Insomnia in Patients with Renal Failure Undergoing Hemodialysis.

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Abstract

Background: Sleep disorders are common among patients with kidney failure undergoing dialysis . The most frequently reported sleep disorders are insomnia , restless leg syndrome , sleep disordered breathing and excessive daytime sleepiness.

Objectives: This study was designed to investigate the rate of insomnia in patients with renal failure undergoing hemodialysis.

Method: This is cross sectional study to assess the rate of insomnia in patients with renal failure admitted to dialysis unit in Marjan Teaching Hospital . The sample composed of 88 cases (51 males and 37 females) referred for hemodialysis. The study done during the period from 18th of July 2012 to 29th of September 2012.

Our questionnaire consists of 2 parts , the first part include informations about common demographic characteristics. The second part of questionnaire include questions exploring the presence of insomnia and other sleep disorders.

Results : 57.9% of the sample were males and 42.1% were females**.** Insomnia was reported by 53.4% among 88 patients undergoing hemodialysis. Insomnia was significantly associated with age , morning hemodialysis , restless leg syndrome and presence of diabetes mellitus There was no significant association between insomnia and other variables(Body Mass Index , sex ,smoking habits and duration of dialysis).

Conclusion : The study showed high rate of insomnia and other sleep disorders among uremic patients undergoing hemodialysis and these findings need to be taken seriously from the nephrologists as sleep disturbances cause significant impairment and disabilities among uremic populations.

Key word : Insomnia , restless leg syndrome(RLS), sleep apnea, excessive daytime sleepiness, renal failure, hemodialysis.

الارق عند مرضى الفشل الكلوي الخاضعين لعلاج الغسل الدموي

الخلاصة

المقدمة: ان اضطرابات النوم شائعة بين مرضى الفشل الكلوي الخاضعين لعلاج الغسل الدموي ، ومن اكثر اضطرابات النوم المسجلة هي الارق ، متلازمة الساق القلقة ، اضطرابات التنفس اثناء النوم و الافراط في النوم خلال وقت النهار.

الأهداف: صممت هذه الدراسة لتحري نسبة الارق بين مرضى الفشل الكلوي الخاضعين للغسل الدموي.

الطريقة : هذه دراسة مقطعية لتقييم نسبة الارق لدى مرضى الفشل الكلوي الداخلين في وحدة غسل الكلية في مستشفى مرجان التعليمي . شملت العينة ٨٨ حالة (٥١ من الذكور ، ٣٧ من الاناث) محالين لغرض الغسل الدموي. تمت هذه الدراسة اثناء الفترة من الثامن العشر من تموز ٢٠١٢ الى التاسع والعشرون من ايلول ٢٠١٢. يتضمن الاستبيان في هذه الدراسة جزئين ، يتضمن الجزء الاول معلومات حول الخصائص السكانية ، ويتضمن الجزء الثاني من الاستبيان اسئلة تستكشف وجود الارق واضطرابات النوم الاخرى.

النتائج : ٥٧،٩% من العينة كانوا من الذكور ، ٤٢،١% من العينة كانت من الاناث . نسبة الارق كانت ٥٣,٤% بين ٨٨ مريض خاضعين للغسل الدموي. ارتبط الارق بشكل ملحوظ بالعمر ، الغسل الدموي خلال وقت الصباح ، متلازمة الساق القلقة وكذالك بوجود داء السكري. لم يكن هناك ارتباط بشكل ملحوظ بين الارق والمتغيرات الاخرى (دليل كتلة الجسم ، الجنس ، التدخين و مدة الغسل الكلوي).

الاستنتاج : بينت هذه الدراسة نسبة عالية من الارق واضطرابات النوم الاخرى بين المرضى المصابين بالفشل الكلوي الذين يتم علاجهم بالغسل الدموي ، ومن الضروري ان تؤخذ هذه النتائج بجدية من قبل اخصائي امراض الكلى لما تسببه اضطرابات النوم من ضعف وعجز ملحوظ بين مرضى الفشل الكلوي.

الكلمات المفتاحية : الارق ، متلازمة الساق القلقة ، توقف التنفس اثناء النوم ، الافراط في النوم خلال وقت النهار ، الفشل الكلوي ، الغسل الدموي.

