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REVIEW ARTICLE

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The role of SARS-CoV-2 infection and its vaccines in various types of hair loss

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Abstract

The prevalence of hair loss has increased during COVID-19. In this study, we review the current literature on incidence and characteristics of various types of COVID-19-related and COVID-19-vaccine- related hair loss including telogen effluvium, alopecia areata, friction alopecia and anagen effluvium. Regarding most of them, the more severe the infection, the more profound and prolonged the course of alopecia. However, the most important issue is reassuring the patients of the non-serious nature of this complication, since psychological support is the most important factor in the earlier resolution of the condition.

KEYWORDS
alopecia areata, anagen effluvium, COVID vaccine, COVID-19, friction alopecia, telogen effluvium

1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19) has opened a mysterious entity into medicine, with the responsible pathogen, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), manifesting with various features.[1,2] Apart from the respiratory and gastrointestinal manifestations, dermatologic involvement has been among the most prevalent presentations of SARS-CoV-2 infected patients.[3–6] This feature can be the first presenting symptom of the infection, may appear during the course of the disease, or even appear after the acute phase and recovery. Moreover, it may be a new-onset cutaneous disorder or occur as an exacerbation of a pre-existing dermatosis.[7–9]

Many of dermatologic disorders such as psoriasis and alopecia areata have been shown to be triggered or exacerbated by even a mild psychological stress.[10–13] Perhaps, COVID-19 has been among the most stressful crises the world has confronted to; therefore, it is reasonable that those infected to the virus and those who are concerned about getting infected, experience distressful conditions.

Hair loss is among the most common complaints of COVID-19 patients which usually occurs in the recovery phase. Although alopecia is not a disabling SARS-CoV-2 infection-related complication, it can have considerable psychological and social impacts, leading to changes in the quality of life.[12] In fact, any new stress, including infection, trauma, surgery and pregnancy, can lead to hair loss with variable durations.[14] However, the one occurring after SARS-CoV-2 infection seems to be prolonged in some individuals, which bring about concerns.[15] Alopecia areata and telogen effluvium have been the most common types of hair loss in the context of COVID-19; nevertheless, frictional alopecia, and pressure-induced alopecia are other reported kinds of hair loss in this setting. Androgenetic alopecia, known as Gabrin sign, is not a complication of COVID-19, rather it is believed to be a risk factor for its severity.[16] On the other hand, SARS-CoV-2

vaccination has been linked to various adverse events, including hair loss with different patterns.[17] The incidence of alopecia following COVID-19 vaccination has risen significantly.[18]

Here, we present a comprehensive review on all aspects of hair loss in the context of COVID-19 and the associated vaccines.

1.1 | Telogen effluvium

Telogen effluvium (TE) is a common type of hair loss occurring following an acute event such as a febrile disease, including COVID-19. Any patient recovering from COVID-19, with any degree of severity, might experience hair loss up to several weeks after the recovery.[19] This condition, also known as COVID-19- associated TE (CATE), is estimated to occur in up to 60% of SARS-CoV-2 infected patients.[20] The feverish condition, weight loss, nutritional deficiency, emotional stress, sleep disturbance, and certain medications can predispose to TE during the course of SARS-CoV-2 infection.[21] On the other hand, medications used in the management of COVID-19, particularly anticoagulants, are associated with the development of TE.[22] The prevalence of hair loss in the COVID-19 era has risen so considerably that SARS-CoV-2 testing has been recommended for all patients with anagen or telogen effluvium.[23] It is interesting to know that COVID-19 related TE has occurred earlier than the time expected in the classic TE, and even during the acute phase of the infection.[24]

TE almost always has a diffuse pattern and occurs a few months after a physical or emotional stress as a result of early follicular transition to the telogen phase.[25] This condition is more prevalent in women and may be associated with the severity of COVID-19; however the psychological stress per se could cause TE even in less severe SARS-CoV-2 cases.[26] Moreover, a great majority of the TE cases have coexisted with androgenic alopecia (AGA), which could be another clue for the presence of psychopathic triggers.[14] Even in the settings of a severe SARS-CoV-2 infection, hypothyroidism should be excluded as the underlying cause of hair loss. New-onset thyroid disorders have been discovered following COVID-19 infection.[27] Moreover, vitamin D deficiency could be another reason for hair loss in the settings of SARS-CoV-2 infection.[28]

Trichoscopy, pull test or modified wash test (MWT) can be performed to detect the type and severity of alopecia.[29] Empty ostia, noncicatricial volume loss, severe thinning of the hairs, and absence of hair shaft diameter variability, along with a positive hair-pull test is indicative of TE. However, the diagnosis of TE is predominantly by clinical history.[30]

Acute telogen effluvium (lasting less than 6 months) is usually reversible and subsides by itself after the emotional stress disappears and does not have any proved treatment; therefore, consultation and reassuring the patient about the self-limiting nature of the condition and the fact that TE does not lead to baldness, and encouraging to decrease the psychophysical stress seem to be sufficient.[31] Iron or zinc supplements can be complementary treatments of hair loss in helping restore the deficient minerals more rapidly.[32] In cases persisting for more than 6 months, hair loss may become chronic. Therefore treatment modalities including topical corticosteroids, minoxidil, finasteride, DHT blockers, hair growth serums, and in recalcitrant cases, surgical hair transplant might be beneficial.[33] Nevertheless, in conditions with coexistence of TE and AGA, the prognosis might be poor since hair density would seldom improve.[14]

