

# Sleep disturbances in late-onset epilepsy of unknown origin: a questionnaire-based controlled study

S. Maio<sup>1</sup>, M. Fernandes<sup>2</sup>, C. Costa<sup>3</sup>, G. Bergamo<sup>2</sup>, F. Dono<sup>4</sup>, S. G. Di Santo<sup>5</sup>, M. Silla<sup>3</sup>, A. Ricci<sup>3</sup>, A. Toja<sup>3</sup>, P. Quintieri<sup>4</sup>, F. Franchini<sup>5</sup>, N. B. Mercuri<sup>1,2</sup>, C. Liguori<sup>1,2</sup>

1. Neurology Unit, University Hospital of Tor Vergata, Rome, Italy

2. Department of Systems Medicine, University of Rome Tor Vergata, Rome, Italy

3. Neurology Clinic, Department of Medicine and Surgery; University of Perugia – S. Maria della Misericordia Hospital, Perugia, Italy

4. Epilepsy Centre, Department of Neuroscience Imaging and Clinical Sciences, University of Chieti-Pescara, Italy

5. Fondazione Santa Lucia, Rome, Italy

**Objectives:** Sleep and wake disturbances are common in people with epilepsy and may be particularly prominent in the elderly. Approximately 15–20% of late onset epilepsy (LOE) cases presents with an unknown etiology (LOEU), a condition increasingly recognized in aging populations.

This study aimed to evaluate subjective sleep quality and daytime sleepiness in individuals with LOEU compared to neurologically healthy older adults.

**Materials and methods:** The study sample included 78 patients diagnosed with LOEU, recruited at the Epilepsy Centres in Rome Tor Vergata, Perugia, and Chieti, and 55 community-dwelling older adults without neurological or psychiatric conditions, who served as the control group. All participants completed two standardized self-report questionnaires: the Epworth Sleepiness Scale (ESS) and the Pittsburgh Sleep Quality Index (PSQI). A subset of patients with LOEU also completed the Beck Depression Inventory-II (BDI-II) and the Quality of Life in Epilepsy Inventory (QOLIE-31). Analyses have been controlled for age and centre of recruitment.

**Table 1.** Participants' demographics and clinical information.

		Groups			
		LOEU (n=78)		Controls (n=55)	
		Mean	SD	Mean	SD
Sex, n., %	Male	43	55.1%	21	38.2%
	Females	35	44.9%	34	61.8%
Age		68.29	8.01	69.76	15.00
Epilepsy duration		45.00	60.92	NA	NA
Seizure Type	Focal	39	50.0%		
	Generalized	31	39.7%	NA	NA
	Unknown	8	10.3%		
N° of seizures		0.72	1.81	NA	NA
ASM Therapy				NA	NA
Monotherapy		71	91%		
	Politherapy	7	9%		
ASM Type	LEV	24	30.8%	NA	NA
	LCM	15	19.2%		
	VPA	9	11.5%		
	ESL	7	9.0%		
	LTG	4	5.1%		
	CBZ	3	3.8%		
	LTG	3	3.8%		
	OXC	3	3.8%		
	ZNS	2	2.6%		
	PB	1	1.3%		
	LEV, LCM	2	2.6%		
	LEV, ESL	1	1.3%		
	LMT, BRV	1	1.3%		
	LMT, PER	1	1.3%		
	VPA, PER	1	1.3%		
BRV, PGB	1	1.3%			

**Abbreviations:** ASM, Antiseizure Medication; LEV, Levetiracetam; CBZ, Carbamazepine; PGB, Pregabalin; OXC, Oxcarbazepine; VPA, Valproic Acid; LCM, Lacosamide; LTG, Lamotrigine; PB, phenobarbital; ESL, Eslicarbazepine acetate; PER, Perampanel; ZNS, Zonisamide; BRV, Brivaracetam; SD, Standard deviation; NA, Non applicable.

**Results:** LOEU patients showed significantly poorer global sleep quality ( $p=0.046$ ) and lower sleep quality and efficiency ( $p<0.001$ ) compared to controls. ESS scores were similar between groups. Patients with generalized seizures reported lower sleep quality than patients with the other type of seizures. Higher depressive symptom scores (BDI-II) were significantly associated with poorer sleep quality and with reduced quality of life (QOLIE-31).

