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COVID-19 vaccine side effects in patients with and without atopic dermatitis

Dear Editor,

With the wave of mass COVID-19 vaccination, reported side effects have been well documented. BNT162b2, mRNA-1273 and Ad26.COV2.S vaccines are the most commonly used in the United States. Studies report only a small incidence of side effects in the general population among these vaccines, with most being minor, such as headache, fever and muscle pain.[1,2] Interestingly, there have been reports of exacerbations of chronic immune-mediated dermatoses like atopic dermatitis and psoriasis following COVID-19 vaccination.[3] This is not an uncommon phenomenon in this population as we have seen increased incidence of atopic dermatitis after measles, mumps and rubella vaccinations; however, these are live vaccines and fundamentally distinct from the available COVID-19 vaccines.[4] The incidence of side effects from the COVID-19 vaccines in patients with atopic dermatitis has not yet been investigated.[5]

In this retrospective cohort study using the COVID-19 Research Database, we examined the side effects after the first and second doses of the BNT162b2 and mRNA-1273 vaccines in patients with and without atopic dermatitis. The sample size for the Ad26.COV2.S vaccine was too small to analyse. Claims were evaluated for two diagnoses of atopic dermatitis prior to 1 January 2020, using International Classification of Diseases, 10th revision (ICD-10) code L20.9, to increase the positive predictive value and to ensure the diagnosis preceded the COVID-19 pandemic. Patients under 18 years of age and those who did not receive two vaccine doses were excluded. Controls without atopic dermatitis were matched 4:1 for age, sex and hypertension. Comorbidities were recorded for both groups and included obesity, type 2 diabetes, congestive heart failure, asthma, chronic obstructive pulmonary disease, chronic ischemic heart disease, rhinitis, chronic kidney disease and hypertension. Common side effects from the COVID-19 vaccines from up to 30 days out from vaccine administration were identified using ICD-10 coding. Adverse effects of interest were anaphylactic reaction, initial encounter of adverse effect of viral vaccines, fever, allergic urticaria, weakness, altered mental status, malaise, allergic reaction, chest pain, symptoms involving circulatory or respiratory systems, other including localized rash, axillary lymphadenopathy, infection following immunization, and myocarditis.[6]

Poisson regression was performed using Stata version 17. The average age was 59.1 years old, 39.4% of patients were male, 5749 patients had atopic dermatitis, and 22,996 patients without atopic dermatitis were the control group (Table 1). Adjusted odds ratios (aOR) for dose one and dose two were calculated for each vaccine (Table 2). Side effects including anaphylactic reaction, other including localized rash, and infection following immunization did not have enough data to generate an aOR for both vaccine types. The aOR for initial encounter of adverse effect of viral vaccines, fever, allergic reaction and axillary lymphadenopathy with BNT162b2 and the aOR for myocarditis with mRNA-1273 were also unable to be calculated due to low sample size.

This study shows that patients with atopic dermatitis do not seem to have an increased risk of immediate side effects from the BNT162b2 or mRNA-1273 COVID-19

TABLE 1 Characteristics of atopic dermatitis patients and matched controls

Characteristics	Atopic dermatitis ($n = 5749$)	Control ($n = 22,996$)
Age (y), mean ± SD	59.1 ± 18.5	59.1 ± 18.5
Gender, *n* (%)		
Male	2264 (39.4)	9056 (39.4)
Female	3485 (60.6)	13,940 (60.6)
Comorbidities, *n* (%)		
Overweight, obese	1348 (23.4)	3207 (13.9)
Diabetes type 2	1428 (24.8)	4564 (19.8)
Congestive heart failure	331 (5.8)	985 (4.3)
Asthma	891 (15.5)	1241 (5.4)
Chronic obstructive pulmonary disease	445 (7.7)	976 (4.2)
Chronic ischemic heart disease	640 (11.1)	1815 (7.9)
Rhinitis	1583 (27.5)	1736 (7.5)
Chronic kidney disease	670 (11.7)	1976 (8.6)
Essential hypertension	2734 (47.6)	10,323 (44.9)
mRNA-1273 vaccine, *n* (%)	4090 (71.1)	16,360 (71.1)
BNT162b2 vaccine, *n* (%)	1659 (28.9)	6636 (28.9)

Abbreviations: SD, standard deviation; y, years.

