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Single Case

Demodicosis Associated with Wearing a Face Mask: A Case Report

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Keywords
Demodicosis · Face mask · COVID-19

Abstract
Demodex mites are common ectoparasites of human pilosebaceous units that do not cause any skin symptoms. However, when there is an abnormal increase in *Demodex* mite density, it can cause multiple skin disorders which are grouped under the term demodicosis. During the COVID-19 outbreak, public health authorities worldwide recommend people to wear face masks when in public places to reduce respiratory transmission. Wearing face mask can cause changes in microenvironment, skin barrier function, and microbiome on human skin. There are several reports of facial skin diseases such as atopic dermatitis, seborrheic dermatitis, acne vulgaris, and rosacea provoked by wearing masks for long periods of time. This is the first case report of demodicosis associated with wearing a face mask. A 46-year-old female presented with dry, itchy erythematous to purpuric patches with fine follicular scales on both cheeks and chin under the mask. Clinical symptoms started slowly with warm, slightly burning, and periodically itching sensation on both cheeks after 3 weeks of wearing surgical face mask for more than 8 h a day. Even after switching to a cloth mask and using topical steroid, the rash improved slightly and recurred after discontinuation of the treatment. The diagnosis of demodicosis was made by relevant correlation of clinical skin lesions, along with standardized skin surface biopsy results that detected abnormal proliferation of *Demodex* mites and clinical cure after oral ivermectin therapy.

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Introduction

COVID-19 is a severe respiratory disease caused by the SARS-CoV-2 virus. Public health authorities worldwide recommend people to wear face masks to reduce respiratory transmission. Wearing face mask can cause changes in microenvironment, skin barrier function, and microbiome on human skin. Demodicosis, caused by *Demodex* mite infestation, can be presented with nonspecific facial symptoms such as unexplained eczema, hypersensitive skin, papulopustular, and nodular lesions [1–3]. All of these symptoms were found to be strongly associated with abnormal proliferation of *Demodex* mites.

Case Report

A 46-year-old healthy woman consulted a dermatologist about itching, burning sensation, and rash on her face for a period of 4 weeks. The patient did not have underlying disease and did not take any medication on a regular basis. Clinical symptoms started slowly with warm, slightly burning, and periodically itching sensation on both cheeks after 3 weeks of wearing face mask for more than 8 h a day during October, the winter season in Thailand. The patient had no history of having this condition before, and she has not used any new cosmetics or topical products in the past several months. At first, the patient wore a surgical face mask, but thought facial rash might be caused by irritation or allergy, then switched to a cloth mask. Even after switching, the clinical symptoms did not improve but had become worse. There was an increase in itching and burning sensation on the face along with a noticeable rash underneath the masked area. During that time, 2% hydrocortisone cream and aloe vera gel were prescribed to apply on the affected area of her face. The application of these drugs resulted in only partial improvement, and the clinical symptom recurred after discontinuation of the treatment. Physical examination revealed mild swelling, dry erythematous and purpuric patches with fine follicular scales on both cheeks and chin in the area covered by face mask (shown in Fig. 1a, b). The patient was examined for the presence of *Demodex* mites via standardized skin surface biopsy method. Microscopic examination of 1 cm^2 surface area sample from the skin lesion, revealed 6 adult mites from the left cheek, 4 adult mites from the right cheek (shown in Fig. 2). Based on clinical manifestation along

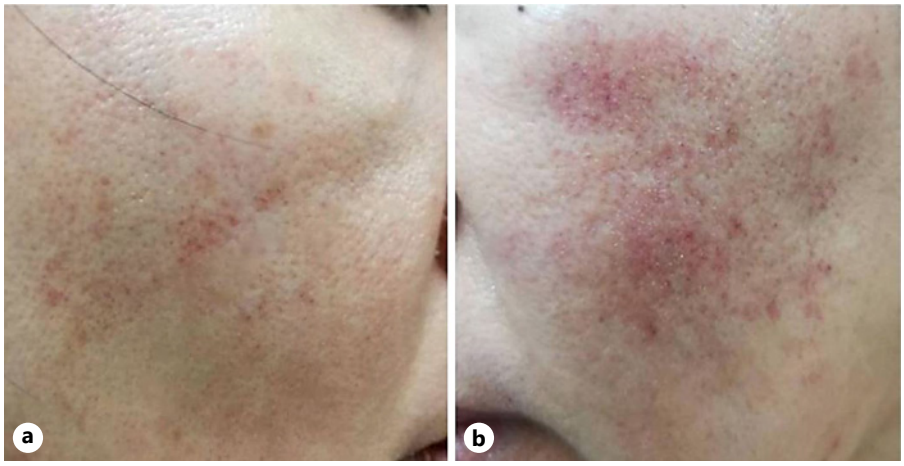

Fig. 1. a, **b** Dry erythematous and purpuric patches, ill-defined, irregular border with fine follicular scales on both cheeks.

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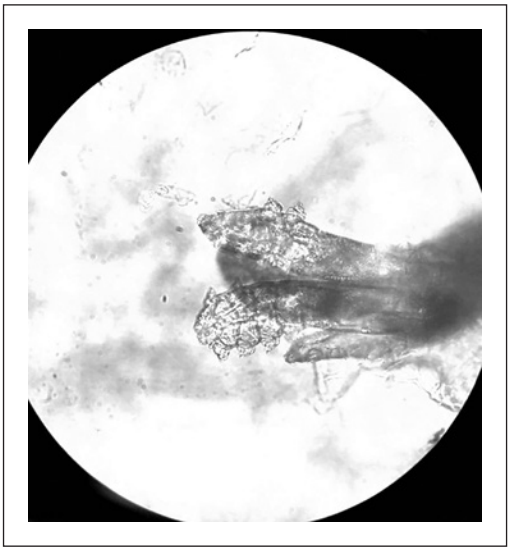

Fig. 2. Demodex mites are detected by SSSB method from skin lesion on the right cheek. SSSB, standardized skin surface biopsy.