Introduction

Sleep disorders are common among patients with kidney failure undergoing dialysis. The most frequently reported sleep disorders are insomnia, restless leg syndrome (RLS), sleep – disordered breathing and excessive daytime sleepiness. A patient is said to have kidney failure when kidney function less than 15ml/min/1.73 square meter. It is associated with inability to excrete waste products, control serum electrolytes and maintain fluid balance. Acute kidney injury (AKI), previously called acute renal failure (ARF), is a rapidly progressive loss of renal function, generally characterized by oliguria (decreased urine production, quantified as less than 400 ml per day [1].

Chronic kidney disease(CKD) can develop slowly and initially show few symptoms. CKD can be the long term consequence of irreversible acute disease or part of a disease progression[2]. In the early stage kidney disease , the patient may not feel sick or notice symptoms as they occur. Azotemia occurs when kidneys fail to filter properly, waste products accumulates in the blood and the body. Renal failure accompanied by noticeable symptoms is termed uremia[3].

Sleep is a state of unconsciousness in which the brain is relatively more responsive to internal than external stimuli. The predictable cycling of sleep and the reversal of relative external unresponsiveness are features that assist in distinguishing sleep from other states of unconsciousness[4]. The "switch" for sleep is considered to be the ventrolateral preoptic nucleus (VLPO) of the anterior hypothalamus. This area becomes active during sleep and uses the inhibitory neurotransmitters GABA and galanin to initiate sleep by inhibiting the arousal regions of the brain. The VLPO innervates and can inhibit the wake-promoting regions of the brain including the tuberomammillary nucleus, lateral hypothalamus, locus coeruleus, dorsal raphe, laterodorsal tegmental nucleus, and pedunculopontine tegmental nucleus. The hypocretin (orexin) neurons in the lateral hypothalamus helps stabilize this switch. When the hypocretin neurons are lost, narcolepsy can result[5]. As the function of sleep has not been fully determined, the absolute number of hours necessary to fulfill its function is still unknown. Some individuals claim full effectiveness with only 3-5 hours of sleep per night, while some admit needing at least 8 hours of sleep per night (or more) to perform effectively. Sleep deprivation is best defined at this point by group means and in terms of the tasks impaired[6] [7].

Glucose-PET studies in individuals deprived of sleep have

shown that after 24 hours of sustained wakefulness, the metabolic activity of the brain decreases significantly (up to 6% for the whole brain and up to 11% for specific cortical and basal ganglionic areas). In humans, sleep deprivation also results in a decrease in core body temperature, a decrease in immune system function as measured by white cell count and activity, and a decrease in the release of growth hormone[8]. Sleep deprivation has also been implicated as a cause of increased heart rate variability. With decreased sleep, higher-order cognitive tasks are affected early and disproportionately. Tests requiring both speed and accuracy demonstrate considerably slowed speed before accuracy begins to fail[9].Self-reported sleep quality is the subjective integration of sleep disturbances and satisfaction with sleep. Studies of patients on maintenance hemodialysis have found that 50% to 80% of dialysis patients experience some sleep complaint or excessive daytime somnolence[10].

Insomnia : Insomnia is primarily a clinical diagnosis and is most frequently diagnosed using data obtained from patient histories and sleep diaries. Insomnia is a common sleep problem, and its prevalence in the general population ranges from 4% to 64% [11]. The prevalence of insomnia is substantially greater in dialysis patients and has been reported to range from 45% to 59% [12]. Insomnia is associated with a substantial impairment in quality of life (QOL). It may cause personal distress and adverse social and economic consequences, leading to a number of deleterious effects on behavior, health, sense of well-being, enjoyment of interpersonal relationships and personal safety . Severe insomnia can impair daytime functioning and increase the occurrence of accidents [13].

Restless leg syndrome(RLS) : Restless legs syndrome is a neurologic sleep and movement disorder characterized by an irresistible urge to move, with unpleasant limb sensations occurring at rest and during the evening or night. It is one of the leading causes of insomnia and possibly the commonest movement disorder known, but remains under recognized and undertreated [14].The pathophysiology of RLS in uremia remains unknown, potential risk factors include anemia, iron deficiency, calcium/phosphate imbalance, and peripheral and central nervous system abnormalities[15].

