

# COVID-19 Skin Manifestations in Skin of Colour

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## Abstract

Coronavirus disease (COVID-19) skin manifestations have been increasingly reported in medical literature. Recent discussions have identified a lack of images of skin of color (SOC) patients with COVID-19 related skin findings despite people with skin of color being disproportionately affected with the disease. There have been calls to prioritize the identification of COVID-19 skin manifestations in patients with SOC and disseminate these findings. The objective of this article is to review the existing literature on COVID-19 skin manifestations and, where possible, discuss how they may present differently in patients with SOC. Further research is needed to allow primary care physicians and dermatologists to be aware of and easily identify patients with cutaneous findings that may be secondary to COVID-19. Patients presenting with idiopathic dermatologic manifestations should be considered for COVID-19 testing and follow public health guidelines for self-isolation.

## Keywords

skin of colour, skin manifestations, coronavirus, COVID-19, urticaria, maculopapular, papulovesicular, exanthem, chilblain, livedo racemosa, livedo reticularis, purpura, petechiae

## Introduction

The initial cases of Coronavirus disease (COVID-19), a disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), were first reported in China in December 2019.<sup>1</sup> The disease has grown to become a global pandemic with over 120 million confirmed cases to date.<sup>2</sup> Canada reported its first case of COVID-19 in January 2020 and has since recorded over 960,000 confirmed cases.<sup>3,4</sup> Most of the reported cases have been in Canada's two most populous provinces, Quebec and Ontario. The two provinces account for approximately 70% of the total cases in Canada and represent 62% of the country's population.<sup>4</sup> Comprehensive race-based COVID-19 data are currently limited in Canada. According to the latest data released in December 2020 by the Toronto Public Health Unit, Ontario, racialized persons account for 77% of reported COVID-19 cases while only representing half of the city's population.<sup>5</sup>

COVID-19 is a multisystem disease affecting several vital organs.<sup>6</sup> Although the cutaneous manifestations of COVID-19 do not present in all infected patients, physicians must be aware of the skin manifestations linked to COVID-19 as they might be the presenting sign of infection in asymptomatic or minimally symptomatic patients. They may also be a useful prognostic marker for disease severity.<sup>7</sup>

Healthcare providers should be able to identify these COVID-19 related cutaneous manifestations in patients of all

skin types. While the scientific literature on COVID-19 cutaneous manifestations continue to grow, there is a paucity of clinical images of skin of color (SOC) patients in medical publications. According to a systematic review of English-language articles published between 31 December 2019 and 3 May 2020, the authors found there were no clinical images representing Fitzpatrick type V or VI skin in the published articles.<sup>8</sup> Since patients with SOC may have subtle disease presentation and different morphologic variants,<sup>9</sup> the lack of representation of images of skin color may delay a diagnosis and result in patients with SOC receiving suboptimal care.<sup>10,11</sup> A prospective study done at the India Institute of Medical Sciences to study the

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prevalence of cutaneous manifestations in COVID-19 infected patients presenting at the center concluded that the reported vascular cutaneous manifestations, such as chilblain-like lesions, vasculitis and livedo reticularis were uncommon among patients with darker skin phototypes.<sup>12</sup> Similarly, a study in Brazil found that patients with non-white skin rarely presented with chilblain-like lesions.<sup>13</sup>

Generally, the presentation and manifestation of any cutaneous pathology can vary widely with skin tone. Inflammatory skin conditions can present differently in darker skin compared to lighter skin. In darker skin, inflammation is more subtle and presents with pigmentary change and violaceous colouration. This is in contrast to lighter skin where inflammation is more noticeable and typically presents as erythema.<sup>14,15</sup>

COVID-19 skin manifestations are no different and SOC patients can present with more subtle dermatoses compared to white skin. Considering the variability of skin findings presented by COVID-19 patients and how COVID-19 has disproportionately affected people of color,<sup>16</sup> it is particularly important that healthcare providers are able to identify how the cutaneous manifestations of COVID-19 may present in SOC patients.

