Prevalence of Sleep Disorders and their Effects on Sleep Quality in Epileptic Patients

Zohreh Yazdi[1], Khosro Sadeghniiat-Haghighi[2], Shoaib Naimian[3], Mohammad Ali Zohal[1], Mostafa Ghaniri[4]

1. Metabolic Disease Research Center, Qazvin University of Medical Sciences, Qazvin, Iran
2. Department of Occupational Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Qazvin University of Medical Sciences, Qazvin, Iran
4. General physician

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ABSTRACT

Introduction: Epilepsy is a complex pervasive neurobehavioral and social condition accompanied by a wide range of comorbid conditions that can adversely affect the quality of life of patients. Sleep complaints are common among patients with epilepsy. The aim of this study was to assess the prevalence of subjective sleep disturbances and its effects on sleep quality in epileptic patients.

Methods: In this cross-sectional study, 152 consecutive epileptic patients and 152 controls were interviewed. We used Epworth Sleepiness Scale, Insomnia Severity Index, Berlin Questionnaire and Pittsburg Sleep Quality Index to measure excessive daytime sleepiness, insomnia, obstructive sleep apnea and sleep quality. R estless leg syndrome was diagnosed using three questions.

Results: The age, gender and average total sleep time was similar in patients and control group. The frequency of excessive sleepiness scale and subjective complaint of sleep maintenance was higher in epileptic patients than control group (P<0.05). The symptoms of restless leg syndrome were reported by 32.3% of patients and 11.8% of controls (P<0.05).

Discussion: Daytime sleepiness, difficulty in sleep maintenance, poor sleep quality and RLS appear to be common in patients with epilepsy. Further confirmatory studies are needed using objective sleep studies to detect underlying mechanisms of sleep disorders in these patients.

Key Words:
Epilepsy,
Seizure,
Sleep Disorders,
Excessive Daytime Sleepiness.

1. Introduction

Epilepsy is a chronic disease that affects 0.5 to 1% of the population (Weerd et al., 2004). The recent study reported that the global adverse effects of epilepsy are high and includesg 0.5% of the whole burden of diseases of the entire world (Leonardi et al., 2002).

A survey conducted on epileptic patients confirmed that people with epilepsy tend to have lower quality of life compared with general population. In addition, people with epilepsy who reported sleep disturbances had significantly more impairment of quality of life compared to people without sleep problems (Piperidou et al., 2008; Senol et al., 2007). Both nocturnal and daytime seizures appear to affect sleep architecture and sleep quality (Kotagal et al., 2008).

The interrelationship between sleep disorders and epilepsy has been described. Type of seizures, time of seizures and antiepileptic drugs may change sleep pattern and decrease sleep quality. In turn, epileptic patients that suffer from sleep disorders may have more difficulties in seizures control (Bazil et al., 2003; Szaflarski et al., 2004; Placidi et al., 2000).

** Corresponding Author:*
Zohreh yazdi, PhD
Assistant Professor, Qazvin University of Medical Sciences, Qazvin, Iran.
Tel 0098 281 3336002 / Fax: 0098 281 3359503
E-mail: yazdizohreh@yahoo.com

In addition, some sleep disorders including periodic leg movement disorder, restless leg syndrome and other parasomnia may mimic epileptic seizures (Malow and Vaughn, 2002). Undiagnosed sleep disturbances can result in daytime drowsiness, worsening memory, and deteriorating seizure control.

Early diagnosis and treatment of coexisting sleep disorders may help to improve patient's condition and control of seizures. Therefore, understanding the prevalence of sleep disorders and its effects on sleep quality is critical for clinicians in optimizing management of the seizures (Babu et al., 2009; Foldvary-Scaefer 2002; Rocamora et al., 2008).

The results from studies on prevalence of sleep disorders in epileptic patients are contradictory. The excessive daytime sleepiness is commonly reported in patients with epilepsy (Bazil et al., 2002). The daytime sleepiness measured by Epworth Sleepiness Scale was found in 11 to 28% of patients. The cause of EDS in these patients may be due to side effects of antiepileptic drugs or to other sleep disorders, poor control of seizures and inadequate sleep (Crespel et al., 2000; Khatami et al., 2006; Vignatelli et al,. 2006). There are a few data about prevalence of insomnia, obstructive sleep apnea and parasomnias in epileptic patients but the frequency of them was reported between 10-65% in OSA, and 10-33% in parasomnias (Vaughn and D'Cruz 2003; Dyken et al., 2001).

In this cross-sectional study, we assessed the prevalence of subjective sleep disturbances and its effects on sleep quality in epileptic patients.