Sleep disordered breathing(SDB) in chronic renal disease refers to an abnormal respiratory pattern (apnoeas, hypopnoeas, or respiratory effort related arousals) or an abnormal reduction in gas exchange (hypoventilation) during sleep. A definitive diagnosis is made by overnight polysomnography (PSG). However, because of significant night to night variability, a repeat PSG may be required in the setting of one normal study if a high index of suspicion is present[16]. Several uremic risk factors have been proposed to explain the pathophysiology of sleep apnea in uremic patient, Suggestion that the accumulation of ‘toxic products’ and the altered biochemical milieu may contribute to uremia-related sleep disorders stems from the observation that infusion with branched chain amino acids has been associated with (1) a return of rapid eye movement (REM) sleep to normal and (2) a significant decrease in end-tidal carbon dioxide during both REM and non-REM sleep[17].

SDB is associated with impaired quality of life in uremic patients on dialysis . SDB causes excessive daytime sleepiness which has been linked to hazardous driving and may contribute to poorer

vocational and rehabilitation potential in chronic kidney disease(CKD) patients. It has been linked with markers of cardiovascular disease in CKD. SDB in those with CKD disrupts the normal NREM sleep, attenuates the vagal modulation of heart rate, with a predominance of the sympathetic nervous system. Increased cardiac and peripheral adrenergic drive may help explain why nocturnal hypoxaemia has been associated with left ventricular hypertrophy, hypertension and increase cardiovascular events in the hemodialysis population [18,19]. The conversion from daytime to nocturnal dialysis has been associated with reduced SDB among both hemodialysis and peritoneal dialysis patients. Nocturnal hemodialysis patients undergo overnight home dialysis (6-7 times per week) has been associated with improvements in several cardiovascular risk factors including hypertension, left ventricular hypertrophy, as well as impaired left ventricular systolic function[20]. Although lifestyle management such as weight loss, cessation of smoking and avoiding caffeinated drinks and alcohol is recommended, evidence of their effectiveness is lacking in patients with CKD[21]. The mainstay of medical treatment is continuous positive pressure (CPAP) which introduces positive pressure to the upper air passages via a nasal interface, face mask or specialized oral appliance[22].

Daytime sleepiness: Subjective assessments using standardized questionnaires have demonstrated a prevalence of daytime sleepiness in 52–67% of patients with renal failure and the reversal of day/night sleep which is the cardinal feature of uremia is the best explanation of excessive daytime sleepiness[23].

Aim of the Study

To investigate the rate of insomnia in patients with renal failure undergoing hemodialysis.

Patients and Method

Study design/Study Location:

This hospital based cross sectional study was carried out in Marjan Teaching Hospital during the period from 18th of July 2012 to 29th of September 2012 . The sample composed of 88 cases (51 males and 37 females) referred to dialysis unit for hemodialysis. Informed consent was obtained from the each patient before data was collected. Inclusion criteria include : willingness and ability to participate , receiving a chronic dialysis for at least 6 months. Exclusion criteria include : refusal or inability to participate and presence of cognitive dysfunction .

Tools of the study:

The outcome variable was the insomnia (presence or absence) of patients with renal failure and the independent variables were age, gender, marital status, educational status, occupational status, past-medical history, smoking status, time and duration of dialysis, restless leg syndrome, excessive daytime sleepiness and the risk of apnea.

Our questionnaire consist of 2 parts , the first part include informations about common demographic characteristics such as name , age , gender , marital status, education level, and employment. Data regarding past medical history , medications, some information about patient's lifestyle (i.e. smoking ,Body Mass Index, daily intake of coffee or alcohol) are also included in the questionnaire.

The second part of questionnaire include questions exploring the presence of sleep disorders.

To diagnose insomnia International Classification of Sleep Disorders(

ICSD-2)definition was used (difficulty in falling a sleep, waking up too early , frequently awakening with difficulty in falling asleep again, secondary daytime impairment related to night time sleep difficulties) .

Other tools in this study :

- International restless leg syndrome study group for the clinical diagnosis of restless leg syndrome.
- Epworth sleeping scale to assess excessive daytime sleepiness.
- Berlin questionnaire to assess the risk of obstructive sleep apnea .

Statistical analysis :

Statistical analysis was carried out using SPSS version 18. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as means with their 95% confidence interval (CI). The Pearson's chi-square test (x^2) was used to determine the associations between categorical variables. Independent sample t-test was used to compare means between two groups. Binary Logistic regression was used for multivariate analysis. A p-value of < 0.05 was considered as statistically significant.

