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PSYCHOGERIATRIC NOTE

Examining electroencephalogram abnormalities in older adults with a mood disorder presenting at a memory clinic

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Mood disorders in later life are often accompanied with cognitive complaints.[1] If severe, these may raise suspicion of an underlying neurodegenerative disorder. This may require evaluation in a memory clinic. The routine work-up of our memory clinic includes an electroencephalogram (EEG). Focal and diffuse EEG abnormalities can be found in Alzheimer's disease, vascular dementia and dementia with Lewy bodies,[2] while in healthy older subjects mild non-specific EEG abnormalities are common.[3] In earlier studies, EEG findings in patients with mood disorders indicate inconsistent, moderate non-specific abnormalities.

In clinical practice it can be difficult to differentiate between older adults with mood disorder (OAMD) and older adults with subjective cognitive decline (SCD), as both overlap in symptoms.

The EEG in OAMD may show abnormalities beyond the expectation on basis of older age alone. In this study we investigated whether the EEG of OAMD with cognitive complaints shows more abnormalities than older adults with SCD, allowing interpretation of EEG in OAMD more carefully.

We included patients from the Amsterdam Dementia Cohort,[4] who were referred to the memory clinic between 2002 and 2019 for diagnostic work-up for memory complaints. Subjects were assessed after evaluation by a multidisciplinary team which included clinical assessments, neuropsychological tests, neuro-imaging and cerebrospinal fluid biomarker analyses, and an EEG registration. Based on this information, patients suspected of mild cognitive impairment or dementia were excluded. Ninety-seven percent (n = 69) of the psychiatric diagnoses were confirmed by a psychiatrist or psychologist. Based on the clinical features, we included 57 older adults with unipolar depression (OAUD) (61% male, mean age 58.4 years, SD 5.3), 14 older adults with a bipolar disorder (OABD) (71% male, mean age 61.1 years, SD 4.9), and 71 persons with SCD (63% male, mean age 56.6 years, SD 4.6). The median Mini-Mental State Examination score for the OAMD group was 27 (interquartile range (IQR): 4) and 29 (IQR: 3) for the SCD control group. The SCD control group was matched by age and gender.

Table 1 Electroencephalogram results

		Older adults with mood disorder (n = 71)	Older adults with SCD (n = 71)	P-value χ^2,(df), P
Mini-Mental State Examination score, median (interquartile range)		27 (4)	29 (3)	P = 0.00
Geriatric Depression Scale (GDS-15), mean ± SD		7.60 (4.24)	1.24 (0.78)	P = 0.00
Psychotropic drugs, present (%)		51 (71.8)	7 (9.9)	
Drowsiness,† present (%)		37 (52)	39 (55)	MW 0.13
Degree of abnormality, present (%)	Normal	43 (61)	42 (59)	MW 0.89
	Slightly abnormal	25 (35)	26 (37)	
	Moderately abnormal	3 (4)	3 (4)	
	Severely abnormal	0 (0)	0 (0)	
Qualities of abnormalities, present (%)	Epileptiform present	1 (1.4)	3 (4.2)	1.03, (1), P = 0.62
	Diffuse, present	9 (12.7)	4 (5.6)	2.12, (1), P = 0.24
	Focal, present	24 (33.8)	27 (38.0)	2.75, (1), P = 0.73
Alpha rhythm, mean ± SD		9.7 ± 0.91	9.8 ± 0.92	MW 0.51
Range		8–13	7.5–12.0	
Mu rhythm,‡ mean ± SD		10.3 ± 2.0	10.0 ± 1.3	MW 0.91
Range		9–20	7–13	

† OAMD: n = 45, SCD: n = 45. ‡ OAMD: n = 32, SCD: n = 40. MW, Mann–Whitney U test; OAMD, older adults with mood disorder; SCD, subjective cognitive decline.

EEGs were recorded using a digital EEG device (Brainlab manufactured by OSG, Belgium) as described in a previous study.[2] The following electrodes sites were used: Fp2, Fp1, F8, F7, F4, F3, A2, A1, T4, T3, C4, C3, T6, T5, P4, P3, O2, O1, Fz, Cz, Pz. The sample frequency was 500 Hz. Electrode impedance was <5 kΩ. The EEG was filtered online with a time constant of 1 s and a low-pass filter of 70 Hz. The recording time in the day was mostly in the morning.[5] Each EEG was visually rated by a certified clinical neurophysiologist and coded. The code was based on four different EEG parameters: severity of EEG abnormalities, epileptic activity, diffuse and focal EEG abnormalities.[2]

In the OAUD-OABD group 61% had a completely normal EEG compared to 59% in SCD. The degree of EEG abnormalities was not significantly different between the two groups (*t*-test, $P = 0.89$) (see Table 1 for full results), nor were there significant differences regarding epileptiform activity, diffuse and focal abnormalities, alpha and mu frequencies.

One of our study strengths is the extensive clinical work-up thereby almost excluding the possibility of neurodegeneration confounding our results. However, our study may be influenced by psychopharmaca in the OAMD group.[6] Another limitation is the fact that quantitative analyses were not performed and therefore specific EEG abnormalities may have been missed.

Previous studies mainly focused on finding a EEG biomarker in mood disorder using features such as alpha asymmetry.[7] The study of Liedorp[2] used the standard EEG parameters as we did, but this study focused on types of dementia. As an additional finding, they concluded that a normal EEG is associated with both SCD and psychiatric findings. In contrast to these study findings, our study showed that the EEG of OAMD with cognitive complaints is not always normal (39% of the cases). However, this finding is corresponding to our controls with SCD. Therefore, these non-specific EEG findings are possibly age-related and not specifically a marker for mood disorder.

In conclusion, a slightly abnormal EEG can be found in about a third of older adults with a mood disorder presenting at a memory clinic, but these abnormalities do not exceed those found in older persons with subjective memory complaints.

DISCLOSURE

The authors have no potential conflicts of interest to disclose.

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INFORMED CONSENT

All patients gave their written informed consent.

ABBREVIATIONS

EEG	electroencephalography
GDS	Geriatric Depression Score
IQR	interquartile range
MD	mood disorder
MMSE	Mini-Mental State Examination (MMSE)
OABD	older adults with bipolar disorder
OAUD	older adults with unipolar depression
SCD	subjective cognitive decline

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