Our review will summarize the key information that is currently known about the COVID-19 cutaneous manifestations and characterize how these may present in patients with SOC.

## Methods

A literature search was conducted in PubMed and Google Scholar databases for articles written in English. There were no date restrictions but we concluded our search in March 2021. Search terms included “darker skin”, “skin of color,” and “skin manifestations” in combination with “COVID-19” and “SARS-CoV-2.” We explored the bibliography sections of each retrieved article to identify other useful references. Due to the paucity of literature on this topic, we scanned other forms of grey literature, mostly published books on skin of color and the British Association of Dermatology website, along with using personal clinical experiences for diagnostic pearls and images.

## Discussion

### COVID-19 and Skin Lesions

The prevalence of COVID-19 skin manifestations remains unknown with varying prevalence being reported in the literature. A large Chinese study of 1099 COVID-19 patients reported an incidence rate of 0.2% while a study of 88 COVID-19 patients by a dermatologist in Italy reported an incidence rate of 20.4%.<sup>17</sup> The cutaneous manifestations of COVID-19 have been documented in patients of all ages, from as early as 2 months to 89 years.<sup>18</sup> Due to the polymorphous nature of the COVID-19 skin manifestations, several pathophysiological mechanisms have been postulated. The etiology and pathophysiology of these skin manifestations

continue to evolve. In general, the skin manifestations are being attributed to the overactivation of inflammatory mediators leading to a cytokine storm and damage to the endothelium.<sup>19</sup> Direct viral effect on the endothelium and viral-induced vasculitis play a predominant role in the cutaneous manifestations seen in COVID-19 patients.<sup>20</sup>

Although the COVID-19 cutaneous manifestations are polymorphous in nature, Genovese et al. recently classified the cutaneous manifestations into six main clinical patterns: (i) urticarial rash, (ii) confluent erythematous/maculopapular/morbilliform rash, (iii) papulovesicular exanthem, (iv) chilblain-like lesions, (v) livedo reticularis/racemose-like pattern, and (vi) purpuric “vasculitic” pattern.<sup>21</sup> Adopting and modifying this classification, we provide an overview of the cutaneous manifestations associated with COVID-19, while focusing on how the cutaneous manifestations may present on patients with SOC. This overview as well as treatments for each manifestation is summarized in Table 1.

(I) *Urticarial rash.* Among the six clinical patterns listed above, urticaria is the second most common skin manifestation that has been reported in COVID-19 patients.<sup>18</sup> Most patients present with urticarial eruption during the active symptomatic phase of the infection.<sup>18</sup> However, in some cases, the eruption precedes other classical symptoms of COVID-19.<sup>22</sup>

In COVID-19 patients, urticaria affects the skin and mucous membrane. It presents as an erythematous and pruritic rash with or without angioedema as well.<sup>23</sup> For most patients with COVID-19, the urticarial rash is self-limiting and disappears or clinically improves within a week. However, the rash can be managed with either a combination of oral antihistamines and oral steroids. In patients with chronic urticaria, antihistamines alone are predominantly used with good efficacy, while low-dose systemic corticosteroids either in conjunction or used alone were also effective.<sup>22</sup>

While urticaria is a common skin manifestation in lighter skin patients with COVID-19, data on prevalence in SOC patients is lacking. There have been no reports of morphological differences in patients with SOC as of March 2021. However, there have been few cases reported of African American patients hospitalized for COVID-19 developing angioedema of the face, lips, mouth and tongue without urticaria.<sup>24</sup> On SOC patients, the hives may be the same color as the surrounding skin and the erythema that often surrounds urticarial rash may be difficult to appreciate, as illustrated in Figure 1. Examining the skin for enlarged follicular openings with increased distance between them is useful in establishing dermal edema.<sup>25</sup> A tactile approach can be beneficial as changes in skin texture or raised bumps can also prompt a physician to a rash that is not readily visible. Treatment of urticarial rash in patients with SOC follows the standard principles of therapy described above.

