

# Unveiling the dermatological manifestations of Covid 19 infections

## Abstract

**Background:** There have been over 86 million global confirmed cases till date, and the disease is known to have a 2.2% case fatality rate, having claimed over 1.87 million lives. Initially having being regarded as a purely respiratory disease with symptoms of viral pneumonia such as fever, fatigue, dry cough, and lymphopenia. The widespread of this coronavirus disease is aimed at the arial route of the **transmission**. Furthermore, the constant mutations in the virulence factors of the virus leads to the in **effectiveness** in the treatment regimens. Covid 19 disease is mainly known to be a pulmonary infection, giving rise to the **pulmonary** fibrosis, focuses and leads to severe pneumonia and **ultimately** gives a fatal result iof not treated promptly. Not only pulmonary but extrapulmonary manifestations of this disease are also seen. Cardiovascular, renal, nervous and dermatological and immune system. The exact **pathogenesis** and the etiology of the extra pulmonary manifestation of covid to the **cutaneous** prognosis, is not yet well known. The virulence factors, the antigens of the virus that exacerbate the dermatological symptoms. The virus causes the **dermatological** symptoms in the form of urticarial rashes, eczematous infections and **mucocutaneous** depositions. The exact **mechanisms** of actions of the disease progresses to the dermatological variant is not known, however this review will concentrate on the cutaneous manifestations of Covid 19 disease and the variant nature of the infection. The widespread of this coronavirus disease is aimed at the arial route of the **transmission**. Furthermore, the constant mutations in the virulence factors of the virus leads to the in **effectiveness** in the treatment regimens. Covid 19 disease is mainly known to be a pulmonary infection, giving rise to the **pulmonary** fibrosis, focuses and leads to severe pneumonia and **ultimately** gives a fatal result **if** not treated promptly. Not only pulmonary but extrapulmonary manifestations of this disease are also seen. Cardiovascular, renal, nervous and dermatological and immune system. The exact **pathogenesis** and the etiology of the extra pulmonary manifestation of covid to the **cutaneous** prognosis, is not yet well known. The virulence factors, the antigens of the virus that exacerbate the dermatological symptoms. The virus causes the **dermatological** symptoms in the form of urticarial rashes, eczematous infections and **mucocutaneous** depositions.

**Keywords:** COVID-19, coronavirus – COVID-19, skin manifestations, skin - pathology, systematic literature search, disease severity, mortality, prognosis

## Introduction:

To infect human cells, the virus **utilized** the angiotensin converting enzyme-two ACE-2 receptor, that is demonstrated differently in different human organs. ACE-2 receptors are abundantly expressed in keratinocytes and then in sweat glands, according to "Xue et al" suggesting that the skin is the vulnerable site for infection by the coronavirus. The numerous cutaneous presentations of corona disease, their clinical importance, and the therapy plan for these manifestations are described in this study. The gripping infection Covid19, originally known as 2019-nCov, has been dubbed by the International Committee on Virus Taxonomy (ICTV) as a rapidly spreading pandemic. It is an upcoming acute respiratory illness, and it