Results

About 160 patients with renal failure (acute and chronic) were attending dialysis unit in Marjan Teaching Hospital . Only 88 patients were included in our study . The overall mean age of patients who sit for renal dialysis was 53.14 ± 13.92 years. Out of 88 patients , 47 patients (53.4%) were complaining from insomnia. Figure 1 shows the distribution of insomnia according to age, majority (89.4%) of patients who aged more than 60 years old have insomnia, meanwhile insomnia were only in (10.6%) of those who aged less than 60 years (X^2 =12.551, df=1 p< 0.001).. Majority (53.2%) of patient with insomnia were female (X^2 =0.034, df=1 p= 0.853) (Figure 2).

Table 1 shows the association of insomnia with marital, educational and occupational status. There was no significant association between insomnia and these independent variables. (89.4%) (44.7%) (85.1%) of patients with insomnia were married, had primary school as a level of their education and unemployed respectively.

Patient's Past-Medical History and Life Style :

Only (42.6%) of patients with insomnia had history of diabetes mellitus, meanwhile (29.8%) of patients with insomnia had history of hypertension and only (23.4%) of patients with insomnia had both history of diabetes mellitus and hypertension (Table 2). Majority (80.9%) of patients with insomnia were non-smokers (Table 2).

Figure 3 shows the distribution of insomnia according to BMI, there was no significant association between insomnia and BMI and only (46.8%) of patients with insomnia were obese. Alcohol dependence and coffee intake are not reported among our patients.

Time and Duration of renal dialysis :

There was significant association between insomnia and time of renal dialysis, majority (78.7%) of patients with insomnia were doing renal dialysis at morning shift. Hemodialysis for more than 1 year was reported among 53.2% of uremic patients with insomnia , there was no significant association between insomnia and duration of renal dialysis (Table 3).

Association between insomnia and other sleep disorders :

There was only significant association between insomnia and RLS. (51.1%) (48.9) (57.4) of patients with insomnia have RLS , have excessive daytime sleepiness and were at high risk of apnea respectively (Table 4).

Logistic regression analysis:
Table 5 shows the logistic regression analysis. Only four independent variables showed significant contribution to the model (age, educational status, past-medical history and RLS). The strongest predictor of reporting insomnia was past-medical history. Patients with past-medical history of diabetes mellitus were 73 times more likely to report insomnia than those with hypertension, hypertension plus diabetes mellitus or with negative past-medical history. Patients who aged ≥ 60 years old were 22 times more likely to report insomnia. In addition, patients with primary school as their level of education were 10 times more likely to report insomnia than patients with other educational levels (illiterate, secondary school and university), as well as insomnia 10 times more in patients with RLS.

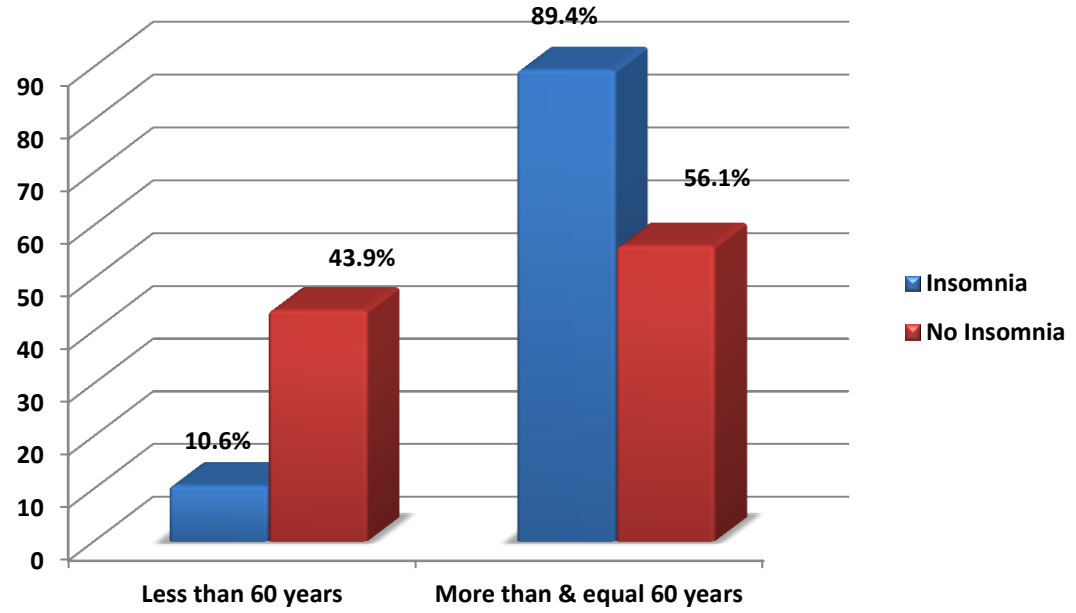

Figure 1 Distribution of Insomnia according to age.