**Table 1.** Overview of the Presentation and Treatment of the Seven Main Clinical Manifestations in SOC.

Clinical pattern	Characteristic morphological presentation	Pearls for identifying in SOC	Treatment	Presentation
Urticarial presentation	<ul style="list-style-type: none"> <li>Erythematous and pruritic rash;</li> <li>Angioedema of the face, lips, mouth and tongue without urticaria is possible</li> </ul>	<ul style="list-style-type: none"> <li>Hives may be skin-colored or violaceous</li> <li>Examine the skin for enlarged follicular openings to establish dermal edema</li> <li>Palpate skin for changes in skin texture or raised bumps</li> </ul>	<ul style="list-style-type: none"> <li>Antihistamines <math>\pm</math> low dose systemic corticosteroids</li> </ul>	
Maculopapular eruption	<ul style="list-style-type: none"> <li>Macular erythema, morbilliform exanths, or papulosquamous lesions</li> <li>Localized to the trunk and extremities with pruritus</li> </ul>	<ul style="list-style-type: none"> <li>Palpate the skin for changes in temperature (warm) to establish inflammation</li> <li>Lichenification occurs readily in darker skin and is visible</li> <li>Erythema presents with pigmentary changes and violaceous colouration</li> <li>Check for hyperpigmentation</li> </ul>	<ul style="list-style-type: none"> <li>Topical corticosteroids for most cases</li> <li>Systemic corticosteroids for severe cases with widespread presentation</li> <li>Early treatment of hyperpigmentation with topical depigmenting agents</li> </ul>	
Psoriasiform Dermatoses	<ul style="list-style-type: none"> <li>Erythematous-squamous rash with varying morphology and size</li> <li>Initially presents with a herald patch</li> </ul>	<ul style="list-style-type: none"> <li>Eruption may have a gray, dark brown or black appearance</li> <li>White patchy and peripheral collarette scales visible</li> </ul>	<ul style="list-style-type: none"> <li>Self-limiting and completely resolves within 30 days</li> <li>Potent topical corticosteroids to manage pruritus</li> </ul>	
Papulovesicular exanthem	<ul style="list-style-type: none"> <li>Varicella-like eruption without pruritus</li> <li>Scattered distribution with truncal involvement</li> <li>Erythematous papules, self-limiting rash</li> </ul>	<ul style="list-style-type: none"> <li>Gray, dark brown, violaceous or black exanths in skin of color</li> <li>Hyperpigmentation may be present around vesicles and papules</li> <li>Linear excoriations may occur due to scratching as pruritus has been reported</li> </ul>	<ul style="list-style-type: none"> <li>No standardized treatments</li> <li>Topical corticosteroids to manage pruritus</li> </ul>	
Chilblain-like acral pattern	<ul style="list-style-type: none"> <li>Less common in skin of color</li> <li>Erythematous-violaceous macules, plaques and nodules on feet and fingers</li> </ul>	<ul style="list-style-type: none"> <li>Assess for swelling as swelling of the digits are more evident than erythema</li> <li>Assess for idiopathic tingling and burning sensation</li> <li>Assess heels and subungual region for hyperpigmented plaques</li> </ul>	<ul style="list-style-type: none"> <li>No standardized treatments</li> <li>Potent topical corticosteroids are most commonly recommended with supportive treatment</li> </ul>	
Livedo reticularis	<ul style="list-style-type: none"> <li>Lace-like pattern of erythematous-violaceous discoloration of lower limbs</li> </ul>	<ul style="list-style-type: none"> <li>Can present as hyperpigmented patches with a lace-like discoloration pattern</li> <li>Lesions are more prominent if patient is upright vs supine</li> </ul>	<ul style="list-style-type: none"> <li>No standardized treatments but active monitoring is recommended</li> <li>Topical or systemic vasodilators, antiplatelets including low dose acetylsalicylic acid, or anticoagulants can be used if concerns for thrombosis and ischemia</li> </ul>	
Purpuric pattern	<ul style="list-style-type: none"> <li>Generalized or localized petechial rash in the skin folds</li> <li>May evolve into hemorrhagic blisters</li> </ul>	<ul style="list-style-type: none"> <li>Examine areas with lighter pigmentation</li> <li>Small, reddish-purple lesions</li> <li>More evident in buccal mucosa or conjunctiva if present</li> <li>Apply pressure to check for blanching. Petechiae will not blanch</li> </ul>	<ul style="list-style-type: none"> <li>Mild cases managed with moderate potency topical corticosteroids</li> <li>Systemic corticosteroids for severe cases</li> </ul>	