mainly transmits by the respiratory tract, through droplets, resp. secretions, and also by direct contact [1]. The virus has been demonstrated to transmit by resp. droplets, mucous membranes exposure by **gummites** and by aerosols and is classified in the subgroup beta COVID as a member of Coronavirus family. RNA of SARS-CoV2 was also seen in the stools of covid 19 infected **suffers**. The outcome of this research established the hypothesis that *SOD3/ATF4*-associated antioxidants, that is particularly in the pulmonary, will function in synergy [2]. This type of coronavirus has a polymorphic nature. This virus is an enveloped virus with +vet sense sRNA and is a member of coronavirus family. Cells are infected by the virus binding to the angiotensin converting enzyme 2 (ACE2) receptor present on the surface of the cell. COVID-19 is mostly transmitted through the lungs, with manifestation varying from flu-like features which are mild to features like hazardous pneumonia and/or fatal respiratory distress. 9 This disease is mostly seen as producing fever & respiratory problems, but it is also seen linked to a variety of extrapulmonary symptoms, including dermatological indications.[3]. There have been over 86 million global confirmed cases till date, and the disease is known to have a 2.2% case fatality rate, having claimed over 1.87 million lives. Initially having being regarded as a purely respiratory disease with symptoms of viral pneumonia such as fever, fatigue, dry cough, and lymphopenia. The widespread of this coronavirus disease is aimed at the arial route of the transmission. Furthermore, the constant mutations in the virulence factors of the virus leads to the in effectiveness in the treatment regimens. Covid 19 disease is mainly known to be a pulmonary infection, giving rise to the pulmonary fibrosis, focuses and leads to severe pneumonia and ultimately gives a fatal result if not treated promptly. Not only pulmonary but extrapulmonary manifestations of this disease are also seen. Cardiovascular, renal, nervous and dermatological and immune system. The exact pathogenesis and the etiology of the extra pulmonary manifestation of covid to the cutaneous prognosis, is not yet well known. The virulence factors, the antigens of the virus that exacerbate the dermatological symptoms. The virus causes the dermatological symptoms in the form of urticarial rashes, eczematous infections and mucocutaneous depositions. The exact mechanisms of actions of the disease progresses to the dermatological variant is not known, however this review will concentrate on the cutaneous manifestations of Covid 19 disease and the variant nature of the infection. The widespread of this coronavirus disease is aimed at the arial route of the transmission. Furthermore, the constant mutations in the virulence factors of the virus leads to the in effectiveness in the treatment regimens. Covid 19 disease is mainly known to be a pulmonary infection, giving rise to the pulmonary fibrosis, focuses and leads to severe pneumonia and ultimately gives a fatal result if not treated promptly. Not only pulmonary but extrapulmonary manifestations of this disease are also seen. Cardiovascular, renal, nervous and dermatological and immune system. The exact pathogenesis and the etiology of the extra pulmonary manifestation of covid to the cutaneous prognosis, is not yet well known. The virulence factors, the antigens of the virus that exacerbate the dermatological symptoms. The virus causes the dermatological symptoms in the form of urticarial rashes, eczematous infections and mucocutaneous depositions. Furthermore, evidence is mounting that COVID-19-related skin symptoms are exceedingly polymorphic. Keratinocytes have much greater levels of ACE2 expression compared to further cellular parts in dermis, for instance fibroblasts and melanocytes. It is confirmed by individualistic ss (RNA) sequencing information, that revealed that keratinocytes account for 97.37 percent total “ACE 2” +vet dungeon in dermis, after the sweating gland dungeon, which is of total 2.63%. Significant extensive appearance of “ACE two” [4], appear as microorganisms can contaminate further man cells along with pleura, potentially leading to new clinical symptoms.

## **Methodology:**

Composition exploration was run using OVID, PubMed and Google search engines for indigenous and review articles issued afterward the beginning of the ongoing COVID-19 epidemic to April 20, 2020. Forage words such as (COVID-19), (2019-nCoV), (SARS-CoV-2) and (coronavirus) are utilized in union with (skin), (dermatology), (cutaneous), (urticaria) and (rash).

## **Results:**

Most Common prevalent dermatological appearance in “COVID-19” seems to be a widespread macular or maculopapular exanthem, with 36.1 percent (26/72) of individuals having such lesions on their skin. 34.7 percent (25/72) [5] of individuals had a papulovesicular rash (vesicles). Urticaria was seen, with nine-point seven percent “seven out of seventy-two” diseased who were reported, and tender purple red pustule which may or may not contain vesicles were noticed in fifteen-point three percent diseased “eleven out of seventy-two”. Finally, two-point eight percent (2/72) of the patients had live do reticulates wound, while 1 diseased (one point four percent) had petechiae. In (67/72) cases, the site of the lesion was described, most of them were located at hands, feet and trunks. Lesions on the trunk were found in 69.4 percent (50/72) of patients [6] In addition, 19.4 % of diseased (14/72) had skin symptoms at their feet and hand. The onset of cutaneous lesions varied by patient, ranging from 3 days prior to “covid 19” identification to thirteen days following the confirmation. Within case’s studied, 12.5 percent (9 / 72) of diseased had skin lesions by the time of confirmation ot the beginnings of “covid-19” features, 69. 4 % (50/72) had cutaneous manifestations following the start of pulmonary features or the confirmation of covid-19. In 18.1 percent (13/72) of patients, the onset of a cutaneous lesion was not reported. 74.0 percent (37/50) of the 49 patients who had lesions within seven days of beginning of pulmonary features or “COVID - 19” confirmation developed skin manifestation in seven days, while six percent reported manifestation following seven days. Out of the total cases 50 cases reported healing times, 100% Healing of cutaneous lesions was recorded by of patients, with healing durations ranging from a few days to a few weeks. (25/50). (2.0 percent) [7].