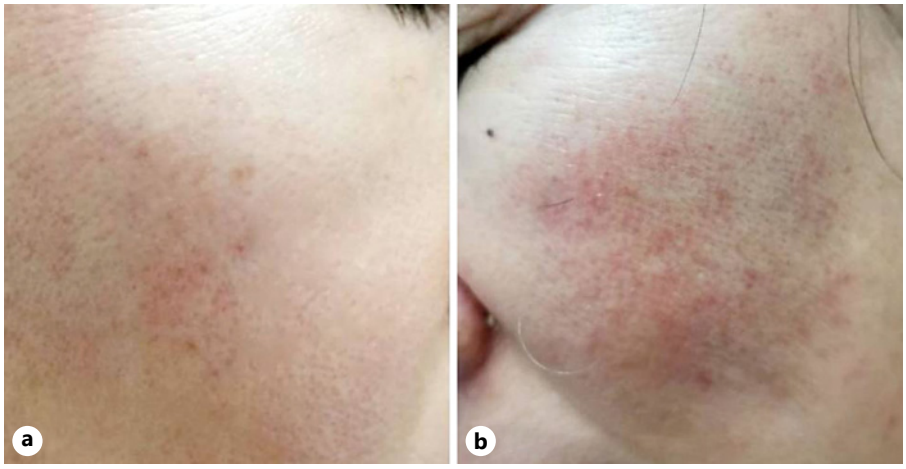

Fig. 3. a, **b** Clinical improvement on both cheeks of the patient after 1 week of oral ivermectin treatment.

with the result of microscopic analysis of standardized skin surface biopsy and the absence of preexisting or concurrent inflammatory skin diseases, primary demodicosis was diagnosed. The patient was prescribed 2 doses of oral ivermectin, 200 μg/kg, 1 week apart together with aloe vera gel. The erythematous and purpuric patches, itching, and burning sensation on both cheeks improved rapidly in 1 week after the treatment (shown in Fig. 3a, b). All clinical symptoms disappeared after 3 weeks. During the treatment, the patient still wears a face mask as usual; she can use either a surgical mask or a cloth mask without any recurrence of the rash.

Discussion

Demodex mites can be found in healthy human skin without causing any problems. They survive by feeding on sebum excretion in hair follicles and sebaceous glands. Changes in microenvironment of the facial skin may increase the number of *Demodex* mites. Studies have

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found a relationship between facial skin pH, skin surface hydration, an abnormal skin fatty acid composition in rosacea patients and high density of *Demodex* mites [4]. Under certain circumstances, when there is an increase in the number of *Demodex* mite density, it can cause demodicosis. Diagnosis criteria for demodicosis consist of relevant correlation of suspected clinical skin lesions, confirmed by the presence of abnormal proliferation of *Demodex* mites and by clinical cure after acaricidal treatment. This patient was diagnosed with demodicosis due to clinical manifestation as erythematous and purpuric patches with dry, rough, fine follicular scales on both cheeks and laboratory test that found more than 5 *Demodex* mites/cm^2 [5]. From medical history and clinical presentations of this patient who has never had demodicosis before, it is possible that this was caused by wearing a face mask for several hours a day over a long period of time. There are several reports of facial skin diseases associated with normal skin flora such as atopic dermatitis, seborrheic dermatitis, acne vulgaris, and rosacea provoked by wearing masks for long periods of time during the COVID-19 pandemic [6–10]. After wearing a face mask for 1–6 h, there is an increase in skin temperature, sebum excretion, and a decrease in skin hydration in the mask-covered area compared to other areas [11]. Environmental conditions and host immunity normally affect the number of normal skin flora. It is possible that the high temperature of the skin, increased permeability of skin barrier, increased sweating, and sebum secretion along with retention of biofluids under the mask can increase number and density of *Demodex* mites causing demodicosis. This patient responded well to oral ivermectin treatment. She was advised to change her mask daily and avoid wearing the mask continuously for several hours each day.

Conclusion

Wearing face mask for several hours a day can cause changes in microenvironment, skin barrier function, and microbiome on human skin. Under such circumstances, normal skin flora can become pathogenic. There have been several reports of facial skin diseases such as atopic dermatitis, seborrheic dermatitis, acne vulgaris, and rosacea provoked by wearing masks for long periods of time. This is the first case report of demodicosis associated with wearing a face mask. Demodicosis should be considered in the differential diagnosis in patients with facial rash from wearing face masks during the COVID-19 outbreak.

Statement of Ethics

The authors state that the patient gave written informed consent for the case to be published (including publication of images). This research complies with all Ethical Guidelines for human studies in accordance with the World Medical Association Declaration of Helsinki. This paper is exempt from The Mae Fah Luang Ethics Committee on Human Research approval with reference number; COE 223/2021. Since it is a case report with no more than 3 cases, the report is derived from a review of medical records and cannot be linked to an individual unless the written consent of the patient is obtained.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Author Contributions

Dr. Anon Paichitrojjana is the only author of this case report. All parts of the menuscript were written by Dr. Anon Paichitrojjana.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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