaction
- **Liver:** microvesicular steatosis

## PREVENTION

### Personal protective equipment (PPE)

Complete precautions must be taken to minimize the risk of virus transmission to others, especially in healthcare settings when performing procedures that can generate aerosols, such as intubation or hand ventilation.<sup>23</sup> For the healthcare professionals caring for people with COVID-19, the CDC recommends placing the person in an Airborne Infection Isolation Room (AIIR), in addition to using standard precautions, contact precautions and airborne precautions.<sup>24</sup>

According to CDC's specific guidelines outlining the use of personal protective equipment (PPE) during the pandemic. The recommended gear should include:

- Respirator or face mask
- Gown
- Medical gloves
- Eye protection

When available, respirators (instead of face masks) are preferred. N95 respirators are approved for industrial settings but the FDA has authorized the masks for use under an Emergency Use Authorization (EUA). They are designed to protect from airborne particles like dust but effectiveness against a specific biological agent is not guaranteed for off-label uses. When masks are not available, the CDC recommends using face shields or, as a last resort, homemade masks.<sup>25</sup>

### DERMATOLOGICAL IMPLICATIONS

Although, the virus is not typically associated with any particular or characteristic skin manifestations. But, certain dermatosis have been reported in these patients, which are thought to be associated with COVID infection, as also no-

ticed with other respiratory viruses like SARS, MERS in the past.<sup>26</sup>

### Clinical Features

**A.** Skin manifestations were observed in about one-fifth of a group of patients with COVID-19 in the Alessandro Manzoni Hospital in Lecco, in northern Italy.<sup>27</sup> Of the 88 COVID-19 patients, 20.5% developed skin manifestations. Eight of the 18 (44%) had skin eruptions at onset of symptoms, and the rest developed after hospitalization. Fourteen (78%) had red rashes, three had widespread urticaria, and one had chickenpox-like vesicles. The most commonly affected area was the trunk. Itching was mild or absent, and lesions usually healed up in a few days. Most importantly, it was noted that the skin manifestations did not correlate with disease severity.

Another group of Physicians from Thailand described a case of a COVID-19 infection in a Bangkok hospital that masqueraded as dengue fever.<sup>28</sup> The patient had presented with only a skin rash, petechiae, and a low platelet count, and was diagnosed initially as a case of Dengue because that's exactly what it looked like. However, subsequently on testing for COVID, it was found to be positive.

COVID-19 cases can present with signs clinically suggestive of small blood vessel occlusion. And, these can be in the form of petechiae or tiny bruises, or transient livedoid eruptions. It suggests vaso-occlusion. Whether it is because of neurogenic cause, due to microthrombotic, or immune complex mediated is not exactly clear at the moment. But, is surely a skin sign that can help physicians to recognize COVID cases early on as they work up their patients with suspected COVID-19 symptoms.<sup>29</sup>

Also, emerging reports are showing higher in-

cidence of certain other group of dermatosis, mainly related to prolonged contact to personal protective equipment, and excessive personal hygiene. And, it includes pressure injury, contact dermatitis, pruritus, pressure urticaria.<sup>30</sup> Also, exacerbation of pre-existing skin diseases like seborrheic dermatitis and acne, has been noticed.<sup>31</sup>

**B.** Another important concern is the care for patients with autoimmune and chronic inflammatory disorders, being treated with biologic drugs or immunosuppressants, such as psoriasis, atopic dermatitis, connective tissue diseases, and hidradenitis suppurativa.<sup>32</sup> European Task force Dermatology Specific Guidelines published are as follows:<sup>33</sup>

- To continue all immune-modulating treatments, including immuno-suppressive therapy, since exacerbations of underlying diseases can have a large negative impact on patients' immunity.
- To strictly follow the recommendations for patients at risk issued by the local health authorities in each European country.
- To carefully observe hygienic procedures using hand wash and disinfectants. Non-irritant soap substitutes should be used in the same way as directed for soap. Moisturizers should be applied afterwards.
- Severe and untreated AD is a known risk factor for disseminated viral skin disease. On the other hand, many conventional systemic immune-modulating agents, such as cyclosporine, may interact with the human bodies defense mechanisms against viral disease. We currently do not know how SARS-CoV-2 affects AD patients and specifically those on immune-modulating therapies.

- Disseminated viral skin infection such as eczema herpeticum, herpes zoster infection or seasonal nasopharyngitis observed in AD patients could serve as potential model diseases for estimating the handling of SARS-CoV-2 infection by AD patients on systemic therapy, but the conclusions which can reasonably be drawn are very limited.
- Targeted treatment selectively interfering with type 2 inflammation, such as dupilumab, is not considered to increase the risk for viral infections and might thus be preferred compared to conventional systemic immunosuppressive treatments, such as cyclosporine, in a situation such as the COVID-19 pandemic. However, this theoretical advantage is not supported by robust clinical data.