## **Discussion:**

The vigorous spread of Covid 19 pandemic has affected almost each and every sector in the community as well as the medical fraternity. While many countries have been facing the consequences of this insisted state of lockdown and medical burdens due to the pandemic, India is suffering under the wrath of the widespread of this Covid 19 virus. The said pandemic has recently taken an aggressive widespread course; resulting in an increased number of cases succumbing to the pathogenesis of this disease. The rapidly elevating graph of the fatalities is observed due to the extra-pulmonary advancing ability of the coronavirus infection. In the cases presenting with severe Covid 19 infection, almost 5% of patients are seen progressing to the pathology known as multi–Organ Dysfunction Syndrome [MODS]. The COVID19 infection has been recorded to exhibit a broad range of manifestations from asymptomatic to severe (5). In general, a high rate of patients has been found to be asymptomatic and the ones with mild infection exhibit the common cold manifestations, fever, dry cough, and myalgia (5), and show a favorable prognosis. The healthcare professionals, are working tirelessly, and are honoring their services towards the general population, despite the threat of getting infected. Worse outcomes have been observed in the middle-aged and elderly patients with primary chronic diseases especially, CVDs, diabetes, obesity, thyroid abnormalities, renal diseases and chronic respiratory diseases among others

who, therefore, had poorer prognosis and comparatively narrow chances to recover successfully. COVID-19, mainly in severe cases, can progress as a serious condition with hypoxemia and dyspnea and could develop as ARDS, one week after the onset of the illness. In addition to lungs, the virus has been known to cause detriment to other organs such as the kidneys, liver, and heart, along with body systems such as nervous and hematological and induce multiorgan failure. (8).

The blood biochemistry indices give an idea about the disease severity in COVID-19 infection. When compared to healthy individuals, patients infected with SARS-CoV-2 showed a marked increase in the serum concentrations of interferons (IFN), tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukins like IL-1 $\beta$ , IL-2, IL-6, IL-7, IL-8, platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF) among others pro inflammatory mediators. (9) Patients have also been known to present with hypoalbuminemia, lymphopenia, leukopenia with leukocytosis and an increase in concentrations of LDH, AST, ALT, bilirubin and especially, D-dimer. Another high mortality risk factor in COVID infected patients was reported to be a high neutrophil-to-lymphocyte ratio (NLR). (10) In addition to this, activation of the complement system leading to cytokine storm that results in inflammatory cells infiltration, amplified and poorly regulated immune responses and impaired coagulation in SARS-CoV2 infection has been known to induce the multi-organ failure in the patients. Counteracting effects such as these hinder the complete obliteration of the virus and pave the way for opportunistic pathogens to cause secondary infections, thus resulting in a sepsis-like state, which was recorded in 17% of patients, 65% of whom have worsened and succumbed to the illness. Greater increases in serum concentration of several pro-inflammatory mediators, brought on by the cytokine storm, have been recorded in the patients admitted to the ICU, which indicates a direct correlation with severity of the disease. (11) Therefore, there is a dire need for evaluation of viral sepsis and multiple organ failure score in COVID-19 patients and further information about the precise mechanisms of pathogenesis of sepsis caused by the novel coronavirus needs to be computed to increase the clinician's knowledge facilitating their determination of the clinical characteristics of viral sepsis and the identification of the risk factors more accurately, so that the mortality and morbidity rate decreases and the outcomes become more favorable.

According to the survey conducted by Mehta and McAuley in March 2020, majority of the cases admitted to ICU showed a dysregulated host response, wherein characteristic features such as hyperinflammation along with the alterations in the coagulation cascade and dysregulation in the immune response were noted, (12) that further contributed to multi organ dysfunction syndrome (MODS), like occurs in the presentation of sepsis (13). The cases are landing into septic shocks associated with the multi-systemic pathologies. The prognosis of such cases is substandard, taking into consideration the mysterious virulent characteristics of the recently discovered mutant strains of Sars-coV-2. Recently, Collange and Tacquard conducted a research study in France (14) in which they reported the cases showing extra-pulmonary pathologies that were associated with Covid 19 infection. On examination these patients revealed multi systemic findings such as Mesenteric vascular ischemia resulting into bowel resection, thrombotic microangiopathy and Anti-phospholipid syndrome. From the study done by the researchers of China and Iran it was concluded that, Covid 19 virus, mainly in severe cases, in addition to respiratory impact, also involves different organs such as heart, liver, and kidney and it also affects hematological parameters and nervous system, and induces multi-organ failure . An eminent author (15) Mao et al reported that the patients with COVID-19 disease, do present with some neurologic manifestations. The patients in his study did develop severe consciousness disorders. When investigated, MRI images suggested occurrence of the pathological entity called as necrotizing-hemorrhagic encephalitis. As long