TABLE 2 Adjusted odds ratios for adverse effects for mRNA-1273 and BNT162b2 COVID-19 vaccines in patients with and without atopic dermatitis

Side effect [ICD-10]	mRNA-1273 aOR (95% CI)	BNT162b2 aOR (95% CI)
Adverse effect of viral vaccines, initial encounter [T50.B95A]		
Dose 1	0.09 (−0.27, 4.13)	n/a
Dose 2	1 (−12,495, 12,495)	n/a
Fever [R50.83]		
Dose 1	1 (−19,781, 19,750)	n/a
Dose 2	1 (−79,122, 79,089)	n/a
Allergic urticaria [L50.0]		
Dose 1	1 (−30,767, 30,734)	n/a
Dose 2	1 (−6257, 6226)	1 (−20,139, 20,106)
Weakness [R53.1]		
Dose 1	0.87 (−2.16, 1.82)	1 (−4382, 4353)
Dose 2	0.58 (−1.47, 0.82)	0.98 (−1.42, 1.45)
Altered mental status [R41.82]		
Dose 1	0.99 (−2062, 2035)	1 (−39,256, 39,226)
Dose 2	0.73 (−1.17, 1.68)	0.99 (−2738, 2710)
Malaise [R53.81]		
Dose 1	0.99 (−2427, 2400)	1 (−20,824, 20,791)
Dose 2	0.47 (−0.9, 1.95)	1 (−8424, 8394)
Allergic reaction [T78.49XA]		
Dose 1	n/a	n/a
Dose 2	0.75 (−0.95, 0.68)	n/a
Chest pain [R07.89]		
Dose 1	0.02 (0.17, 1.73)	1 (−1734, 1707)
Dose 2	0.75 (−0.95, 0.68)	0.65 (−1.74, 1.08)
Symptoms involving circulatory or respiratory systems [R09.89]		
Dose 1	1 (−1733, 1706)	0.02 (0.62, 7.01)
Dose 2	0.19 (−0.33, 1.71)	0.99 (−1987, 1960)
Axillary lymphadenopathy [R59.0 and T88.1XXA]		
Dose 1	1 (−14,797, 14,766)	n/a
Dose 2	n/a	n/a
Myocarditis [I40, I51.4]		
Dose 1	n/a	1 (−4382, 4353)
Dose 2	n/a	n/a

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; ICD-10, International classification of diseases, 10th revision.

vaccines. However, due to the limited sample size, it is difficult to definitively conclude whether patients with atopic dermatitis are not at increased risk of suffering immediate side effects from the vaccines, but also delayed ones. Our small sample size may be explained by underreporting by patients and underdiagnosis of adverse effects secondary to COVID-19 vaccines due to its novel nature, incompletely understood consequences and limited ICD-10 codes associated with adverse effects. Due to the reality of regular COVID-19 vaccinations, side effect profile in susceptible groups, such as patients with immune-driven conditions like atopic dermatitis, is a valuable and relevant area of research.

CONFLICT OF INTEREST

Ms. Shin, Mr. Shahsavari, Ms. Lee and Ms. Laborada report no conflicts of interest. Dr. Wu is or has been an investigator, consultant or speaker for AbbVie, Almirall, Amgen, Arcutis, Aristea Therapeutics, Bausch Health (Ortho Dermatologics), Boehringer Ingelheim, Bristol-Myers Squibb, Dermavant, Dr. Reddy's Laboratories, Eli Lilly, Galderma, Janssen, LEO Pharma, Mindera, Novartis, Regeneron, Sanofi-Genzyme, Solius, Sun Pharmaceutical, UCB and Zerigo Health. Dr. Thyssen is an advisor for AbbVie, Almirall, Arena Pharmaceuticals, Coloplast, OM Pharma, Aslan Pharmaceuticals, Union Therapeutics, Eli Lilly & Co, LEO Pharma, Pfizer, Regeneron, and Sanofi-Genzyme, a speaker for AbbVie, Almirall, Eli Lilly & Co, LEO Pharma, Pfizer, Regeneron and Sanofi-Genzyme and received research grants from Pfizer, Regeneron and Sanofi-Genzyme.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated during the current study.

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