### **C. Drug Related:**

Lastly, the drug interactions or adverse cutaneous drug reactions noticed in COVID positive patients being treated with experimental agents or even the high risk groups like health care workers being given prophylactic anti COVID drugs like antimalarials. Antimalarials like chloroquine and Hydroxychloroquine can aggravate pre-existing psoriasis. In a study done on 20 patients, authors reported 7 patients with a maculopapular exanthema (with edema of the face for 1 patient), 6 patients of acute generalized exanthematous pustulosis (AGEP), 3 had photosensitivity with light-induced exanthem, 2 developed urticaria and 2 patients had other CADR - a drug reaction with eosinophilia and systemic symptoms (DRESS) and a DRESS/AGEP overlap. Some cases of purpuric eruption, reticularis like photodistributed livedo, lichenoid photodermatitis and photodistributed lichen planus were also described. In this review, we have basically fo-

cused on the dermatologic aspects of COVID-19 infection, so that dermatologist may be aware of the skin complications and the preventive measures to be taken in the COVID-19 pandemic.<sup>34</sup>

#### **D. Personal Protection Equipments (PPE) induced:**

Erythema, papules, maceration, and scaling are the most commonly reported skin changes due to prolonged use of PPE. Symptoms have included burning, itching, and stinging. Such findings have been attributed to the use of PPE in 97.0% of 542 frontline healthcare workers (HCWs). The most commonly affected skin sites were the nasal bridge (83% due to the use of protective goggles but not the hygiene mask, cheeks, forehead, and hands. The prolonged contact with masks and goggles may cause a variety of cutaneous diseases ranging from contact and pressure urticaria or contact dermatitis to aggravation of pre-existing dermatoses. A former study pointed out that more than 1/3 of health care workers complained of acne, facial itching, and even dermatitis from wearing a N95 mask. The use of protective hats and the accompanying occlusions may induce pruritus and folliculitis or exacerbate seborrheic dermatitis. Long-term use of protective gloves leads to occlusion and a hyper-hydration state of the epidermis clinically observable as maceration and erosions, possibly leading to the development of contact dermatitis. Exaggerated hand washing with detergents/ disinfectants can impair the hydro-lipid mantle of the skin surface and may also be responsible for irritation and even the development of contact dermatitis. Two-thirds of health care workers will wash their hands over 10 times a day, but hardly one fifth are using skin protective cream.<sup>35</sup>

#### **E. Changes in dermatology practice:**

Apart from taking due precautions to minimize the chance of contracting the disease from an infected patient, some other specific measures required to be taken while practicing dermatology are as follows:

- We, as a physician are fortunate enough to have complete visual access to the target organ (skin) and are able to effectively cater to most of our patient's needs via pictures or video consultations. Thus, every dermatologist is advised to widely advertise his/her WhatsApp number to minimize unnecessary office visit.
- Office visits should be only by appointment with enough time gap to sanitize the area after every patient.
- Each patient should be screened for fever before entering the consultation chamber and should mandatorily wear the mask of any kind and should either wear gloves or sanitize hands.
- The consultation time should be kept to minimum while practicing social distancing and wearing protective gears including and not limited to cap, gloves, mask, shoe cover and face shield.
- The consultation chamber should be well ventilated and have stand alone AC unit preferably
- All non essential procedures should be deferred for later date whenever possible.
- If a procedure leading to production of smoke is unavoidable, it should only be done if a smoke evacuators is installed in the procedure room.
- For those dermatologist into academics, all teaching activities should be done remotely

through online lectures, seminars and workshops. Conferences and other gatherings are completely forbidden.

- Practitioners who have high risk criteria of being age 60 years or older, immunocompromised, having co-morbid condition like diabetes or pregnant should be prohibited from evaluating patients.

**F. Self experienced changes in dermatology practice during the last four months of pandemic:**

Apart from noticing couple of cases of classically described COVID toes (Fig. 1 & Fig. 2), other dermatological diseases seen in COVID positive patients were lichenoid eruption (Fig. 3), urticarial rash (Fig. 4), photo dermatitis (Fig. 5), stasis eczema (Fig. 6), Herpes zoster (Fig. 7), relapse of psoriasis (Fig. 8). Amongst the non COVID patients, I experienced sudden increase in infective dermatosis like tinea cruris (Fig. 9), tinea corporis (Fig. 10), scabies (Fig. 11) which could possibly be explained by the complete lockdown imposed in our country. Similarly, I noticed surge in dermatosis induced by excessive hand washing or use of hand sanitizers, especially in healthcare workers (Fig. 12). Also, noticed during this time were dermatoses induced by excessive and prolonged use of personal protective gear especially in healthcare workers (Fig. 13 & Fig. 14).



**Fig. 3** Showing lichenoid lesions on back in a COVID positive patient.



**Fig. 4** Showing urticarial lesions on back in a COVID positive patient.



**Fig. 1 & 2** Showing COVID toes.



**Fig. 5** Showing photodermatitis on face in a female patient.



**Fig. 6** Showing stasis eczema in a COVID positive patient.



**Fig. 10** Showing Tinea cruris in a male patient.



**Fig. 7** Showing herpes zoster on right palm in a COVID positive patient.



**Fig. 11** Showing scabietic lesions in finger web spaces in a child.



**Fig. 8** Showing psoriasis on scalp in a COVID positive patient.



**Fig. 12** Showing hand dermatitis in a nurse.



**Fig. 9** Showing Tinea corporis in a male patient.



**Fig. 13** Dermatitis nape of the neck resulting from tying threads of the surgical gown.

## CONCLUSION

The skin and COVID-19 interactions, as well as the consequences to the skin and mucous membranes of increased personal hygiene measures, should be recognized by dermatologists and their co-workers. The use of preventive measures, including emollients, barrier creams, and moisturizers, is essential in preventing skin complications aggravated by preventive measures during the pandemic.

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