NEW ONSET AUTOIMMUNE DISEASE MORE COMMON AFTER COVID-19

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BACKGROUND

- Viral infections including SARS-CoV-2 may trigger autoimmune disease by T-cell-mediated autoimmune response through molecular mimicry-cross-reactive T-cell recognition or bystander T-cell activation. Autoantibodies have been detected in patients with COVID-19 and some human proteins have homologous regions with SARS-CoV-2 peptides that could function as autoantigens.
- While there are scattered reports of various autoimmune diseases diagnosed after COVID-19, the risk is not known.

METHODS

- This is a propensity-score matched, retrospective cohort study designed to assess the risk of specific autoimmune diseases after COVID-19.
- TriNetX (a global federated health research network providing access to electronic medical records across 72 large healthcare organizations) was utilized to define a cohort of adults 18 years or older seen on or after January 1, 2020 with at least one follow-up visit after an index date.
- Exposure was defined as COVID-19 diagnosis by ICD10 code or positive laboratory test. Controls did not have COVID-19 (by the same criteria) and were propensity score-matched to patients who had COVID-19 by age and female sex.
- Index date was the date of COVID-19 diagnosis or first provider visit for any reason during the study period for controls (1/1/2020-12/21/2022).
- Outcomes were autoimmune diseases (see Figure 1) diagnosed by ICD-10 codes and were assessed starting one month after index date (to exclude prior undiagnosed autoimmune disease) until one year after.
- Incidence of each outcome by COVID-19 exposure status and risk ratios (patients with outcome/total patients per group) for each outcome were assessed.

Autoimmune diseases were more likely to be diagnosed within the first year after COVID-19 than in age-, sex-matched controls.

RESULTS

TABLE 1: Cohort Demographics

	Overall	COVID-19	No COVID-19	*P-value*
	N=4,016,472	N=2,008,236	N=2,008,236	
Age at Index	49.2 ± 17.9	49.2 ± 17.9	49.2 ± 17.9	0.999
Sex				
Female	2,319,466	1,159,733 (57.7%)	1,159,733 (57.7%)	0.999
Male	1,580,186	779,391 (38.8%)	800,795 (39.9%)	<0.001
Unknown	116,820	69,112 (3.4%)	47,708 (2.3%)	<0.001
Race				
White	2,408,045	1,265,032 (63%)	1,143,013 (56.9%)	<0.001
Black/African American	560,582	287,866 (14.3%)	272,716 (13.6%)	<0.001
Asian	89,046	38,888 (1.9%)	50,158 (2.5%)	<0.001
American Indian, Alaska Native	14,197	7,362 (0.4%)	6,835 (0.3%)	<0.001
Pacific Islander	5,701	3,096 (0.2%)	2,605 (0.1%)	<0.001
Unknown Race	938,901	405,992 (20.2%)	532,909 (26.5%)	<0.001
Ethnicity				
Not Hispanic/Latino	2,447,980	1,286,935 (64.1%)	1,161,045 (57.8%)	<0.001
Hispanic/Latino	293,214	167,538 (8.3%)	125,676 (6.3%)	<0.001
Unknown Ethnicity	1,275,278	553,763 (27.6%)	721,515 (35.9%)	<0.001

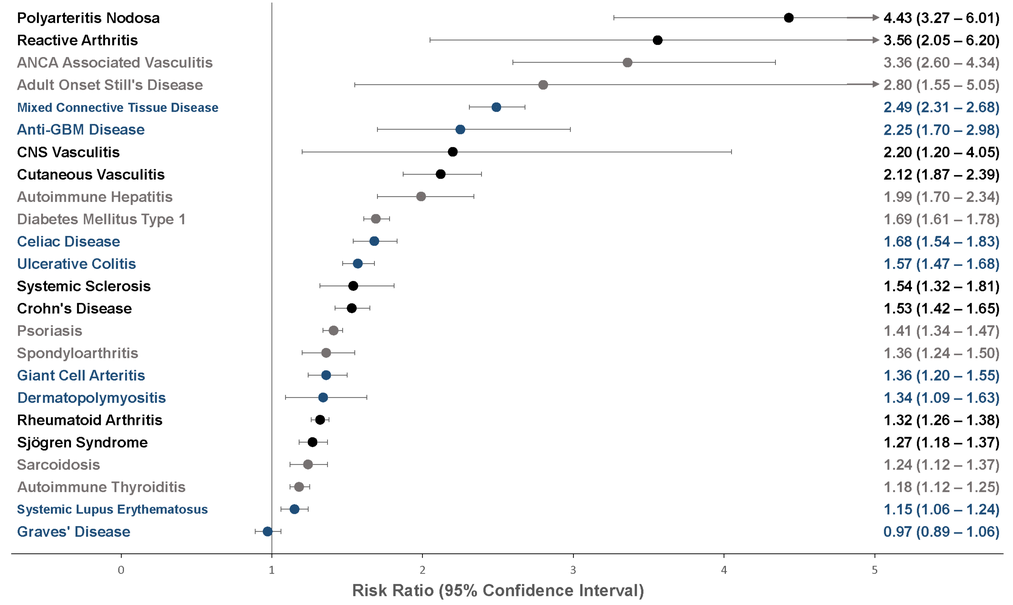
Demographics after propensity score matching by age and female sex.