2. Methods

Adults 18 years or older and with a known diagnosis of epilepsy who attended our neurology clinic between September 2010 and February 2011 were approached for subjective sleep disorders. Adult family members in the same age range without a history of epilepsy who accompanied the epileptic patients were assessed in our study for subjective sleep disorders as thea control group. Subjects in control were comparable with patients in respect to age and sex. A total of 152 epileptic patients and 152 age and gender matched controls were included in this study.

Patients who had chronic respiratory disease or progressive neurological disorder and any patient or control subject with a history of shift work, were excluded from the study.

The ethical committee of Qazvin University of Medical Sciences approved this case-control study, and signed informed consent forms were obtained from all of participants.

All of the data were collected by questionnaires administered by one interviewer for both of patients and the control group. Demographic data and information about age at onset, type of seizures, seizure frequency, seizure time and duration of illness, were collected for patients' group. We collected information about participants' sleep habits: when he goes to bed, for how many hours he sleeps, and when he usually wakes up.

The validated Persian version of sleep questionnaires were used for information collection. The Persian versionss of these questionnaires have been used in previous studies.

The Epworth Sleepiness Scale consists of eight questions that subjectively evaluate urge of patients to sleep in different life situations . ESS was designed based on Likert scale rating from 0 to 3. Scores $\geq$ 10 are considered excessive daytime sleepiness (Halvani et al., 2009).

The Insomnia Severity Index is composed of seven items assessing recent problems with sleep onset, sleep maintenance, early morning awakening, and satisfaction with sleep patterns. In addition, the ISI estimates perceived impairment due to insomnia by subjects. Patients rate each item on a 0-4 scale and a total score $\geq$ 8 is considered as insomnia (sadeghniiat et al., 2008). We used Berlin questionnaire to screen sleep breathing disorder. The BQ includes eight items about snoring, daytime somnolence and history of hypertension. The patients were categorized as being at low risk or high risk of having sleep apnea (Amra et al., 2011).

The PSQI is an instrument used to measure the quality and patterns of sleep in the adults. It differentiates poor sleep from good sleep by measuring seven items: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction during the last month. Scoring of answers is based on a likert scale 0 to 3, whereby 3 reflects the negative extreme on the scale. A global score of "5" or greater indicates a poor sleep (Farrahi et al., 2012).

We diagnosed restless leg syndrome using three questions. : a) Do you have the tendency to move your legs when lying down or sitting? b) Do you feel partial relief with leg movement? c) Is your complaint about the feelings worse at night? People who responded "yes" to all three questions were considered as people who suffer from RLS (Sharifian et al., 2009).

The internal consistency of these questionnaires in our study was high with a cronbach's alpha of 0.75, 0.71, 0.82, 0.79 and 0.85, respectively.

SPSS for windows, Version 13.0 was used for data analysis. The differences in proportions between the groups were compared using Fisher's exact test and independent t test or Mann-Whitney U test. The data had non normal distribution. We used Pearson correlation coefficient to assess correlation between variables. Values were considered statistically significant at P-value<0.05.

3. Results

During the study period 152 epileptic patients were eligible for participation in our study. Control participants were recruited through people without any history of seizure, who could be age- and gender matched with epileptic patients.

The mean age of patients was 31.06±14.7 years and 85 of them (56%) were male. The mean body mass index was 24.3±4.6. The mean years of suffering from seizure were 5.3±5.7, and the average age at diagnosis was 22.6±9.4. Patients with less than one seizure per month constituted 143 (94%), and patients with more than one seizure during month comprised 8 (6%) of the patients. Only in 27 (17.7%) of patients seizures predominantly occurred during sleep.

Table 1 shows descriptive statistics off the main demographic features in epileptic patients and control group. As the table shows, there is no difference between patients and control groups in age (31.06 years vs. 28.9 years), gender, and BMI.

Of 152 epileptic patients, 98 (64.5%) had generalized epilepsy and 54 (35.5%) had focal epilepsy (34 patients with temporal lobe epilepsy and 20 patients with frontal lobe epilepsy). Prevalence of sleep disturbances were not different between patients in terms of locality in epileptogenic foci (P>0.05). Majority of epileptic patients (86.8%) were on polytherapy and. remaining (13.1%) on monotherapy. Furthermore, there was no differences between the prevalence of sleep disturbances in patients with different types of treatment regimen (P>0.05).