1.2 | Alopecia areata

Alopecia areata (AA) is a kind of autoimmune hair loss which can occur recurrently and does not leave scars. The incidence of this type of alopecia is estimated to be 2% in the community.[11] However, its incidence has risen significantly in patients attending dermatology clinics since the beginning of the COVID-19 pandemic, so as suggesting that new onset AA might be another dermatological presentation of SARS-CoV-2 infection.[34] Genetic factors, atopy, autoimmunity, stress, micronutrients deficiency, hormonal changes, vaccination, and infections have been implicated in the evolution of this condition.[12]

The important issue is the vicious circle created by the association of alopecia areata and stressful conditions. These stressors can lead to alopecia, which in turn aggravates the anxiety and this chain continues in the form of a defective cycle.[35] The mechanisms by which AA occurs during the course of SARS-CoV-2 infection might be the cross-reaction of the viral antigen with self-antigens, leading to a hyper-immune reaction against the host hair follicles or the dermal papilla cells, resulting in hair loss.[36,37] Other likely mechanisms include the cytokine storm, leading to IL-6 elevation, which prevents hair shaft elongation and matrix cells proliferation, or gives rise to microthrombi formation and obstruction of the hair follicles vessels as a result of the coagulation cascade activation.[38,39] Moreover, COVID - related morbidity and mortality, added to the psychological burden imposed by the social distancing, strict lockdown, travel prohibition, gatherings restriction and unemployment, all can be considered as a trigger for alopecia in the settings of COVID-19.

The SARS-CoV-2 vaccines have also led to alopecia, including AA and also its extensive variants, alopecia totalis and alopecia universalis.[40,41] Cases of AA following COVID-19 vaccines have been either new-onset or the recurrence of the pre-existing ones.[42,43] The molecular mimicry and production of pathological autoantibodies, may be the underlying mechanism of many of the COVID-19 vaccines side effects, including hair loss.[43] Moreover, the adjuvants as components of COVID-19 vaccines can cause an autoimmune/inflammatory syndrome leading to alopecia.[44] However, the vaccine-associated autoimmune reactions occur more commonly in patients with genetic predisposition.[43]

Demonstrating black dots, and fractured and exclamation mark hairs by trichoscopic examination is suggestive for AA.[12] It is important to perform a thorough laboratory workup including serum micronutrients levels, liver, renal, and thyroid function and immune rheumatologic tests in any case of new-onset AA even in the settings of an obvious cause such as an acute infection.[45]

Topical allergens, such as Cignolin or Anthralin, and topical immunotherapy for recalcitrant and extensive cases are the standard treatment regimens for AA.[11,12]

1.3 | Other types of alopecia

Since the beginning of the pandemic, increased rate of irritant and allergic contact dermatitis has been reported in individuals using protective personal equipment (PPE), especially in the health care personnel[46] which could have led to localized hair loss beneath the mask or the gloves used for protection, known as frictional hair loss. Wearing PPE for a relatively long duration leads to dehydration and skin lipid loss, which in turn may cause alopecia.[47] The friction and epidermal barrier breakdown imposed by an improperly fitted mask or prolonged wearing of gloves and masks can be prevented by selecting a properly fitted mask and regular PPE changing.[48]

Interestingly, the prolonged proning position in some COVID-19 patients to overcome the respiratory distress has led to pressure-induced alopecia, which is believed to be the result of dermis ischemic damage.[49]

Seborrheic dermatitis (SD) is another dermatologic condition whose exacerbation has increased since the beginning of the COVID-19 pandemic. Again, emotional stress is among the main aggravating factors of this condition. Moreover, face masks used for protection against the infection can exacerbate SD.[50] Thus, it is reasonable that SARS-CoV-2 infected patients, or even those in concern of getting infected experience flares of SD, leading to increased rate of alopecia.[51] Deterioration of scalp psoriasis, with accompanying alopecia, has also been reported in SARS-CoV-2 infected patients.[52]

Anagen effluvium (AE) is another pattern of hair loss in the context of SARS-CoV-2 infection, which is less common than TE. It is characterized by the abrupt excessive hair loss during the acute phase of an infection, including COVID-19 and presents with a non-scarring alopecia with fracturing of the hair shaft. The pathophysiologic mechanism might be the severe inflammatory reaction, viral direct injury or the anti-SARS-CoV-2 regimens; therefore, the resolution is anticipated upon the infection amelioration.[53]

Fibrosing alopecia, leading to cicatricial alopecia has also been rarely reported following COVID-19. This type of alopecia is characterized by a diffuse centro parietal hair loss with a gradual and chronic course and its onset in the settings of SARS-CoV-2 infection is indicative of the immunologic reactions and the inflammatory process.[54]

Medications used in the treatment of SARS-CoV-2 infection can also be implicated in the intervening hair loss. Alopecia can occur as a side-effect of many of the therapeutic agent utilized for the management of COVID-19, which include colchicine, interferons, antiretroviral agents, hydroxyl chloroquine and IVIG.[55,56]

And last but not least, post COVID-19 syndrome is a prolonged course of SARS-CoV-2 related manifestations which is defined as persistence of some symptoms including fatigue, palpitations, concentration difficulties and hair loss. In this condition, abnormal hair shedding or loss continue long after the recovery.[57]

2 | CONCLUSION

As a matter of fact, the COVID-19 pandemic has imposed a vast range of predisposing factors, being sufficient for the onset of hair loss. The more severe the infection, the more profound and prolonged the course of alopecia. However, the most important issue is reassuring the patients of the non-serious nature of this complication, since psychological support is the most important factor in the earlier resolution of the condition.

CONFLICT OF INTEREST

All the authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTION

All authors contributed to the preparation of data and finalization of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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