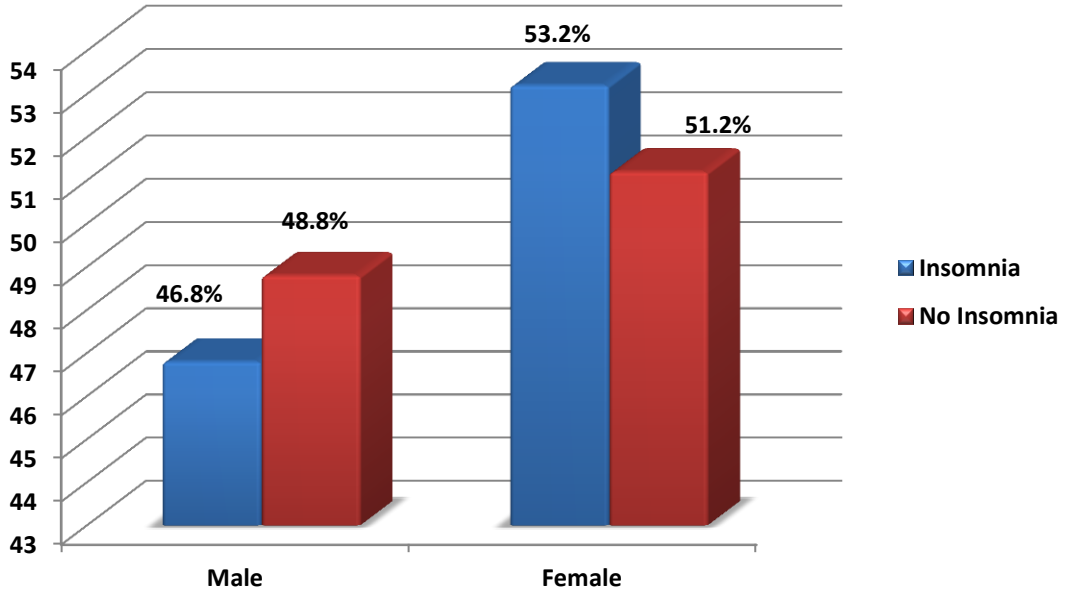

Figure 2 Distribution of Insomnia according to sex

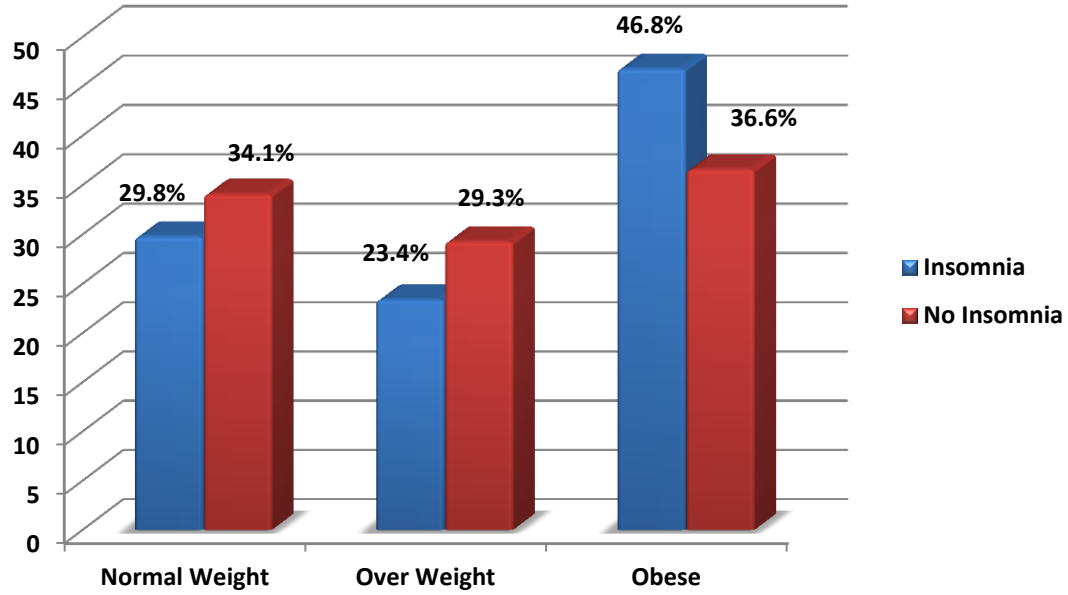

Figure 3 Distribution of Insomnia according to BMI

Table 1 Association of insomnia with marital, educational and occupational status

Variable	Insomnia			χ^2	df	*P* values
	No (%)	Yes (%)	Total (%)			
Marital status						
Single	3 (7.3)	4 (8.5)	7 (8.0)	0.050	2	0.975
Married	37 (90.2)	42 (89.4)	79 (89.8)			
Widow	1 (2.4)	1 (2.1)	2 (2.2)			
Educational status						
Illiterate	19 (46.3)	15 (31.9)	34 (38.6)	5.554	3	0.135
Primary school	14 (34.1)	21 (44.7)	35 (39.8)			
Secondary school	8 (19.5)	7 (14.9)	15 (17.0)			
University	0 (0.0)	4 (8.5)	4 (4.5)			
Occupational status						
Unemployed	34 (82.9)	40 (85.1)	74 (84.1)	0.078	1	0.780
Employed	7 (17.1)	7 (14.9)	14 (15.9)			

* Significance level p value < 0.05, df : degree of freedom

Table 2 Association of insomnia with patient's past-medical history and smoking status

Variable	Insomnia			χ^2	df	*P* values
	No (%)	Yes (%)	Total (%)			
Past-medical history						
No history of any disease	8 (19.5)	2 (4.3)	10 (11.4)	11.119	3	**0.011***
Hypertension	17 (41.5)	14 (29.8)	31 (35.2)			
Diabetes mellitus	6 (14.6)	20 (42.6)	26 (29.5)			
