Research letters

SARS-CoV-2 infection in patients with atopic dermatitis: a cross-sectional study

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Dear Editor, SARS-CoV-2 disproportionately impacts certain populations with inflammatory conditions that have an elevated risk of respiratory comorbidities.[1–3] Additionally, atopic dermatitis (AD) is associated with other atopic diseases, such as allergic rhinitis and asthma, which increase the risk of respiratory infections and predispose patients to neuropsychiatric disorders.[4] There are limited studies evaluating the role of systemic medications in risk of infection. However, recent studies postulated that systemic immunomodulatory and biologic treatments may protect patients from worsening SARS-CoV-2 outcomes.[5,6] In this study, we aimed to compare rates of SARS-CoV-2 infection, hospitalization and mortality among patients with or without AD in a California-based population.

A retrospective cross-sectional study was conducted using the University of California COVID Research Data Set (UC CORDS), a Health Insurance Portability and Accountability Act secure medical records dataset for patients tested for SARS-CoV-2 across University of California medical centres.[7] Information regarding SARS-CoV-2 testing, patient demographics, hospitalization and mortality (from all causes, at any time after the positive test) was collected from 1 March 2020 to 8 October 2020. Patients with AD were diagnosed with 'atopic dermatitis' (International Classification of Diseases 10th Revision code L20·9), 'acute dermatitis' (L30·9), 'atopic neurodermatitis' (L20·81), 'nummular eczema' (L30·0) or 'flexural eczema' (L20·82) by a dermatologist or primary care provider. Specific systemic treatment subgroups were identified (prednisone, methotrexate, ciclosporin or dupilumab) for at least 30 days prior to SARS-CoV-2 testing. Fisher exact and χ^2-tests were used for statistical analysis.

In total 269 299 patients were tested within the UC CORDS, with a 3·64% positive test rate (n = 9808, average age 42 years) (Table 1). Of these, 5387 patients with AD were tested for SARS-CoV-2 and had a 2·95% (n = 159, average age 34 years) infection rate, which was lower than in those without AD (3·66%, n = 9649, average age 42 years) (P = 0·0063). This observation was significant in women with AD compared with those without (2·7% vs. 3·46%, P = 0·022), but was not significant in men (3·3% vs. 3·89%, P = 0·14). There were similar proportions of COVID-19-positive men with and without AD (49% vs. 47%, P = 0·70).

SARS-CoV-2-positive patients with AD (n = 159) who were taking systemic medications had SARS-CoV-2 infection rates comparable with those not taking systemic medications. This was noted for patients on prednisone (2·6% vs. 2·99%, P = 0·62) and methotrexate (2·7% vs. 2·96%, P > 0·99) (Table 1). No patients in the SARS-CoV-2-positive AD cohort were on ciclosporin or dupilumab. Hospitalizations within 2 weeks of a SARS-CoV-2 test (1 week prior or subsequent to testing) were assessed as a marker of infection severity. The hospitalization rate of SARS-CoV-2-positive patients with AD was 13·8% (n = 22), which was not significantly different from those without AD (19·3%, n = 1858; P = 0·085).

Lastly, the mortality rate of SARS-CoV-2-positive patients in the UC CORDS was 2·1% (n = 203, average age 71 years), and that of SARS-CoV-2-positive patients with AD was 1·9% (n = 3, average age 82 years). The mortality rate for SARS-CoV-2-positive patients with AD on prednisone was 8% (n = 1), which was not significantly different from those without AD (P = 0·21).

In this UC CORDS dataset, patients with AD did not have significantly increased risk for SARS-CoV-2 infection, including those on immunomodulatory medications (prednisone or methotrexate). In AD, inflammatory cytokines, such as interleukin-13, can regulate SARS-CoV-2 entry into airway epithelial cells by increasing transmembrane protease serine 2 and decreasing angiotensin-converting enzyme 2 expression, thus decreasing the risk of SARS-CoV-2.[1] Although our study did not have COVID-19-positive patients on dupilumab, other studies have shown that patients with AD treated with dupilumab did not have increased risk of SARS-CoV-2 infection or worsened clinical outcomes.[5,6] These data do not account for the presence of comorbidities such as asthma and/or allergic rhinitis. The overall lower age of patients with AD, compared with those without AD, may account for the observed significant difference in infection rates (average 42 vs. 47 years).

