Neuropsychological correlates of cerebral white matter lesions in patients with MCI or dementia

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Objective: Cerebral white matter lesions (WML) are common in patients with dementia and may influence cognitive performances. The aim of the present study was to evaluate the association between severity of WML and cognitive impairment in patients with different types of dementia.

Materials and methods: All patients with a diagnosis of MCI or dementia referring to the Alzheimer's Disease Evaluation Unit of the Hospital of L'Aquila between January 2014 and May 2015 for neuropsychological evaluation were included in the study. The Blennow scale was used to assess the severity of cerebral WML on brain CT scans and the Fazekas scale on brain MRI. Three neurologists assessed separately degenerative and vascular changes on neuroimaging studies; discrepancies were resolved with discussion and a consensus was required in any case. Cognitive impairment was evaluated with Mini Mental State Exam (MMSE), Mental Deterioration Battery (MDB), Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL).

Results: 109 patients meeting the inclusion criteria, 32 men (29.4%) and 77 women (70.6%) with a mean age of 74.6 (±6.7), were included in the study. Seven patients (6.4%) had MCI, 48 (44%) dementia of Alzheimer's type, 44 (40,4%) vascular dementia or mixed dementia (neurodegenerative with a vascular component), and 10 (9,1%) other types of dementia. Thirty-one patients (28.4%) had a Blennow score ≥1 and 24 (22.0%) a Fazekas score ≥1. Nineteen (17.4%) had a moderate grade and 23 (21.1%) had a severe grade of atrophy on brain imaging.

Figure 1. Dementia's distribution.

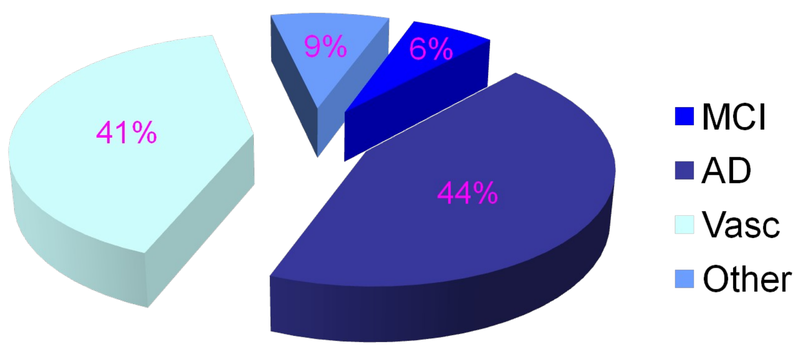
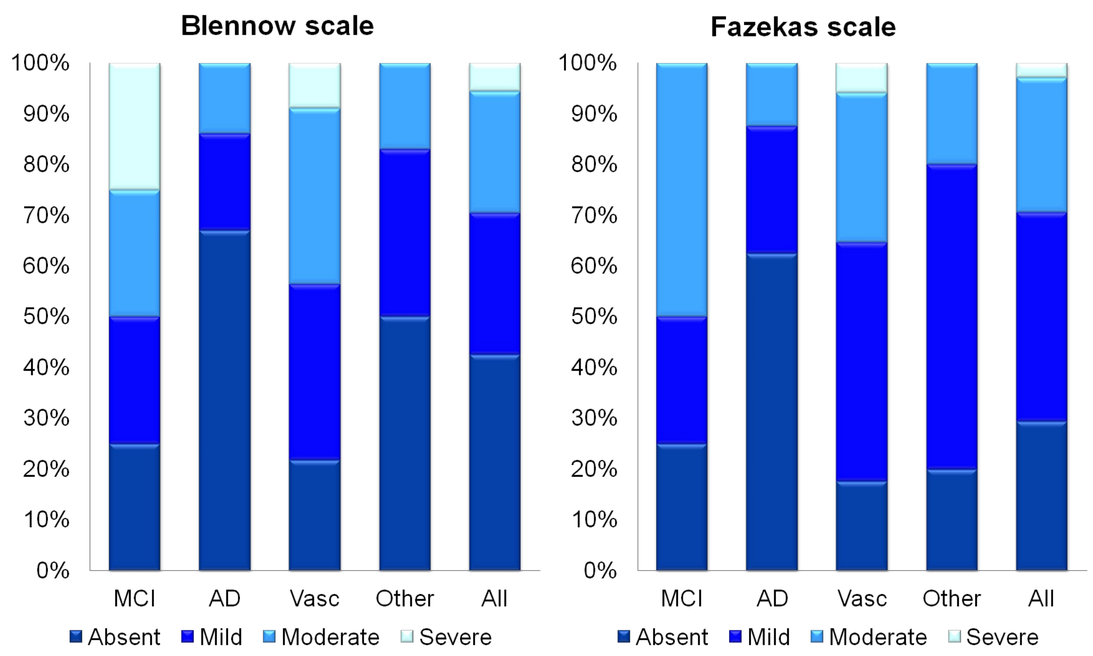


Figure 2. Severity of leukoaraiosis in patients with dementia.



In our study, the Fazekas score was negatively associated with performances at the Rey immediate recall (r=-0.76; P=0.004) and delayed recall tests (r=-0.69; P=0.018). Brain atrophy was associated with a lower mean MMSE (24.36 vs 22.33; P=0.003) and semantic verbal fluency score (15,2 vs 12,20; P=0.048). However, we did not find a significant relationship between WML and MMSE score.

Figure 3. Brain imaging and cognitive functions.

Variables	Fazekas scale		Blennow scale		Brain atrophy	
	r	P	r	P	η	P
MMSE	0,07	0,77	0,16	0,29	0,26	0,003
Temporal Orientation	0,25	0,58	0,05	0,90	0,30	0,64
Spatial orientation	0,73	0,06	-0,28	0,47	0,41	0,13
Rey immediate recall	-0,76	0,004	0,19	0,26	0,40	0,82
Rey delayed recall	-0,69	0,018	0,24	0,16	0,35	0,80
Raven's Matrices	0,18	0,66	0,06	0,81	0,42	0,57
Short-term memory	0,50	0,17	-0,05	0,79	0,46	0,35
Phonological verbal fluency	-0,08	0,81	0,18	0,33	0,58	0,17
Semantic verbal fluency	0,05	0,89	0,12	0,54	0,22	0,048
CDR	-0,18	0,47	-0,13	0,39	0,27	0,003
ADL	-0,25	0,42	0,02	0,90	0,48	0,30
IADL	-0,21	0,50	-0,02	0,93	0,43	0,40

Conclusion: According to previous studies, our data suggest that overall dementia scores, such as MMSE, are mainly affected by degenerative processes involving the cortex and only marginally affected by WML. However, in subjects with either MCI or dementia, the occurrence of WML may greatly impair memory and executive functions, suggesting the importance of the interaction between degenerative and vascular pathology.
Degenerative changes of the brain influence more general performances, as evaluated by the MMSE, but WML may interact with degenerative pathology and may have a relevant impact on global functions such as memory.

References:

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