Hypertension & diabetes mellitus	10 (24.4)	11 (23.4)	21 (23.9)			
Smoking status						
Non- smoker	34 (82.9)	38 (80.9)	72 (81.8)	0.063	1	0.801
Smoker	7 (17.1)	9 (19.1)	16 (18.2)			

* Significance level p value < 0.05

Table 3: Association of insomnia with time and duration of dialysis

Variable	Insomnia			χ^2	df	*P* values
	No (%)	Yes (%)	Total (%)			
Time of dialysis						
Morning	22 (53.7)	37 (78.7)	59 (67.0)	6.125	2	**0.045***
afternoon	13 (31.7)	7 (14.9)	20 (22.7)			
Evening	6 (14.6)	3 (6.4)	9 (10.2)			
Duration of dialysis						
6 months- year	23 (56.1)	22 (46.8)	45 (51.1)	0.756	1	0.385
More than 1 year	18 (43.9)	25 (53.2)	43 (48.9)			

* Significance level p value < 0.05

Table 4: Association between insomnia and other sleep disorders

Variable	Insomnia			χ^2	df	*P* values
	No (%)	Yes (%)	Total (%)			
RLS						
No	36 (87.8)	23 (48.9)	60 (68.2)	13.626	1	**<0.001***
Yes	5 (12.2)	24 (51.1)	28 (31.8)			
ESS						
Enough sleep	23 (56.1)	20 (42.6)	43 (48.9)	1.999	2	0.368
Average sleep	4 (9.8)	4 (8.5)	8 (9.1)			
Very sleepy and should seek medical advice	14 (34.1)	23 (48.9)	37 (42.0)			
Apnea						
Low risk	20 (48.8)	20 (42.6)	40 (45.5)	0.343	1	0.558
High risk	21 (51.2)	27 (57.4)	48 (54.5)			

