per year, and then, a *t*-test was performed. There was no significant difference in the incidence rates of impetigo, MC, scabies and varicella between 2018 and 2019 ($P = 0.019$), but there was a significant decrease in the incidence of contagious infectious diseases between 2019 and 2020 ($P = 0.005$).

COVID-19 continues to have negative social and economic impacts worldwide. One positive change that has emerged, however, is an increased interest in hand hygiene and wearing a mask. This improvement in hand hygiene significantly reduced the incidence of impetigo, MC, scabies and varicella, which are transmitted through person-to-person contact, compared to the incidence of these infectious diseases before the outbreak of COVID-19. In the case of varicella, which is spread through both airborne and direct contact routes, the increase in mask wearing also seems to have contributed to a decrease in the incidence of this virus' spread. Hand washing with soap is effective at reducing microbial contamination.[1] Mask wear has increased during the COVID-19 pandemic, and Hsu *et al.*[2] reported a reduction of influenza infections in Taiwan, and Sakamoto *et al.*[3] noted lower seasonal influenza activity during the COVID-19 period in Japan, which were similar to our results regarding varicella. As most of the infectious diseases seen in dermatology clinics are transmitted through contact, hand hygiene seems to have a large impact on skin infections.

Until now, many papers have reported a reduction in respiratory diseases in the COVID-19 era from increased mask use, but few papers have described a reduction in contagious infectious skin diseases related to hand hygiene and mask wearing. This study demonstrated a significant decrease in contagious infectious skin diseases with improved hand hygiene and mask use after the COVID-19 outbreak. Therefore, thorough personal hygiene may help prevent the spread of diseases and should be promoted even after the end of the COVID-19 era.

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All authors declared that they have no conflicts of interest.

Data availability statement
Data are openly available in a public repository that issues data sets with DOIs.

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Erythema annulare centrifugum triggered by SARS-CoV-2 infection

Erythema annulare centrifugum (EAC) is a reactive phenomenon of the skin that has been reported to occur in association with numerous conditions, including infections.[1] It commonly presents with annular, erythematous plaques with a fine desquamation in the inner portion of the advancing edge.[2] In the last year, a wide spectrum of cutaneous manifestations has been associated with SARS-CoV-2 infection, including acral areas of erythema with vesicles or pustules, other vesicular eruptions, urticarial lesions, maculopapular eruptions and livedo or necrosis.[3,4]

A 37-year-old otherwise healthy woman presented with a 1-week history of itching skin lesions on the arms and back. She referred history of fever, headache and malaise 2 weeks before the onset of these lesions. A nasopharyngeal reverse transcription-polymerase chain reaction (RT-PCR) was positive for SARS-CoV-2 at that time. Physical examination revealed multiple erythematous papules and annular plaques with central clearing and a delicate scale on the inner margin on the upper arms and back (Fig. 1). Potassium hydroxide test was negative. Histopathology showed a prominent perivascular lymphocytic infiltrate on papillary dermis and occasionally on reticular dermis, with endothelial tumefaction, hematic extravasation and sparse interstitial eosinophils (Fig. 2). Clinicopathologic findings were compatible with EAC. A routine laboratory work-up had no alterations. Treatment with clobetasol propionate 0.05% cream was applied once daily for 2 weeks with completely resolution of the lesions.

EAC is a gyrate erythema characterized by erythematous papules that expand centrifugally with central clearing resulting in annular plaques.[2] Typically, a fine scale is present in the inner portion of the advancing edge, known as trailing scale.[2] Pruritus is variable, and the most frequent localizations are the trunk and lower extremities.[1] EAC is thought to be a delayed-type hypersensitivity response to a wide variety of antigens. Possible triggers may include viral, bacterial or fungal infections, medications,

