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EVALUATION OF SLEEP QUANTITY AND QUALITY IN OLDER ADULTS WITH NOCTURIA USING PORTABLE ELECTROENCEPHALOGRAM ACQUISITION DEVICE

Hypothesis / aims of study
  Nocturia is not only bothersome for patients and their partner because of sleep disturbance but also associated with increased morbidity such as bone fracture and depression. Although the state of sleep should be evaluated objectively by electroencephalography (EEG), the disturbed sleep has never been evaluated by EEG. We investigated the state of sleep in the older adults with nocturia by use of portable EEG acquisition device.

Study design, materials and methods
  The sleep EEG was recorded at home for 2 or more continuous days in 17 older adults with nocturia and 10 adult volunteers by the portable EEG acquisition device (Proassist, Ltd., Japan). Frequency volume charts were simultaneously recorded in all those subjects.

Results
  The average ages of older adults and volunteer groups were 72.6±0.6 and 37.7±11.3 years old, respectively. The measurement of sleep EEG in older adults and volunteers were performed totally 43 and 12 times (average 2.6±1.6 times/older adult, 1.2±0.4 times/volunteer). The total number of nocturnal voiding during examination was 90 and average frequency of nocturia was 2.1±1.2 times/older adult. There were significant differences in time in bed, sleep period time, total wake time after sleep onset, deep sleep time, and sleep efficacy between older adults with nocturia and adult volunteers without nocturia. (Table 1)
  Older adults with hours of undisturbed sleep (HUS) (defined as the time between sleep onset and the first awakening to voiding) within 2 sleep cycles had longer wake time after sleep onset and shorter deep sleep time and lower sleep efficacy compared to those with HUS more than 2 sleep cycles. (Table 2)

Interpretation of results
  We objectively demonstrated with portable EEG acquisition device that not only the frequency of nocturnal voiding but also the time of awakening deteriorates the quality of sleep in older adults with nocturia.

Concluding message
  It is very important to pay attention to both the frequency of nocturnal voiding and the time of awakening for improvement of QOL in older adults with nocturia.

Disclosures
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Table 1. Comparison of sleep variables between adult without nocturia and older with nocturia

	adults without nocturia (n=10)			older with nocturia (n=17)			
age(y.o)	37.7	±	11.3	72.6	±	0.6	<0.0001
BMI							
Men/women		5/5			17/0		
Total number of measurement of sleep encepharpgram		12			43		
Average number of measurement of sleep encepharpgram	1.2	±	0.4	2.6	±	1.6	
Time in bed (min)	368	±	42	444	±	51	<0.0001
Sleep period time (min)	355	±	41	413	±	51	0.0001
Total sleep time (min)	336	±	29	319	±	51	0.221
Wake time after sleep onset (min)	20	±	19	96	±	48	<0.0001
Sleep efficacy (%)	95	±	5	74	±	19	<0.0001
REM sleep time (min)	115	±	32	100	±	29	0.214
Light sleep time (min)	159	±	24	171	±	36	0.254
Deep sleep time (min)	62	±	14	48	±	24	0.02
Length of 2 sleep cycle (min)	185	±	48	154	±	52	0.027
Deep sleep time in 2 sleep cycle/ Total Deep sleep time	0.72	±	0.23	0.89	±	0.16	0.017

Table 2. The relationships between sleep parameters and Hours of undisturbed sleep / Nocturia

	Hours of undisturbed sleep							Nocturia						
	1 or 2 sleep cycle (n=19)			> 2 sleep cycle (n=24)				0 or 1 (n=15)			≧2 (n=28)			
Time in bed (min)	458	±	57	433	±	45	n.s	432	53	±	450	±	51	n.s
Sleep period time (min)	424	±	55	405	±	47	n.s	403	54	±	419	±	50	n.s
Total sleep time (min)	306	±	54	330	±	47	n.s	331	50	±	313	±	51	n.s
Wake time after sleep onset (min)	118	±	53	79	±	37	0.009	72	33	±	110	±	50	0.01
Sleep efficacy (%)	69	±	20	79	±	18	0.003	78	22	±	73	±	18	0.032
REM sleep time (min)	95	±	35	103	±	25	n.s	97	25	±	101	±	32	n.s
Light sleep time (min)	170	±	41	171	±	33	n.s	176	35	±	168	±	37	n.s
Deep sleep time (min)	37	±	24	56	±	22	0.023	62	25	±	40	±	21	0.014