* Significance level p value < 0.05

Table 5 Logistic regression analysis

Predictors	Regression Coefficient (β)	S.E.	Wald Test	df	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Age								
≥ 60 years	3.090	0.976	10.031	1	**0.002***	21.985	3.248	148.820
Gender								
Female	0.880	0.815	1.165	1	0.280	2.411	0.488	11.921
Marital status								
Single			1.228	2	0.541			
Married	1.900-	2.327	0.666	1	0.414	0.150	0.002	14.324
Widow	3.564-	3.217	1.228	1	0.268	0.028	0.0	15.490
Educational status								
Illiterate			7.145	3	0.067	17.920	2.052	156.45
Primary School	2.886	1.106	6.814	1	**0.009***	10.175	0.809	127.93
Secondary School	2.320	1.292	3.226	1	0.072	3.586	0.0	0.0
university	24.303	17892.19	0.0	1	0.999		0.043	3.578
Occupational status								
Employed	0.937-	1.129	0.690	1	0.406	0.392	0.043	0.0
Past-medical history								
Negative history	2.758	1.590	8.077	3	0.044			
Hypertension	4.290	1.641	3.011	1	0.083	15.775	0.700	355.73
Diabetes mellitus	2.268	1.509	6.834	1	**0.009***	72.949	2.926	1818.7
Hypertension + Diabetes mellitus			2.259	1	0.133	9.659	0.502	185.93
Smoking status								
Smoker	0.305	0.994	0.094	1	0.759	1.357	0.193	9.517
Duration of dialysis								
More than 1 year	0.338-	0.761	0.198	1	0.657	0.713	0.161	3.168
RLS								
Yes	2.304	0.882	6.819	1	**0.009***	10.017	1.777	56.472
ESS								
Enough sleep			0.279	2	0.870			
Average sleep	0.651-	1.357	0.230	1	0.631	0.521	0.036	7.454
Very sleepy and should seek medical advice	0.074	0.751	0.010	1	0.921	1.077	0.0247	4.689
Apnea								
High risk	0.328-	0.812	0.163	1	0.686	0.720	0.147	3.536
BMI								
Normal weight			0.654	2	0.721			
Over weight	0.578	1.027	0.316	1	0.574	1.782	0.238	13.327
Obese	0.786	0.983	0.638	1	0.424	2.194	0.319	15.076
Time of dialysis								
Morning shift	0.669-		0.504	2	0.777			
Afternoon shift	0.336-	0.943	0.503	1	0.478	0.512	0.081	3.252
Evening shift		1.331	0.064	1	0.801	0.715	0.053	9.709
Constant	5.794-	2.847	4.141	1	0.042	0.003		

Discussion

To our knowledge, this hospital based cross sectional study is the first study carried out in Babylon government and may be in Iraq to assess the rate of insomnia and other sleep disorders among uremic patients undergoing hemodialysis. The sample included 88 cases (51 males and 37 females) referred to dialysis unit in

Marjan Teaching Hospital for hemodialysis.

Our data showed high rate of insomnia 53.4% among patients undergoing hemodialysis which is lower than the results of other study done in Saudi Arabia [24], this difference is probably due to lower prevalence of restless leg syndrome in our study (31.8%) and less duration of dialysis (more than 12 months in 48.9% of patients). Our results also compared with the study of Sabbatini et al[25]who reported that 45% of patients with end stage renal disease were affected by insomnia.

The result of the present study confirming the strong impact of this specific complaint in dialysis patients and the greater daytime consequences than in the general population like tiredness on awakening, morning headache and transient concentration disturbances, as a result the nephrologists should investigate the sleep complaints of all patients on dialysis therapy, since the above symptoms could be the manifestation of insomnia and other sleep disorders rather than a direct consequences of dialysis.

Sabbatini et al [25] reported a higher prevalence of insomnia in females and older patients, and these findings compared with our results, females were more strongly affected than males, (53.2%) of patient with insomnia were female (X^2 =0.034, df=1 p= 0.853) and majority (89.4%) of patients who aged more than 60 years old have insomnia. Sleep complaints seem to be more common in elderly patients on dialysis than in younger patients [26]. The sleep changes in old age population also contribute to the complaints of insomnia in uremic patients especially reduction in slow wave sleep (particularly stage 4 sleep) and rapid eye movement sleep, increased night time wakefulness and reductions in total night time sleep and increase in sensitivity to environmental stimuli that disrupt sleep. In addition , restless leg syndrome(RLS) is more prevalent among elderly uremic patients which could be an important cause of insomnia among this age group.