Table 1. Demographic features of patients and control

	Epileptic Patients	Control	P-value
Age	31.06±14.7	28.9±10.5	0.08
Male/female	85/67	94/58	0.22
Family status			
Single	59 (38.8%)	45 (29.6%)	0.09
Married	88 (57.9%)	100 (65.8%)	
Divorced	5 (3.3%)	7 (4.6%)	
Education	6.9±3.1	8.9±2.7	0.06
BMI	24.3±4.6	22.9±5.9	0.1
Occupation			
Employed	105 (69.1%)	131 (86.2%)	0.09
Unemployed	47 (30.9%)	21 (13.8%)	

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The average total sleep time in epileptic and control group was similar, as well as duration taken to fall asleep each night. After we categorized total hours of sleep during the night, number of patients with total sleep time less than 5 or more than 7 was higher statistically in epileptic patients than control group (n= 9 vs. n= 4 who asleep less than 5 and n= 19 vs. n= 6 who asleep more than 7 hours respectively).

Table 2 and 3 show and compare sleep habits and sleep disturbance for each group. As the tables show, subjective complaint of sleep maintenance (P<0.05) and, EDS (both of ESS≥ 10 and ESS≥14) was more common in patients compared with the control group. There is no difference between number of patients and controls how had low, moderate and high risk of OSA (P>0.05). The frequency of restless leg syndrome, as assessed with three questions, was higher in epileptic patients (32.3% vs. 12%, P<0.05).

The result of PSQI showed that poor sleep quality was higher in epileptic patients than control group (total score 6.2 vs. 4.3 respectively, P<0.05). Table 4 shows and compares different distinct subscales of PSQI for each group. Epileptic patients had significantly poor subjective sleep quality, longer sleep duration and more sleep disturbances during the night. Also, prevalence of daytime dysfunction was more prevalent in patients than in the control group.

Table 2. Prevalence of insomnia and excessive daytime sleepiness

	Epileptic Patients	Control	P-value
Sleep Onset Insomnia	38.1%(58)	40.1%(61)	0.081
Sleep Maintenance Insomnia	58.6%(89)	33.5%(51)	0.01
Early Morning Awakening	28.3%(43)	24.3%(37)	0.12
Isi Score ≥ 8	17.7%(27)	14.5%(22)	0.086
Epworth Sleepiness Score (≥10)	23% (35)	10.5%(16)	0.001
Epworth Sleepiness Score (≥14)	10.5%(11)	33.3%(5)	0.004
Ess Mean (range)	6.2 (4-21)	2.9 (0-9)	0.009

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Table 3. Prevalence of obstructive sleep apnea and restless leg syndrome

	Epileptic Patients	Controls	P-value
Obstructive Sleep Apnea			
Low risk	121(79.6%)	118 (77.6%)	0.29
Moderate risk	24 (15.8%)	29 (19%)	
High risk	7 (4.6%)	5 (3.3%)	
Restless Leg Syndrome	%32.3(49)	11.8%(18)	0.005

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Table 4. Results from different distinct subscales of PSQI in epileptic patients and control group

Components of PSQI	Epileptic Patients	Controls	P-value
Subjective Sleep Quality	2.1±0.9	1.4±0.5	0.03
Sleep Latency	1.1±0.5	0.9±0.4	0.62
Sleep Duration	1.8±0.7	1.4±0.3	0.021
Habitual Sleep Efficiency	1.1±0.9	0.9±0.4	0.36
Sleep Disturbances	2.3±1.2	1.1±0.5	0.004
Use of Sleep Medication	2.4±1.1	0.8±0.3	0
Daytime Dysfunction	1.8±0.8	0.7±0.4	0.038

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4. Discussion

As we saw in the results, excessive daytime sleepiness and difficulty in sleep maintenance is seen to be more prevalent in epileptic patients than the control group. However, there was no difference in terms of obstructive sleep apnea. Also, it was showed that sleep quality in epileptic patients was worse than the control group.

Most studies run on this issue indicate that prevalence of sleepiness in epileptic patients has been higher compared to the normal population. Of course, the studies show some slight differences in prevalence of EDS. These differences could be attributed to different groups of patients being studied. In some studies, a correlation has been observed between the type of medication and seizure time with sleepiness. But some other studies have showed that excessive daytime sleepiness in epileptic patients had commenced even before starting the medication (Piperidou et al., 2008; Placidi et al., 2000; Manni and Tattara 2000).

In our study there was no association between type of medication and EDS. In a study conducted on 622 epileptic patients it was demonstrated that experience of sleepiness was higher at the beginning of medication just to be followed by a reduction of that, 3 month after medication (Mattson 1989). Some studies demonstrated that EDS is higher in patients with polytherapy compared to patients with monotherapy (Manni and Tattara 2000). We did not come across any evidence of this claim which might be related to the fact that most of our patients were on polytherapy treatment.

