Outcomes of SARS-CoV-2 Infections in Patients With Neurodegenerative Diseases in the LEOSS Cohort

The impact of preexisting neurodegenerative diseases on superimposed SARS-CoV-2 infections remains controversial. Here we examined the course and outcome of SARS-CoV-2 infections in patients affected by Parkinson's disease (PD) or dementia compared to matched controls without neurodegenerative diseases in the LEOSS (Lean European Open Survey on SARS-CoV-2-infected patients) cohort, a large-scale prospective multicenter cohort study.[1]

The LEOSS scientific data set comprises anonymous data after data quality control, including plausibility checks. Collected data include demographic information, standardized clinical classification of the SARS-CoV-2 severity (hospitalization and discharge), administered medical care (eg, intensive care unit [ICU] stay, and ventilation), preexisting and concomitant signs and symptoms, medication, laboratory parameters, and mortality. The patient sample age is grouped in decades.

Our study population comprised n = 4310 SARS-CoV-2-infected patients (59% men). Forty of them had PD (median decade: 76–85 years, 63% men); 290 had dementia (median decade: 76–85 years, 50% men) (Supplementary Tables S1 and S2). Dementia was classified into Alzheimer's disease (22.1%), vascular dementia (13.3%), other dementia (12.4%), and unknown/missing value (52.1%). More than 95% of the patients were from tertiary referral centers in Germany between March 2020 and November 2020.

Using a systematic sampling strategy, we extracted 15 controls randomly from the study population for each PD patient (1:15) and 2 randomly selected controls for each dementia patient (1:2). Any potentially confounding effects resulting from variability in age and sex were fully adjusted for by the matching procedure. To avoid bias, we handled patients and controls the same way according to standard epidemiological principles.

The overall SARS-CoV-2-associated mortality in the PD (32.5%) and dementia (32.1%) groups did not significantly differ from their respective control groups (28.7% and 26.5%).

Delirium occurred more frequently in dementia compared to PD and controls, but patient-reported parameters (eg, dry cough and dyspnoe) were less frequent in dementia compared to PD and controls. Interestingly, dementia patients remained in the ICU and were ventilated for a shorter time period than controls. The major SARS-CoV-2 outcome parameters (duration of inpatient stay, duration of ICU stay, and duration of ventilation; SARS-CoV-2-related mortality) were also not significantly different between PD patients, dementia patients, and controls. The age and gender distributions in our patient sample were not significantly different from previously published epidemiological cohort studies reporting the typical characteristics of German PD and dementia patients.[2-5] This suggests that our sample was representative of the patients observed in the general population. Only the subgroup of female dementia patients had a higher mortality than their female controls (Table 1).

Although prior studies have reported higher SARS-CoV-2-related mortality in patients with PD or dementia compared to patients without preexisting neurodegenerative diseases,[6,7] encouragingly, our comparably relatively large, well-controlled, standardized data set with prospective patient enrollment does not support the notion of an increased risk for a fatal course of SARS-CoV-2 in PD or dementia patients, when treated in tertiary referral centers. Further research is required to shed light on the impact of gender on the outcome of SARS-CoV-2 infections in dementia patients.

Ethics

Approval for LEOSS was obtained by the applicable local ethics committees of all participating centers and registered at the German Clinical Trials Register (DRKS, number S000 21145).

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TABLE 1. Parameters of SARS-CoV-2 disease course in patients with neurodegenerative comorbidity and controls

Parameter disease course	PD patients vs. controls		Dementia patients vs. controls		PD patients vs. dementia patients	
Duration of inpatient stay	$P = 0.608$	OR: NA*	$P = 0.933$	OR: NA*	$P = 0.503$	OR: NA*
Duration of ICU	$P = 0.215$	OR: NA*	**$P = 0.0003$** shorter stay in ICU for D patients	OR: NA*	$P = 0.899$	OR: NA*
Ventilation duration	$P = 0.256$	OR: NA*	**$P = 0.0037$** shorter ventilation for D patients	OR: NA*	$P = 0.800$	OR: NA*
Covid death	$P = 0.605$	OR 0.8347 CI [0.4208; 1.6556]	$P = 0.084$ men, $P = 0.448$ women, $P = 0.00036$ higher lethality for women patients with dementia vs. women controls	OR 0.7626 CI [0.5603; 1.0378]	$P = 0.956$	OR 1.02 CI [0.5034; 2.0664]
Death	$P = 0.895$	OR 0.955 CI [0.4821; 1.8922]	$P = 0.057$ men, $P = 0.792$ women, $P = 0.0016$ higher lethality for women patients with dementia vs. women controls	OR 0.7510 CI [0.5587; 1.0094] Men: OR 1.0563 CI [0.7025; 1.5883] Women: OR 0.4964 CI [0.3199; 0.7702]	$P = 0.532$	OR 0.7995 CI [0.3958; 1.6149]
Dry cough	$P = 0.572$	OR 1.237 CI [0.5914; 2.5877]	**$P = 0.00014$** D patients with fewer dry cough	OR 2.0252 CI [1.4029; 2.9235]	$P = 0.226$	OR 1.6159 CI [0.7386; 3.5354]
Dyspnoe	$P = 0.708$	OR 0.8794 CI [0.4484; 1.7249]	**$P = 0.0085$** D patients with fewer dyspnoe	OR 1.5743 CI [1.1211; 2.2107]	$P = 0.100$	OR 1.8008 CI [0.8854; 3.6624]
Fever	$P = 0.194$	OR 1.6 CI [0.783; 3.2677]	$P = 0.247$	OR 1.2006 CI [0.881; 1.6361]	$P = 0.5439$	OR 0.7935 CI [0.3788; 1.6624]
Delirium	$P = 0.799$	OR 0.7647 CI [0.0962; 6.0767]	**$P = 0.00056$** D patients with more frequent delirium	OR 0.3125 CI [0.1563; 0.6249]	$P = 0.223$	OR 0.3028 CI [0.0396; 2.3156]
Headache	$P = 0.423$	OR 2.2348 CI [0.2971; 16.8076]	**$P = 0.00177$** D patients with fewer headaches	OR 12.3931 CI [1.6674; 92.1096]	$P = 0.117$	OR 6.8718 CI [0.4212; 112.1193]
Taste disorder	$P = 0.632$	OR 1.6339 CI [0.2149; 12.4198]	**$P = 0.0342$** D patients with fewer taste disorders	OR 4.3146 CI [0.9895; 18.8137]	$P = 0.291$	OR 3.4231 CI [0.3032; 38.6459]

Adjusted for age and sex. Univariate statistical analyses were performed to determine the significance between the analyzed subgroups. Odds ratios with the corresponding confidence intervals were generated. Abbreviations: PD, Parkinson's disease patients; D, dementia; controls, SARS-CoV-2 patients without comorbidities, Parkinson's disease or dementia; ICU, intensive care unit; OR, odds ratio; CI, confidence interval; OR, NA*, due to the data structure, multiple ORs are generated for the respective categories. These ORs can be obtained on request.

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Supporting Data

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