

Olfactory dysfunction and chronic cognitive impairment following SARS-CoV-2 infection in a sample of older adults from the Andes mountains of Argentina

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Abstract

Background: COVID-19 has affected more than 150 million people. The causal coronavirus, SARS-CoV-2 has infected twice as many individuals who have remained asymptomatic. COVID-19 includes central nervous system (CNS) manifestations and may result in chronic neuropsychiatric sequelae. Risk factors for COVID-19 sequelae overlap with those for Alzheimer's disease (AD), particularly older age and ApoE4 status. The Alzheimer's Association Consortium on Chronic Neuropsychiatric Sequelae of SARS-CoV-2 infection (CNS SC2) established harmonized definitions, ascertainment and assessment methodologies to evaluate and longitudinally follow up cohorts of older adults with variable exposure to COVID-19. We present preliminary data from CNS SC2 in a prospective cohort of 234 older adult Amerindians from Argentina.

Method: Participants are ≥ 60 years recruited from the health registry of the Province of Jujuy containing all SARS-CoV-2 testing data (regardless of clinical status and of the result of the testing). We randomly invite older adults stratified by testing status regardless of symptom severity, a minimum of 3 months after clinical recovery (maximum 6 months); refusal to participate is $<45\%$. Assessment includes interview with the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) and Clinical Dementia Rating scale; neurocognitive assessment; emotional reactivity scale; and neurological assessment including semiquantitative olfactory function test, motor function, coordination and gait. We present here the results of olfactory testing and cognitive assessments.

Result: We assessed 233 infected participants and 64 controls. Average duration of formal learning is 9.35 ± 2.6 years and mean age is 66.7 ± 5.13 years. Normative data for the local population were available for Word list, Corsi Blocks, Oral Trails and Five Digit Tests and were used to normalize Z-scores and categorize the sample in 3 groups: normal cognition (NC, 44.6%); memory only impairment (MOI, 21%); and mul-

tiple domain impairment (MDI,34.4%). Individuals with MDI presented severe alterations in short-term memory; semantic memory; naming; executive function and attention compared to NC or MO groups (Table 1). Severity of cognitive impairment was significantly correlated with severity of olfactory dysfunction ($\chi^2 = 13.82$; $p = 0.003$) but not severity of acute COVID-19.

Conclusion: Older adults frequently suffer persistent cognitive impairment after recovery from SARS-CoV-2 infection; cognitive impairment is correlated with persistent anosmia.

TABLE 1

Task	NC	MO	MDI	Mean	SD	F	p
n	104	49	80				
Shortened Boston Naming Test				8.3	3.2	18.5	0.000
Weschler Memory Scale-Long Term Recall	-0.2	-1	-2.2	5.3	2.3	108.6	0.000
Weschler Memory Scale-Short Term Recall	-0.9	-2	-2.1	5.8	2.3	46.4	0.000
Weschler Memory Scale-Recognition	-0.7	1	-1.5	21.1	2.6	13.7	0.000
Corsi Blocks direct	0	0.3	-3	6.4	2	10.7	0.000
Corsi Blocks inverse	-0.4	-0	-1.1	5.2	2.1	16.5	0.000
Cactus and Camel				27.3	4.9	16.6	0.000
Oral Trails Verbal Search (time in seconds)	0.39	0.5	0.91	33.8	19.8	7.8	0.000
Oral Trails Verbal Search errors	-1	1	2.33	0.3	0.8	4.5	0.013
Oral Trails Visual Search (time in seconds)	0.56	0.8	1.23	71.4	38.8	12.8	0.000
Oral Trails Visual Search errors	0.14	0.4	0.23	0.4	1.4	1.6	0.211
Oral Trails Mental Search (time in seconds)	0.92	1	1.5	86.2	58.4	17.7	0.000
Oral Trails Mental Search errors	0.05	0.8	1.08	2.2	3	11.6	0.000
Oral Trails Visual-Mental Search (time in seconds)	0.99	1.3	1.7	103.7	55.6	29.6	0.000
Oral Trails Visual-Mental Search errors	0.46	0.54	0.72	1.9	4.2	7.6	1.000
Oral Trails Mental Switching (time in seconds)	0.1	1.1	1.56	90.6	57.9	29.8	0.000
Oral Trails Mental Switching errors	0.64	0.6	1	3.1	4.4	17.4	0.000
Digit Symbol score				35.9	17.7	34.9	0.000
Tower of Hanoi				10.2	3.8	4.4	0.014
Five Digit Test reading time	0.49	0.4	1.16	38.5	22.7	18.4	0.000
Five Digit Test reading errors	0.05	0	0.32	0.6	4.7	2.4	0.090
Five Digit Test counting time	0.4	0.4	1	40.9	23.5	18.8	0.000
Five Digit Test counting errors	0.1	0.3	0.29	0.7	4.7	2.3	0.100
Five Digit Test selecting time	1.04	0.3	1.2	62.5	35.8	27.8	0.000
Five Digit Test selecting errors	-1.2	0.3	0.5	2.3	4.9	8.5	0.000
Five Digit Test switching time	0.72	0.4	1.53	87.1	44.9	40.5	0.000
Five Digit Test switching errors	0.17	0.2	0.82	4	5.7	1661	0.000