Moreover, some studies have showed that patients with concurrent existence of other types of sleep disorders such as restless leg syndrome and obstructive sleep apnea suffer from more severe excessive daytime sleepiness (Malow et al., 1997). The findings indicate that there are complex phenomena in pathogenesis of EDS, which needs a more investigation. In our study, the prevalence of high risk patients for OSA was almost the same as the control group. Results obtained from other studies have been controversial. The instrument applied for diagnosis of OSA has been different in these studies, which might be an explanation for the difference in results. In a study that sleep apnea was diagnosed with polysomnography, it has been revealed that 10.8% of patients were suffering from sleep apnea that is similar to the results obtained from our research (Manni et al., 2003). Results from other studies that survey prevalence of OSA in epileptic patients have been different.

In a recent study, no difference was detected between epileptic patients and control group in terms of prevalence of OSA (Khatami et al., 2006 and Malow et al., 1997). In another study, 615 patients with OSA were investigated and, it became clear that the prevalence of epilepsy in these patients was 3.4% which was higher than epilepsy in normal population (Haellinger et al., 2000).

Several mechanisms have been mentioned as the causes of the increase in OSA prevalence in epilepsy. One of them is weight gain following treatment with anti epileptic drugs (Manni et al., 2003 and Tattara et al., 2000). The reason for lack of difference on OSA between patients and control group in our study could be attributed to sameness of body mass index in both groups.

In our study, patients with epilepsy had worse sleep quality likely due to the fragmentation of sleep. Results obtained from ISI questionnaire (higher prevalence of sleep maintenance insomnia in epileptic patients) and PSQI questionnaire confirmed this issue. The scores from subjective sleep quality and sleep disruption were significantly raised in epileptic patients. Our findings supported by other studies (Khatami et al. 2006, Krishnan et al. 2012)

Also due to the results of our study, the prevalence of RLS in epileptic patients was higher than the control group. There are case reports that have reported RLS in epileptic patients during taking some AEDs medication (Arico et al., 2011; Radtke 2001). However, in our study no association was found between different medication regimes and RLS syndrome, likely to be caused by lack of any considerable difference among patient's regimes of AEDs.

This study has a few limitations that need to be considered. One limitation of our study relates to the absence of objective sleep tests (polysomnography, MSLT, and MWT) to confirm suspected sleep disorders and the presence of EDS. Another limitation of our study is its retrospective design and the small sample size. Further longitudinal studies and objective sleep tests are needed to establish our findings. Also, we suggest that taking history from sleep disturbances is important in patients with epilepsy.

In sum, results from our study demonstrated the high prevalence of excessive daytime sleepiness, restless leg syndrome and poor sleep quality in patients with epilepsy. Our findings support undertaking objective sleep tests for early diagnosis of sleep disturbances in these patients. We believe that our findings have implications for both clinical and research purposes. Moreover, it seems necessary to pay more attention to diagnosis and treatment of sleep disorders in epileptic patients by physicians.

References

Amra, B., Sheikh Bahaee, F., Amini, M., Gloshan, M., Fietze, I., Penzel, T. (2011) Sleep apnea symptoms in diabetics and their first degree relatives. Int J Prev Med, 3, 95-101.

Arico, I., Condurso, R., Granata, F., Nobili, L., Bruni, O., Silvestri, R. (2011). Nocturnal frontal lobe epilepsy presenting with restless leg syndrome-like symptoms. Neurol Sci., 32, 313-315.

Babu, C.S., Satishchandra, P., Sinha, S., Subbakrishna, D.K. (2009). Co-morbidities in people living with epilepsy: Hospital based-control study from a resource-poor setting. Epilepsy Research., 86, 146-152.

Bazil, C.W. (2003). Epilepsy and sleep disturbance. Epilepsy & Behavior. 4, 39-45.

Bazil, C.W. (2002) Sleep and Epilepsy. Semin. Neurol., 22, 321-327.

Crespel, A., Coubes, P., Baldy-Mpulinier, M. (2000) Sleep influence on seizures and epilepsy effects on sleep in partial frontal and temporal lobe epilepsies. Clin. Neurophysiol., 111, 54-59.

Dyken, M.E., Yamada, T., Lin-Dyken, D.C. (2001) Polysomnographic assessment of spells in sleep: nocturnal seizures versus parasomnias. Semin. Neurolo., 21, 377-390.

Farrahi Moghaddam, J., Nakhaee, N., Sheibani, V., Garrusi, B., Amirkafi, A. (2012) Reliability and validity of the Persian version of the Pittsburg Sleep Quality Index (PTSD-P). Sleep Breath, 16, 79-82.