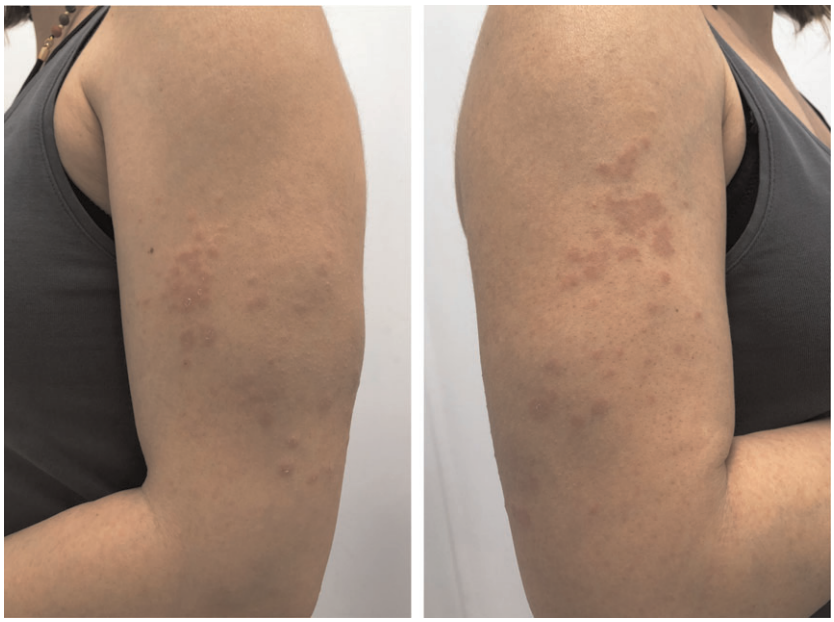

Figure 1 Multiple erythematous papules and annular plaques with a trailing scale on the upper arms.

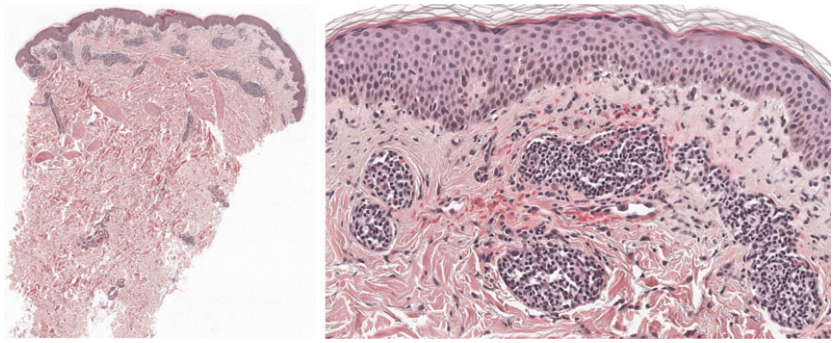

Figure 2 Prominent perivascular lymphocytic infiltrate on papillary dermis in a 'coat sleeve' appearance with endothelial tumefaction, hematic extravasation and sparse interstitial eosinophils.

foods, malignancy or other systemic diseases.[1,2,5] However, in many patients, a specific trigger cannot be recognized.[6] Histopathologic findings in EAC consist of a dense perivascular lymphocytic infiltrate on papillary dermis and possibly reticular dermis, which is known as a 'coat sleeve' appearance. Variable oedema, spongiosis, parakeratosis and basal layer vacuolization may be present.[1] Differential diagnosis includes other skin disorders that may present with annular, erythematous lesions such as erythema migrans, tinea, pityriasis rosea, psoriasis, granuloma annulare and annular lupus erythematosus.[1,7]

In our case, the typical clinic and histopathologic findings of EAC together with SARS-CoV-2 infection confirmed by a RT-PCR 2 weeks before supported the theory of a possible association. EAC has been suggested to be a tumour necrosis alpha (TNF-alpha) dependent process.[8] Therefore, the proinflammatory cytokines released during SARS-CoV-2 infection could be involved in the pathogenesis of EAC.[7]

To our knowledge, there is only one previous report of EAC presumptive triggered by SARS-CoV-2. The patient presented with clinical and histopathological skin lesions consistent with EAC accompanied by anosmia and ageusia that completely resolved with doxycycline.[7] However, a RT-PCR was not obtained at that time and diagnosis of SARS-CoV-2 was made two months later based on a serological screening test.[7]