TABLE 2: Incidence of Autoimmune Disease after COVID-19

	COVID-19		No COVID-19	
	Total Patients*	Patients with Outcome	Total Patients*	Patients with Outcome
Rheumatoid Arthritis	1,956,144	4,692 (0.24%)	1,987,037	3,613 (0.18%)
Psoriasis	1,968,087	4,277 (0.22%)	1,989,737	3,074 (0.15%)
Diabetes Mellitus Type 1	1,958,101	3,779 (0.19%)	1,986,952	2,264 (0.11%)
Autoimmune Thyroiditis	1,984,216	2,602 (0.13%)	1,996,781	2,209 (0.11%)
Mixed Connective Tissue Disease	1,993,315	2,478 (0.12%)	2,003,286	1,000 (0.05%)
Ulcerative Colitis	1,989,768	2,254 (0.11%)	1,999,880	1,440 (0.07%)
Crohn's Disease	1,989,745	1,760 (0.09%)	1,999,610	1,156 (0.06%)
Sjögren syndrome	1,994,950	1,552 (0.08%)	2,001,801	1,229 (0.06%)
Celiac Disease	1,994,762	1,389 (0.07%)	2,003,404	829 (0.04%)
Systemic Lupus Erythematosus	1,991,563	1,345 (0.07%)	2,000,691	1,178 (0.06%)
Giant Cell Arteritis	1,998,200	998 (0.05%)	2,004,240	734 (0.04%)
Graves' disease	1,997,449	989 (0.05%)	2,001,875	1,020 (0.05%)
Sarcoidosis	1,998,256	848 (0.04%)	2,003,633	684 (0.03%)
Cutaneous Vasculitis	1,999,065	788 (0.04%)	2,004,855	373 (0.02%)
Spondyloarthritis	2,003,676	531 (0.02%)	2,006,125	390 (0.02%)
Autoimmune Hepatitis	2,005,057	451 (0.02%)	2,006,916	226 (0.01%)
Systemic Sclerosis	2,004,185	384 (0.02%)	2,006,556	249 (0.01%)
ANCA Associated Vasculitis	2,006,439	255 (0.013%)	2,007,690	76 (0.004%)
Polyarteritis Nodosa	2,006,905	226 (0.01%)	2,007,830	51 (0.002%)
Dermatopolymyositis	2,005,843	225 (0.01%)	2,007,166	168 (0.008%)
Anti-GBM Disease	2,006,805	160 (0.008%)	2,007,769	71 (0.004%)
Reactive Arthritis	2,007,775	57 (0.003%)	2,008,121	16 (0.001%)
Adult Onset Still's Disease	2,007,724	42 (0.002%)	2,008,042	15 (0.001%)
CNS Vasculitis	2,007,941	33 (0.002%)	2,008,122	15 (0.001%)

Patients with a specific outcome prior to the index date or within one month after the index date were excluded from the analysis for that outcome. Analysis performed after propensity score matching by age and female sex.

FIGURE: Risk Ratios for Autoimmune Disease after COVID-19 (Color in figure is to make viewing easier.)



CONCLUSIONS

- Rheumatoid arthritis, psoriasis and diabetes mellitus type 1 had the highest incidence after COVID-19 (0.24, 0.22 and 0.19%, respectively).
- While the incidence of most of the autoimmune diseases assessed were low in both groups, the risk ratios for all but one condition (Grave's) showed statistically significant higher risk in patients after COVID-19 than in those without COVID-19.
- Risk ratios were highest for polyarteritis nodosa (4.43, 3.27-6.01), reactive arthritis (3.56, 2.05-6.2) and ANCA-associated vasculitis (3.36, 2.6-4.34).
- Future work will assess the validity of autoantibodies in predicting autoimmune disease after COVID-19.
- Limitations included: inability to adjust for all potential confounders, use of ICD-10 codes for establishing exposure/outcomes.

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