Foldvary-Scaefer, N. (2002) Sleep complaints and epilepsy: The role of seizures, antiepileptic drugs and sleep disorders. J. Clinic. Neurology, 19, 514-521.

Haellinger, P., Gugger, M., Hess, C.W., Bassetti, C. (2000) Epilepsy and obstructive sleep apnea. Sleep, 20, A270.

Halvani, GH., Zare, M., Mirmohammadi, SJ. (2009) The relation between shift work, sleepiness, fatigue, and accidents in Iranian industrial mining group workers. Industrial Health, 47, 134-138.

Khatami, R., Zutter, D., Siegel, A., Mathis, J., Donati, F., Bassetti, C.L. (2006) Sleep-wake habits and disorders in a series of 100 adult epilepsy patients- A prospective study. Seizure, 15, 299-306.

Kotagal, P., Yardi, N. (2008) The relationship between sleep and epilepsy. Seminars in Pediatric. Neurology, 15, 42-49.

Krishnan, P., Sinha, S., Taly, A., Ramachandraiah, C., Rao, S., Satishchandra, P. (2012) Sleep disturbances in juvenile myoclonic epilepsy: A sleep questionnaire-based study. Epilepsy & Behavior, 23, 305-309.

Leonardi, M., Ustun, T.B. (2002) The global burden of epilepsy. Epilepsia, 43, 21-5.

Malow, B.A., Vaughn, B.V. (2002) Treatment of sleep disorders in epilepsy. Epilepsy & Behavior. 3, S35-S37.

Manni, R., Tattara, A. (2000) Evaluation of sleepiness in epilepsy. Clinical Neurophy, 111, S111-S114.

Mattson, R.H. (1989) Selection of antiepileptic drug therapy. In: Levy R, -Mattson RH, Meldrum B, Penry JK, editors. Anticeptic drugs, 3rd ed. pp. 103-105.

Malow, B.A., Bowes, R.J., Lin, X. (1997) Predictors of sleepiness in epilepsy patients. Sleep, 20, 1105-1110.

Manni, R., Terzaghi, M., Arbasino, C., Sartori, I., Calimberti, A., Tartara, A. (2003) Obstructive sleep apnea in a clinical series of adult epilepsy patients: frequency and features of the comorbidity. Epilepsia, 44, 836-840.

Malow, B.A., Fromes, G.A., Aldrich, M.S. (1997) Usefulness of polysomnography in epilepsy patients. Neurology, 48, 1389-1394.

Piperidou, C., Karlovasitou, A., Triantafyllou, N. (2008) Influence of sleep disturbance on quality of life patients with epilepsy. Seizure, 17, 588-594.

Placidi, F., Scalise, A., Marciani, M.G., Romigi, A., Diomedi, M., Gili, G.L. (2000) Effect of antiepileptic drugs on sleep. Clinic. Neurophy, 111, S115-S119.

Rocamora, R., Sanchez-Alvarez, J., Salas-Puig, J. (2008) The relationship between sleep and epilepsy. The Neurologist, 14, S35-S43.

Radtke, R. (2001) Sleep disorders in neurology, 18, 77.

Senol, V., Soyuer, F., Arman, F., Ozturk, A. (2007) Influence of fatigue, depression, and demographic, socioeconomic, and clinical variables on quality of life of patients with epilepsy. Epilepsy & Behavior, 10, 96-104.

Sadeghniiat, kh., Aminian, O., Poryaghob, GH., Yazdi, Z. (2008) Efficacy and hypnotic effects of melatonin in shift work nurses: Double blind, placebo-controlled, cross over trial. Journal of Circadian Rhythm 29, 6-10.

Sharifian, A., Firoozeh, M., Pouryaghoub, GH. (2009) Restless Legs Syndrome in shift workers: A cross sectional study on male assembly workers. Journal of Circadian Rhythms 7, 12-19.

Szaflarski, J.P., Szaflarski, M. (2004) Seizure disorders, depiression, and health-related quality of life. Epilepsy. & Behavior, 5, 50-70.

Vignatelli, L., Bisulli, F., Naldi, I. (2006) Excessive daytime sleepiness and subjective sleep quality in patients with nocturnal frontal lobe epilepsy: A case-control study. Epilepsia, 47, 73-77.

Vaughn, B.V., D'Cruz, O.F. (2003) Obstructive sleep apnea in epilepsy. Clin. Chest. Med, 24, 239-248.

Weerd, A.D., Haas, S.D., Otte, A. (2004) Subjective sleep disturbance in patients with epilepsy: A questionnaire-based study on prevalence and impact on quality of life. Epilepsia, 45, 1397-1404.