Usually, EAC has a self-limited course and good prognosis.[2] Data on treatment for EAC are sparse. Topical corticosteroids, topical vitamin D analogues, metronidazole, macrolides (azithromycin, erythromycin), fluconazole and etanercept have been reported to be useful in some cases.[2,7,8]

We report the second case of EAC probably triggered by SARS-CoV-2 in a patient with confirmed infection by nasopharyngeal RT-PCT 2 weeks before the onset of the cutaneous lesions that completely resolved with clobetasol propionate 0.05% cream.

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Conflict of interest

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Varicella-zoster and herpes simplex virus reactivation post-COVID-19 vaccination: a review of 40 cases in an International Dermatology Registry

Editor,

Since December 2020, the American Academy of Dermatology and the International League of Dermatologic Societies' COVID-19 Dermatology Registry has tracked dermatologic reactions post-COVID-19 vaccination. Within months, a variety of cutaneous manifestations were reported after the Moderna and Pfizer-BioNTech COVID-19 vaccines.[1] As of April 2021, a total of 672 possible vaccine-related skin reactions have been reported by healthcare providers. Here, we evaluate the first 40 cases of varicella-zoster virus (VZV) and herpes simplex virus (HSV) reported in the registry after COVID-19 vaccination with either the Moderna or the Pfizer-BioNTech vaccines.

Of 40 cases of herpesvirus activation diagnosed by healthcare providers after vaccination, 35 cases were VZV reactivation and 5 cases were HSV reactivation (Table 1). The median age of patients was 46 (IQR 36–67). The majority were female (70%), white (80%), and from the United States (95%).

Among the 35 patients with VZV reactivation (Fig. 1), 19 received Pfizer-BioNTech and 16 received Moderna. Most (77%) cases occurred after the first vaccine dose only, and none of the patients had repeat viral flares after both doses. Median onset was 7 days (IQR 2–13) from vaccination to the first VZV symptom, and symptoms lasted median of 7 days (IQR 5–12). Patients were primarily treated with valacyclovir/acyclovir (86%). One patient was not planning on receiving their second vaccine dose due to VZV after the first dose. Data on prior VZV vaccination were available for 14 individuals, and of these, only one had received a VZV vaccine (live-attenuated), 7 years prior.

Of 5 patients reported with HSV reactivation post-COVID vaccine, 4 received Pfizer-BioNTech and 1 received Moderna. Four of these cases occurred after the first dose, and one case occurred only after the second dose. Median onset of first HSV symptom was 13 days (IQR 8–15) post-vaccination and lasted median of 7 days (IQR 3–7). Four patients (80%) received valacyclovir/acyclovir as treatment, and none delayed their second vaccine dose.

One limitation is that the registry did not routinely ascertain whether VZV/HSV was diagnosed by the reporter based on laboratory testing (e.g. PCR) or on clinical grounds alone, although clinical diagnosis of zoster without laboratory testing has a reported positive predictive value of 86%–92%.[2,3] Additional limitations are incomplete VZV vaccination history and immune status data, which hinder the ability to draw conclusions about the relationship between prior vaccination, immunocompromised status, and risk of VZV reactivation post-COVID vaccination. Furthermore, an epiphenomenon cannot be ruled out since the registry is not designed to establish the incidence of zoster in the vaccinated group or compare it to the incidence in a non-vaccinated group.

VZV reactivation after COVID vaccination has been reported in case reports and small case series,[4–7] and it has also been reported after other vaccines, including yellow fever, hepatitis A, rabies and influenza.[8] While other cutaneous vaccine reactions reported to the registry occurred primarily after Moderna, such as delayed large local reactions,[9] VZV reactivation events occurred after both Moderna and Pfizer in similar proportions in this study, suggesting that reactivation may be the result of an immune reaction process to mRNA vaccines in general. Although the precise

