The risk of COVID-19 in patients with atopic dermatitis

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Background, Objective, and Patients

Background

- Atopic dermatitis
  - Affects approximately 24% and 7% of US children and adults, respectively[1]
  - Associated with numerous comorbidities implicated as risk factors for severe COVID-19 infections (i.e. cardiovascular disease, hypertension, obesity)[2-3]
  - Associated with increased risk of infections[4]
- Some therapies for moderate-to-severe atopic dermatitis have been linked to increased risk of infection[5]
  - However, case reports have described mild COVID-19 infections in patients being treated with dupilumab[6]

Objective

1. To assess the risk of incident COVID-19 infection associated with atopic dermatitis in adults
2. To assess the risk of incident COVID-19 infection associated with atopic dermatitis in adults treated with dupilumab and other systemic therapies

Key Inclusion Criteria

- Atopic dermatitis cohort
  - At least 2 *ICD-10* codes for atopic dermatitis (L20.x) between May 1, 2019, and January 1, 2020
- Controls without atopic dermatitis
  - no ICD-10 codes for atopic dermatitis (L20.x) between May 1, 2019, and January 1, 2020
  - Randomly selected in 1:10 ratio

Key Exclusion Criteria

- Under the age of 20

Dataset

- ***Symphony Health*** is a leading provider of high-value data for biopharmaceutical manufacturers, healthcare providers, and payers. The company helps clients understand disease incidence, prevalence, progression, treatment, and influences along the patient and prescriber journeys by connecting and integrating a broad set of primary and secondary data. Symphony Health derived data improves health management decisions, and helps clients drive revenue growth while providing critical insights on how to effectively adapt to the changing healthcare ecosystem.

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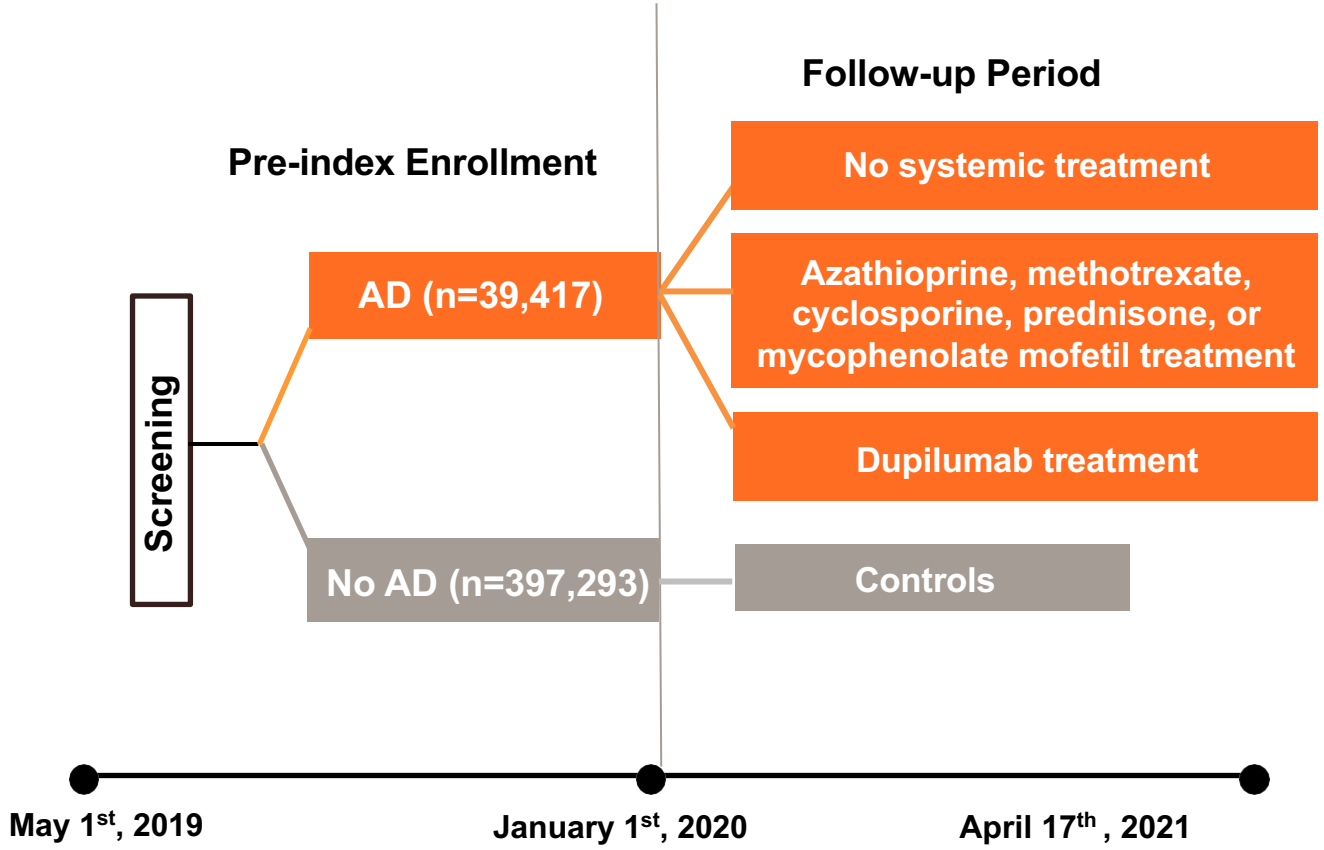
Study Design and Analyses