as its inception in dec. 2019 Wuhan, China, the world has been witnessing to the horrors of a new viral sickness produced by the novel severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The WHO On (16) 11th march 2020, announced the illness 2019 coronavirus (COVID-19) & called it a pandemic." As of May 9, 2021, the global burden of the disease has increased to greater than 1570 lakh cases and greater than 30 lakh mortality. There have been over 86 million global confirmed cases till date, and the disease is known to have a 2.2% case fatality rate, having claimed over 1.87 million lives. Initially having being regarded as a purely respiratory disease with symptoms of viral pneumonia such as fever, fatigue, dry cough, and lymphopenia. The widespread of this coronavirus disease is aimed at the arial route of the transmission. Furthermore, the constant mutations in the virulence factors of the virus leads to the in effectiveness in the treatment regimens. Covid 19 disease is mainly known to be a pulmonary infection, giving rise to the pulmonary fibrosis, focuses and leads to severe pneumonia and ultimately gives a fatal result if not treated promptly. Not only pulmonary but extrapulmonary manifestations of this disease are also seen. Cardiovascular, renal, nervous and dermatological and immune system. The exact pathogenesis and the etiology of the extra pulmonary manifestation of covid to the cutaneous prognosis, is not yet well known. The virulence factors, the antigens of the virus that exacerbate the dermatological symptoms. The virus causes the dermatological symptoms in the form of urticarial rashes, eczematous infections and mucocutaneous depositions. The exact mechanisms of actions of the disease progresses to the dermatological variant is not known, however this review will concentrate on the cutaneous manifestations of Covid 19 disease and the variant nature of the infection. The widespread of this coronavirus disease is aimed at the arial route of the transmission. Furthermore, the constant mutations in the virulence factors of the virus leads to the in effectiveness in the treatment regimens. Covid 19 disease is mainly known to be a pulmonary infection, giving rise to the pulmonary fibrosis, focuses and leads to severe pneumonia and ultimately gives a fatal result if not treated promptly. Not only pulmonary but extrapulmonary manifestations of this disease are also seen. Cardiovascular, renal, nervous and dermatological and immune system. The exact pathogenesis and the etiology of the extra pulmonary manifestation of covid to the cutaneous prognosis, is not yet well known. The virulence factors, the antigens of the virus that exacerbate the dermatological symptoms. The virus causes the dermatological symptoms in the form of urticarial rashes, eczematous infections and mucocutaneous depositions.

In the Southeast Asia region, India accounts for 95% of cases and 93 percent of deaths, as well as 50% of global cases and 30% of global deaths. To infect human cells, the virus utilized the angiotensin converting enzyme-two ACE-2 receptor, that is demonstrated differently in different human organs. ACE-2 receptors are abundantly expressed in keratinocytes and then in sweat glands, according to Xue et al (3) suggesting that the skin is the vulnerable site for infection by the coronavirus. The numerous cutaneous presentations of corona disease, their clinical importance, and the therapy plan for these manifestations are described in this study. The gripping infection Covid-19, originally known as 2019-nCov, has been dubbed by the International Committee on Virus Taxonomy (ICTV) as a rapidly spreading pandemic. It is an upcoming acute respiratory illness, and it mainly transmits by the respiratory tract, through droplets, resp. secretions, and also by direct contact. The virus has been demonstrated to transmit by resp. droplets, mucous membranes exposure by gummites and by aerosols and is classified in the subgroup beta COVID as a member of Coronavirus family. The RNA of SARS-CoV2 was also seen in the stools of covid-19 infected suffers. The outcome of this research established the hypothesis that *SOD3/ATF4*-associated antioxidants, that is particularly in the pulmonary, will function in synergy. This type of coronavirus has a polymorphic nature. This virus is an enveloped virus with +vet

sense sRNA & is a member of coronavirus family. Cells are infected by the virus binding to the angiotensin converting enzyme-2 (ACE2) receptor present on the surface of the cell. COVID-19 is mostly transmitted through the lungs, with manifestation varying from flu-like features which are mild to features like hazardous pneumonia and/or fatal respiratory distress. This disease is mostly seen as producing fever & respiratory problems, but it is also seen linked to a variety of extrapulmonary symptoms, including dermatological indications. (17-21).

### **Conclusion:**

The presentation of skin manifestations varies greatly, yet this systematic study aids in the classification of these diverse patterns. Clinicians are the first to observe the manifestation in “COVID - 19” cases and must be ready to spot a COVID-19-related dermatologic presentation. The predictive value of each dermatologic symptom should be investigated further. COVID-19-related cutaneous symptoms have become more widespread in recent months, drawing international scientific attention as well as media attention. Right after the outbreak broke out, in few months numerous reports and structured evaluations about the cutaneous aspects of “COVID - 19” were issued.