(II) *Maculopapular rash.* Maculopapular rash is reported as one of the most common cutaneous manifestation in COVID-19 patients.<sup>26</sup> The majority of patients presented with the maculopapular rash during the symptomatic phase of their infection, at

the same time as the onset of other non-cutaneous COVID-19 symptoms. However, the rash was also present in asymptomatic COVID-19 patients.<sup>7</sup> Maculopapular eruptions encompass a broad category of primary morphologies. As such, the



**Figure 1.** Urticarial rash in SOC.<sup>56</sup>

classification of maculopapular rashes actually encompasses macular erythema and morbilliform exanths.<sup>27</sup> This presentation is typically localized to the trunk and extremities with pruritus in most patients, as illustrated in Figure 2. Topical corticosteroids are sufficient in managing most cases. In severe cases with widespread presentation, systemic corticosteroids may be indicated.<sup>21</sup>

A self-reported study from Brazil found the prevalence of morbilliform exanthem to be 4% in COVID-19 patients with non-white skin.<sup>13</sup> In SOC patients, erythema can translate into hyperpigmentation. The increase in pigment may make it difficult to recognize the erythema.<sup>28</sup> As a result, it is possible for SOC patients to present with a varying shade of red. To confirm inflammation in SOC patients, one can touch the skin to check if the skin is warm or hot to the touch. Palpation is an underestimated examination modality but assessing the skin for scale, textural changes, sweating differences and temperature can provide clues to an underlying dermatological condition.<sup>29</sup>

In darker skin, lichenification occurs readily.<sup>30</sup> Due to the pruritus associated with COVID-19 maculopapular rash, SOC patients may present with some lichenification. The thickened skin is often darker than surrounding skin. This darkening is



**Figure 2.** Maculopapular rash in SOC.<sup>56</sup>



**Figure 3.** Psoriasiform Dermatoses in SOC.<sup>31</sup>

more apparent in dark-skinned patients. While treatment of COVID-19 related morbilliform eruptions in SOC patients follows the standard principles of therapy above, specific considerations exist. SOC patients frequently experience post inflammatory hyperpigmentation after an inflammatory injury resolves. Early treatment of the hyperpigmentation with topical depigmenting agents may hasten its resolution.<sup>28</sup>

(III) *Psoriasiform Dermatoses.* Cases of pityriasis rosea-like manifestations have also been reported in COVID-19 positive patients.<sup>31-33</sup> Patients initially present with a herald patch with scaling collarette followed by widespread erythematous-squamous rash of varying morphology and size.<sup>31,34</sup> There have been cases reported of a pityriasis rosea-like rash without an associated plaque or herald patch.<sup>32</sup> Most patients with pityriasis rosea-like manifestations were asymptomatic for COVID-19.<sup>31,32</sup> The rash is self-limiting and completely resolves within two to 4 weeks. The associated pruritus can be managed with a potent topical corticosteroid.<sup>31,32</sup>

The erythematous appearance of pityriasis rosea rash typically seen in lighter skin may not be encountered in SOC.<sup>35</sup> In SOC, the exanthem may have a gray, dark brown, or even black appearance as the erythema associated with this presentation may not be readily noticeable. Paying close attention for scaling in SOC may be beneficial as there is greater visibility of white patchy and peripheral collarette scales, as illustrated in Figure 3.<sup>31</sup>

(IV) *Papulovesicular exanthem.* The papulovesicular exanthem rash was initially described as a varicella-like eruption due to its similarity with lesions seen in varicella patients. However, the involvement of the trunk and scattered distribution of the lesions in addition to the absence of pruritus differentiates it from a varicella infection.<sup>21</sup>