Study Design, (CORONAVIRUSHUB-00174)



Analyses

- Incident COVID infection rate: number of participants who received a medical code of U07.1 during follow-up period
- Demographic and clinical characteristics summarized by frequency for categorical variables and mean for continuous variables.
- Poisson regression model to assess risk of incident COVID-19 infection associated with atopic dermatitis in adults
- Poisson regression model to assess risk of incident COVID-19 infection associated with atopic dermatitis in adults taking systemic medications
- Poisson regression models to assess risk of incident COVID-19 infection associated with atopic dermatitis for adults taking dupilumab compared to adults taking another systemic medication

- Treatment status was assessed by a look-back period until 1/1/19
- Patients who received dupilumab were analyzed as the dupilumab cohort, regardless of use of an oral agent

Patient Characteristics and Medication Exposures

Table 1. Patient characteristics

	Atopic Dermatitis (n=39,417)	No Atopic Dermatitis (n=397,293)	*P* value
Age, mean±SD	54.9±.17.0	57.3±16.0	<0.0001
Sex, No (%)			
Female	23,555 (59.8)	223,412 (56.2)	<0.0001
Male	15,862 (40.2)	173,881 (43.8)	
Race/Ethnicity, No (%)			
Caucasian	25,187 (63.9)	295,823 (74.5)	<0.0001
Hispanic	4,468 (11.3)	36,035 (9.1)	
African American	6,969 (17.7)	52,415 (13.2)	
Asian	1,822 (4.6)	6,670 (1.7)	
Other	971 (2.5)	6,350 (1.6)	
Payment Type			
Assistance program*	2,639 (6.7)	19,767 (5.0)	<0.0001
Medicare, private, cash	36,778 (93.3)	377,526 (95.0)	
Confirmed COVID-19, No (%)	1,807 (4.6)	12,910 (3.3)	<0.0001
Comorbidities, No (%)			
Asthma	3,428 (8.7)	5,024 (1.3)	<0.0001
Rhinitis**	5,317 (13.5)	3,927 (1.0)	<0.0001
COPD	1,519 (3.9)	9,667 (2.4)	<0.0001
CHF	896 (2.3)	6,598 (1.7)	<0.0001
Chronic Ischemic heart disease	1,464 (3.7)	12,097 (3.0)	<0.0001
DM2	4,185 (10.6)	29,258 (7.4)	<0.0001
DM1	192 (0.5)	1,631 (0.4)	0.025
Overweight/obese	2,580 (6.6)	10,906 (2.8)	<0.0001
CKD	1,442 (3.7)	10,831 (2.7)	<0.0001
Hypertension	8,880 (22.5)	56,510 (14.2)	<0.0001
HIV	155 (0.4)	623 (0.2)	<0.0001

*includes Medicaid; **allergic and/or vasomotor
COPD – chronic obstructive pulmonary disease; CHF – congestive heart failure; CKD – chronic kidney disease; DM2 – Type-2 diabetes mellitus; DM1 – Type-1 diabetes mellitus; HIV – human immunodeficiency virus; SD – standard deviation

Table 2. Summary of medication exposure for patients with moderate-to-severe atopic dermatitis (at least one prescription of dupilumab, methotrexate, prednisone, cyclosporine, mycophenolate mofetil, or azathioprine between 1/1/19 and 4/17/21).