Limitations of this study include the small sample size on systemic medications, lack of data on systemic medication use within the control population, use of tertiary centre data and de-identified data with lack of clinical details including confounding variables (age, body mass index, average medication doses, concurrent medication use) or follow-up. Future studies with identifiable datasets will help better assess this relationship. Understanding the mechanisms underlying SARS-CoV-2 susceptibility are fundamental to develop better guidelines for populations at risk.

Table 1 Patients with atopic dermatitis (AD) within the University of California COVID Research Data Set who tested positive for SARS-CoV-2 and had been on medication for AD for at least 30 days prior to the SARS-CoV-2 test, compared with patients without AD and patients not on medication, respectively (up to 8 October 8 2020)

	SARS-CoV-2 positive			SARS-CoV-2 hospitalizations[a]			SARS-CoV-2 mortality[b]		
	AD	Control[c]	P-value[d]	AD	Control[c]	P-value[d]	AD	Control[c]	P-value[d]
All patients[e]	159 (2·95)	9649 (3·66)	0·0063	22 (13·8)	1858 (19·3)	0·085	3 (1·9)	200 (2·1)	> 0·99
Male	75 (3·3)	4701 (3·89)	0·14	12 (16·0)	1040 (22·1)	0·20	0 (0·0)	125 (2·7)	N/A
Female	84 (2·7)	4948 (3·46)	0·022	10 (11·9)	818 (16·5)	0·26	3 (4)	75 (1·5)	0·14
Medication	On medication	Control[f]	P-value[d]	On medication	Control[f]	P-value[d]	On medication	Control[f]	P-value[d]
Prednisone[g]	12 (2·6)	147 (2·99)	0·62	4 (33)	18 (12·2)	0·065	1 (8)	2 (1·4)	0·21
Methotrexate[h]	2 (2·7)	157 (2·96)	> 0·99	N/A	N/A		N/A	N/A	

The data are presented as n (%). N/A, not applicable. [a]Hospitalization within 2 weeks (1 week prior or subsequent to) of SARS-CoV-2 test. [b]Death any time after SARS-CoV-2 test. [c]Patients without AD. [d]Statistical analysis of those with AD vs. those without AD using χ^2-test for more than five patients or Fisher exact test for fewer than five patients. P-values < 0·05 are significant. [e]Age range 0–89 years, average 42. [f]Patients with AD who are not on the specified medication; no patients with AD were on ciclosporin or dupilumab. [g]Age range 5–89 years, average 54. [h]Age range 4–89 years, average 41.

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Air pollution and risk of hospital outpatient visits for eczematous skin disorders in metropolitan cities of South Korea

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Dear Editor, Evidence suggests that air pollution could trigger multiple health problems including dermatological diseases. Atopic dermatitis (AD) is particularly strongly associated with increased exposure to air pollution.[1] Several studies have suggested a strong link between eczematous dermatitis (ED) and air pollution;[2–4] however, most studies were confined to a single centre or a single city. We performed a time-stratified case–crossover study on the association between short-term changes in air pollutants and the risk of outpatient visits for ED in all hospitals located in seven metropolitan cities in South Korea using the National Health Insurance Service–National Sample Cohort. ED was defined as diagnostic codes L20–30, from the International Classification of Disease, 10th revision. Repeated outpatient visits within 90 days were considered as single events. We compared exposure to air pollution before the event (case period) with exposure at other times (control period). The control period was identified by matching the day of the week within the same year and month. In the first stage, conditional logistic regression analysis, adjusted for meteorological factors and national holidays, was performed in each city. In addition, different lag patterns were considered using a single- or cumulative-lag model to