### **References:**

1. Guo YR, Cao QD, Hong ZS, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak—an update on the status. *Mil Med Res* 2020;7:11.
2. Abouhashem AS, Singh K, Azzazy HME, Sen CK. Is low alveolar type II Cell SOD3 in the lungs of elderly linked to the observed severity of COVID-19? *Antioxid Redox Signal* 2020;33:59–65.
2. Li MY, Li L, Zhang Y, Wang XS. Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues. *Infect Dis Poverty* 2020;9:45.
3. Xue X, Mi Z, Wang Z, Pang Z, Liu H, Zhang F. High expression of ACE2 on keratinocytes reveals skin as a potential target for SARS-CoV-2. *J Invest Dermatol* 2020 [Epub ahead of print]; DOI: 10.1016/j.jid.2020.05.087.
4. Recalcati S. Cutaneous manifestations in COVID-19: a first perspective. *J Eur Acad Dermatol Venereol* 2020;34:e212–e213.
5. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020;382:1708–1720.
6. Kleitman T. Skin and COVID-19. *J Med Vasc* 2020;45:175–176.
7. Nieto D. Algorithm for the classification of COVID-19 rashes. *J Am Acad Dermatol* 2020;83:e103–e104.
8. Ely JW, Seabury Stone M. The generalized rash: part I. Differential diagnosis. *Am Fam Physician* 2010;81:726–734.
9. Ely JW, Seabury Stone M. The generalized rash: part II. Diagnostic approach. *Am Fam Physician* 2010;81:735–739.
10. Galván Casas C, Català A, Carretero Hernández G, et al. Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases. *Br J Dermatol* 2020;183:71–77.
11. Herrero-Moyano M, Capusan TM, Andreu-Barasoain M, et al. A clinicopathological study of eight patients with COVID-19 pneumonia and a late-onset exanthema. *J Eur Acad Dermatol Venereol* 2020 [Epub ahead of print]; DOI: 10.1111/jdv.16631.
12. Reymundo A, Fernández-Bernáldez A, Reolid A, et al. Clinical and histological characterization of late appearance maculopapular eruptions in association with the

- coronavirus disease 2019. A case series of seven patients. *J Eur Acad Dermatol Venereol* 2020 [Epub ahead of print]; DOI: 10.1111/jdv.16707.
13. Rubio-Muniz CA, Puerta-Peña M, Falkenhain-López D, et al. The broad spectrum of dermatological manifestations in COVID-19: clinical and histopathological features learned from a series of 34 cases. *J Eur Acad Dermatol Venereol* 2020 [Epub ahead of print]; DOI: 10.1111/jdv.16734.
  14. de Masson A, Bouaziz JD, Sulimovic L, et al. Chilblains is a common cutaneous finding during the COVID-19 pandemic: a retrospective nationwide study from France. *J Am Acad Dermatol* 2020;83:667–670.
  15. Askin O, Altunkalem RN, Altinisik DD, Uzuncakmak TK, Tursen U, Kutlubay Z. Cutaneous manifestations in hospitalized patients diagnosed as COVID-19. *Dermatol Ther* 2020 [Epub ahead of print]; DOI: 10.1111/dth.13896.
  16. De Giorgi V, Recalcati S, Jia Z, et al. Cutaneous manifestations related to coronavirus disease 2019 (COVID-19): a prospective study from China and Italy. *J Am Acad Dermatol* 2020;83:674–675.
  17. Chandak S, Madke B, Jawade S, Singh A. Hydroxyurea-induced azure lunula: Case Report. *JOURNAL OF DERMATOLOGY & DERMATOLOGIC SURGERY-JDDS*. 2021 Jun;25(1):44–5.
  18. Verma, Shyam B., Bhushan Madke, Rajiv S. Joshi, and Uwe Wollina. “Pseudoedematous Striae: An Undescribed Entity.” *DERMATOLOGIC THERAPY* 33, no. 4 (July 2020). <https://doi.org/10.1111/dth.13754>.
  19. Verma SB, Madke B. Topical corticosteroid induced ulcerated striae. *ANAIS BRASILEIROS DE DERMATOLOGIA*. 2021 Feb;96(1):94–6.
  20. Shah D, Talwar D, Kumar S, Acharya S, Dubey A. Mucormycosis as a complication of LOIN G COVID: A case series. *MEDICAL SCIENCE*. 2021 Jun;25(112):1331–7.
  21. Godhiwala P, Acharya S, Jagtap G, Bhake A, Shukla S. Leukemoid Reaction in a COVID-19 Patient. *JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS*. 2021 Feb 8;10(6):399–400.