	Dupilumab cohort (n=2,793)	Oral Cohort (n=8,846)	All patients with moderate-to-severe atopic dermatitis (n=11,639)
Oral systemic, No (%)			
Methotrexate	167 (6.0)	714 (8.1)	881 (7.6)
Prednisone	980 (35.1)	8,180 (92.5)	9,160 (78.7)
Cyclosporine	90 (3.2)	512 (5.8)	602 (5.2)
Mycophenolate mofetil	0 (0)	0 (0)	0 (0)
Azathioprine	20 (0.7)	117 (1.3)	137 (1.2)
Dupilumab, No (%)	2,793 (100)	0 (0)	2,793 (24.0)

Results: Poisson Regression Models

Factor	Crude IRR (95% CI)	P value	Adjusted IRR (95% CI)	P value
AD vs no AD – Main analysis	1.41 (1.34-1.48)	<0.0001	1.19 (1.13-1.25)	<0.0001
AD vs no AD –Sensitivity analysis #1[a]	1.51 (1.45-1.56)	<0.0001	1.20 (1.15-1.25)	<0.0001
AD vs no AD –Sensitivity analysis #2[b]	1.33 (1.14-1.56)	<0.0001	1.31 (1.12-1.54)[c]	0.001
AD group comparison by systemic medication exposure				
Dupilumab vs No systemic medication	0.62 (0.49-0.78)	<0.0001	0.68 (0.54-0.86)	0.001
Methotrexate vs No systemic medication	0.80 (0.54-1.17)	0.249	0.84 (0.57-1.24)	0.378
Prednisone vs No systemic medication	1.16 (1.04-1.30)	0.007	1.15 (1.03-1.29)	0.012
Cyclosporine vs No systemic medication	1.37 (0.96-1.94)	0.081	1.24 (0.87-1.77)	0.231
Azathioprine vs No systemic medication	1.68 (0.87-3.24)	0.120	1.69 (0.88-3.26)	0.118
Dupilumab vs Methotrexate	0.78 (0.50-1.21)	0.264	0.81 (0.51-1.28)	0.364
Dupilumab vs Prednisone	0.53 (0.42-0.68)	<0.0001	0.58 (0.46-0.74)	<0.0001
Dupilumab vs Cyclosporine	0.45 (0.30-0.68)	<0.0001	0.57 (0.36-0.90)	0.016
Dupilumab vs Azathioprine	0.37 (0.18-0.73)	0.004	0.40 (0.20-0.81)	0.012

Adjusted for sex, age, ethnicity, payment type, and comorbidities (i.e. asthma, rhinitis, overweight/obese, congestive heart failure, chronic ischemic heart disease, chronic kidney disease, chronic obstructive pulmonary disease, essential hypertension, human immunodeficiency virus, type-2 diabetes mellitus, type-1 diabetes mellitus); No subjects with record of mycophenolate mofetil prescription

[a] Inclusion of subjects with unknown ethnicity/race, sex, and/or payment type; [b] Inclusion of all subjects aged 20-65 years old with zip codes in California or New York with no history of asthma, rhinitis, overweight/obese, congestive heart failure, chronic ischemic heart disease, chronic kidney disease, chronic obstructive pulmonary disease, essential hypertension, human immunodeficiency virus, type-2 diabetes mellitus, or type-1 diabetes mellitus (DM1); [c]Adjusted for sex, age, ethnicity, payment type

Conclusion

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- Adult patients with atopic dermatitis showed a higher prevalence of comorbidities previously implicated as COVID-19 risk factors including diabetes, hypertension, cardiovascular disease, and obesity.
- Atopic dermatitis itself was associated with a small increased risk of contracting COVID-19 infection.
- Of all systemic medications, dupilumab was associated with the lowest risk of contracting COVID-19 infection.
- Adults with atopic dermatitis taking dupilumab demonstrated a lower risk of incident COVID-19 infection compared to adult atopic dermatitis patients taking no systemic medication, suggesting dupilumab may have a protective role against COVID-19.