Some COVID-19 patients develop erythematous papules over the extremities resembling pseudo-vesicles. The skin lesions generally appear 3 days after the onset of systemic



**Figure 4.** Papulovesicular Exanthem in SOC.<sup>55</sup>

symptoms and is associated with moderate to severe COVID-19 severity. They heal after about 8 days without any scarring or post-inflammatory pigmentation.<sup>36</sup> Considering the rash is self-limiting in about a week, there are no standardized treatments for COVID-19 related papulovesicular exanthem.<sup>21</sup> However, high-potency topical corticosteroids have been used as treatment.<sup>37</sup>

SOC patients may present with hyperpigmentation around the vesicles and papules.<sup>25</sup> The rash may be umbilicated with some crusting. While pruritus has not been reported widely in the literature, the few cases involving SOC had an associated pruritus.<sup>31</sup> As a result, linear excoriations may occur in SOC patients due to scratching, as illustrated in Figure 4 .

(V) *Chilblain-like lesions.* Asymptomatic carriers of the SARS-CoV-2 may present with chilblain-like lesions without any history of exposure to cold. The lesions present as erythematous-violaceous macules, plaques and nodules on the lateral aspects of the feet and the distal aspects of the fingers. The manifestation is more common in children and young adults.<sup>38</sup> This presentation has been termed “COVID toes”, and is usually associated with mild COVID-19 disease severity representing the convalescent phase of infection.<sup>39</sup> While there are no treatment guidelines for COVID-19 patients presenting with chilblain-like lesions of the feet and hands, potent topical corticosteroids are most commonly recommended with supportive treatment.<sup>40</sup>

A case series of 318 patients with chilblain-like lesions found that 0.7% of the cases were black or African American.<sup>39</sup> Similarly, a study in Brazil found that patients with non-white skin rarely presented with chilblain-like lesions.<sup>13</sup> However, when SOC patients present with chilblain-like lesions, they are more subtle. The red and pink hues are not readily visible.<sup>11</sup> Assess the patient for swelling as edema and swelling of the digits are more evident than the erythema, as illustrated in Figure 5.<sup>11,41</sup> Examine the heels and subungual regions for edematous pink plaques since they can progress into



**Figure 5.** Chilblain-like lesions in SOC.<sup>40</sup>

hyperpigmented plaques.<sup>42</sup> A tingling and burning sensation have been reported in some patients.<sup>11</sup>

(VI) *Livedo reticularis and racemosa.* SARS-CoV-2 infected patients may present with livedo reticularis or racemosa, a lace-like pattern of unilateral erythematous and violaceous cutaneous discoloration of the lower limbs. Livedo reticularis is characteristic with ischemia of cutaneous capillaries. The prevalence of livedo reticularis-like and racemosa-like lesions have been reported to range from 0.6% to 3.5% of all COVID-19 cutaneous manifestations.<sup>21</sup> Although patients do not commonly present with livedo racemosa, if they do it is often associated with high disease severity and mortality.<sup>43,44</sup> The livedo reticularis associated with COVID-19 disease is often transient and self-resolves within 24 hr without treatment.<sup>18</sup> In some patients it can persist for weeks and can progress into necrosis secondary to small vessel thrombosis.<sup>36</sup> There are no established therapeutic options for COVID-19 related livedo reticularis or racemosa-like lesions. If there are concerns for thrombosis and ischemia, topical or systemic vasodilators, antiplatelets including low dose acetylsalicylic acid, or anticoagulants can be tried.<sup>45</sup>

Studies have shown that vascular cutaneous manifestations are uncommon in darker skin types.<sup>12,46</sup> While the literature may describe livedo reticularis as a reddish-blue discoloration, this may not be apparent in SOC. On SOC, an uneven distribution of melanin throughout the skin causes hyperpigmented patches that form the lace-like discoloration of the skin, as illustrated in Figure 6. In addition, livedo reticularis/racemosa is more prominent when the patient is upright and may not be apparent if the patient is examined in the supine position.<sup>47</sup>