**Table 2.** Differences in daytime sleepiness and sleep quality between seizure types.

	Seizure Types						Test of Differences
	Focal (n=39)		Generalized (n=31)		Unknown (n=8)		
	Mean	SD	Mean	SD	Mean	SD	
ESS	4.62	3.28	3.84	2.34	5.38	2.47	$F_{2,75}=20.858, p=0.245$
TST	6:51	1:34	6:45	1:03	5:37	1:46	$F_{2,75}=18.507, p=0.220$
Global PSQI	6.49	3.93	4.48	2.83	8.63	5.85	$F_{2,75}=17.915, p=0.032^{\#}$
C1. Sleep Quality	0.77	0.74	0.68	0.79	1.50	0.93	$F_{2,75}=18.887, p=0.101$
C2. Sleep Latency	1.21	1.00	0.39	0.56	1.00	1.12	$F_{2,75}=17.878, p=0.002^*$
C3. Sleep Duration	0.95	0.83	0.97	0.84	1.75	1.28	$F_{2,75}=18.134, p=0.269$
C4. Sleep Efficiency	1.03	1.11	0.68	1.05	1.88	1.36	$F_{2,75}=18.859, p=0.080$
C5. Sleep Disturbances	1.44	0.64	1.10	0.47	1.50	0.93	$F_{2,75}=18.018, p=0.055$
C6. Sleeping Medication	0.38	0.96	0.26	0.77	0.38	1.06	$F_{2,75}=19.005, p=0.827$
C7. Daytime Dysfunction	0.74	0.85	0.42	0.56	0.75	0.89	$F_{2,75}=18.734, p=0.166$
Circadian Rhythm							$\chi^2(4)=1.580, p=0.812$
Advanced	1	2.6%	0	0%	0	0%	
Intermediate	32	82.1%	28	90.3%	7	87.5%	
Delayed	6	15.4%	3	9.7%	1	12.5%	

**Table 3.** Differences in excessive daytime sleepiness and sleep quality between ASM types.

	Types of ASM						Test of Differences
	LCM (n=15)		LEV (n=25)		Other ASM (n=36)		
	Mean	SD	Mean	SD	Mean	SD	
ESS	3.13	2.26	3.80	2.61	5.47	2.96	$F_{2,75}=40.078, p=0.010^*$
TST	6:17	1:26	6:36	1:20	6:51	1:29	$F_{2,75}=37.078, p=0.441$
Global PSQI	5.67	4.75	6.44	4.01	5.83	3.65	$F_{2,75}=33.870, p=0.803$
C1. Sleep Quality	0.80	0.77	0.84	0.69	0.83	0.91	$F_{2,75}=38.066, p=0.986$
C2. Sleep Latency	0.67	0.82	1.12	1.05	0.78	0.93	$F_{2,75}=38.250, p=0.290$
C3. Sleep Duration	1.20	1.01	1.00	0.87	1.03	0.91	$F_{2,75}=35.497, p=0.810$
C4. Sleep Efficiency	1.00	1.20	1.08	1.29	0.94	1.07	$F_{2,75}=35.131, p=0.912$
C5. Sleep Disturbances	1.20	0.77	1.40	0.58	1.31	0.62	$F_{2,75}=34.497, p=0.664$
C6. Sleeping Medication	0.40	1.06	0.40	1.00	0.28	0.78	$F_{2,75}=33.072, p=0.844$
C7. Daytime Dysfunction	0.47	0.64	0.64	0.81	0.67	0.79	$F_{2,75}=38.489, p=0.626$
Circadian Rhythm							$\chi^2(4)=2.183, p=0.702$
Advanced	0	0%	0	0%	1	2.8%	
Intermediate	13	86.7%	23	92.0%	29	80.6%	
Delayed	2	13.3%	2	8.0%	6	16.7%	

**Table 4.** ANCOVA Results for Excessive Daytime Sleepiness and Sleep.

Variables	Effect	Groups	Mean $\pm$ SD	F	p-value	Partial $\eta^2$
ESS	Group	LOEU	4.38 $\pm$ 2.87	0.378	0.540	0.003
		Controls	4.42 $\pm$ 2.64			
Global PSQI	Group	LOEU	5.91 $\pm$ 3.95	7.645	0.007 <sup>c</sup>	0.056
		Controls	5.00 $\pm$ 2.24			
C1. Sleep Quality	Group	LOEU	0.81 $\pm$ 0.81	5.916	0.016 <sup>c</sup>	0.044
		Controls	0.80 $\pm$ 0.52			
C2. Sleep Latency	Group	LOEU	0.86 $\pm$ 0.95	0.100	0.752	0.001
		Controls	0.89 $\pm$ 0.98			
C3. Sleep Duration <sup>a</sup>	Group	LOEU	1.04 $\pm$ 0.90	2.066	0.153	0.016
		Controls	0.95 $\pm$ 0.73			
C4. Sleep Efficiency <sup>a</sup>	Group	LOEU	0.97 $\pm$ 1.15	25.236	0.001 <sup>b,c</sup>	0.164
		Controls	0.49 $\pm$ 0.84			
C5. Sleep Disturbances <sup>a</sup>	Group	LOEU	1.31 $\pm$ 0.63	0.048	0.826 <sup>b</sup>	0.001
		Controls	1.22 $\pm$ 0.46			
C6. Sleeping Medication <sup>a</sup>	Group	LOEU	0.33 $\pm$ 0.89	1.091	0.298	0.008
		Controls	0.36 $\pm$ 0.97			
C7. Daytime Dysfunction <sup>a</sup>	Group	LOEU	0.62 $\pm$ 0.76	0.480	0.490 <sup>c</sup>	0.000
		Controls	0.29 $\pm$ 0.50			

**Conclusion:** People with LOEU showed poorer night-time sleep than controls, despite similar daytime sleepiness. Sleep problems are more pronounced with generalized seizures and are linked to depressive symptoms and lower quality of life. These findings highlight the need to routinely assess and manage sleep and mood in people with LOEU to improve well-being and possibly reduce seizure recurrence.