(VII) *Purpuric Pattern/Petechiae.* Patients with SARS-CoV-2 may also present with purpuric lesions. These lesions can present either as generalized or localized petechial rash in the skin folds. They may evolve into hemorrhagic blisters and in severe cases can result in extensive acute necrosis, as illustrated in Figure 7.<sup>21</sup> While they are not as common as the



**Figure 6.** Livedo reticularis in SOC.<sup>57</sup>

other skin manifestations, they have been reported to occur more frequently in elderly patients with severe COVID-19.<sup>21</sup> Among the cutaneous manifestations in the literature purpuric lesions have the highest rate of COVID-19 related mortality.<sup>21</sup> Topical moderate-potency corticosteroids can be used to manage mild cases of purpuric lesions. However, for severe cases with necrosis, systemic corticosteroids may be indicated.<sup>21</sup>

A study in Brazil found that four percent of non-white skin patients with COVID-19 cutaneous manifestations presented with purpuric lesions.<sup>13</sup> In SOC patients, petechiae may be difficult to see for an untrained eye. Look for petechiae in SOC patients by examining areas with lighter



**Figure 7.** Petechial rash in SOC.<sup>58</sup>

pigmentation. The small, reddish purple lesions may be more evident if present in the buccal mucosa of the mouth or conjunctiva of the eye.<sup>48</sup> One can also apply pressure to the area to check for blanching. While erythematous areas will blanch, petechiae or purpuric lesions will not.<sup>49</sup>

### Managing Post-Inflammatory Pigmentary Changes in Skin of Colour

By 2031, people with SOC could constitute one-third of Canada's population.<sup>50</sup> Disease presentation, treatment plan and sequelae in SOC patients can be different than those of lighter skinned patients.<sup>51</sup> A thorough understanding of how skin conditions and variances may present in this group will enable physicians provide personalized care to SOC patients. Pigmentation is one of the clinically important variations one must consider when developing a plan of care for a SOC patient. Post inflammatory hyperpigmentation is often prominent and prolonged in SOC.<sup>52</sup> Pigmentary abnormalities can have a negative impact on the quality of life for SOC patients. They are among the most common reasons why SOC patients seek dermatological care.<sup>53</sup>

Generally, pigmentary changes including hyperpigmentation, hypopigmentation and polymorphic pigmentation are key indicators of an underlying or resolved dermatological condition. When unsure, a physician can ask patients about any changes in their skin since they may be able to detect very subtle changes in their own skin color. In SOC patients presenting with COVID-19 skin manifestations, preventive and therapeutic measures should be considered to manage any associated pigmentary changes. Medical therapy may not be needed in all patients presenting with post-inflammatory hyperpigmentation since the condition improves with time. Early treatment of the hyperpigmentation with strict ultraviolet radiation avoidance, topical depigmenting agents such as hydroquinone and azelaic acid, as well as retinoids may hasten its resolution.<sup>28</sup>

### Conclusions

As new strains of SARS-CoV-2 emerge, scientists predict the coronavirus may become endemic.<sup>53</sup> Considering this, and the need to curtail the spread of this virus, knowledge of COVID-19 related cutaneous manifestations is important as physicians continue to screen patients for signs and symptoms of COVID-19. Healthcare professionals must recognize the cutaneous manifestations of COVID-19 and how they may present in SOC.

While the COVID-19 dermatology registries established by the American Academy of Dermatology (AAD) and the British Association of Dermatologists (BAD) have added to the number of published images that characterize COVID-19 cutaneous manifestations in SOC, their efforts need to be amplified.<sup>54,55</sup> Collaboration with other national and

international dermatologic societies, particularly in countries with a high proportion of people with SOC, to create their own registries could increase the number of available photos in literature. Furthermore, leveraging the skills of our colleagues in primary care and including them in these registries may also capture more COVID-19 patients with SOC who may not be seen by dermatologists.

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