42.6% of patients with insomnia had history of diabetes mellitus, and although most of diabetic patients were on antidiabetic medications they still had symptoms and complications of diabetes (frequent urination at sleeping time and painful peripheral neuropathy) which also interfere with normal sleep in patients with renal failure.

Eating habits , sedentary life style and unemployment (84.1% of patients were unemployed) are a contributory factors to increasing weight. Our results showed no significant association between insomnia and Body Mass Index (BMI) but still a high number of patients are above the normal range of BMI.

We reported a higher rate of insomnia among patients on morning dialysis shift and this is the same finding of Sabbatini et al[25]; however , in other study [24] , those with the afternoon dialysis had a higher rate of insomnia than any other shift. Majority of our patients are undergoing hemodialysis during morning time and the prevalence of restless leg syndrome was higher among them , and this may reflect the higher rate of insomnia at morning shift.

(53.2%) of patients with insomnia were doing renal dialysis for more than 1 year duration, there was no significant association between insomnia and duration of renal dialysis, while Sabbatini et al **[**25**]** reported an association between longer duration of dialysis and insomnia.

Regarding restless leg syndrome (RLS), we confirm its

significant association with insomnia and it is compared with findings of Al-Jahdali[24]. The prevalence of RLS was 31.8% in all studied patients and 51.1% in patients with insomnia and this findings is lower than results of other studies [24],[25]. Nearly all our patients were receiving erythropoietin and iron supply which has been used to treat underlying anemia and RLS and this may explain the lower prevalence of this syndrome.

Excessive daytime sleepiness has been reported in dialysis patients who complaining from insomnia using Epworth Sleepiness Scale (ESS), 48.9% of patients with insomnia also suffering from daytime somnolence. Up to 50% of uremic patients who complained of insomnia also had excessive daytime sleepiness compared to 12% in control subjects[27]. It is not surprising to find such results as tiredness, fatigue and sleep deprivation at night are the usual consequences of insomnia. The pathogenesis of daytime somnolence is likely to be multifactorial and may be share with other uremia-associated sleep disorders[28].

Risk of apnea in patients with renal failure was assessed using Berlin Questionnaire, 54.5% of the total patients were at high risk of apnea using the above screening tool .
This percentage is higher than result of other study done in Italy [29].
Obesity, older age, volume overload and presence of other medical illnesses like diabetes mellitus, are all risk factors predispose uremic patients to high risk of apnea.

The main limitations of this study are the small number of patients included in our survey in addition our questionnaire did not include questions that investigated the presence of other psychiatric disorders like depression which can be a cause of insomnia and tiredness among uremic patients.

The present work studied the most prevalent sleep disorders among patients with renal failure undergoing dialysis. Other sleep disorders like narcolepsy, sleep walking and bruxism are also need to be investigated and searched out among uremic patients, so more studies needed regarding this issue and the nephrologists should become aware and familiar with the above sleep disorders.

References

1- Klahr S, Miller S. "Acute oliguria". N Engl J Med 338.1998(10): 671–5.
2- National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. Am J Kidney Dis. 2002; 39 (2 Suppl 1) : S1-266.
3- Dr Per Grinsted . "Kidney failure (renal failure with uremia, or azotaemia)".2005
4- Siegel JM. Clues to the functions of mammalian sleep. Nature. October 2005; 437(7063):1264-1271.
5- Siegal JM, Moore R, Thannickal T, et al. A Brief History of Hypocretin/Orexin and Narcolepsy. Neuropsychopharmacology. 2001; 25: S14-S20.
6- Banks S, Dinger DF. Behavioral and Physiological Consequences of Sleep Restriction. Jounal of Clinical Sleep Medicine. August 2007; 3 (5): 519-528
7- Bonnet MH, Arand DL. We are chronically sleep deprived. Sleep. Dec 1995;18(10):908-11.
8- Moldofsky H. Sleep and the immune system. Int J Immunopha-rmacol. Aug 1995; 17 (8): 649-54.
9- Gomes AA, Tavares J, de Azevedo MH. Sleep and Academic Performance in Undergraduates: A Multi-measure, Multi-predictor Approach. Chronobiol Int. Nov 2011; 28(9):786-801

10- Unruh M, Hartunian M, Chapman M, Jaber BL. Sleep quality and clinical correlates in patients on maintenance hemodialysis. Clin Nephrol. 2003;5 9 (4): 280-288.
11- Leger D, Guilleminault C, Dreyfus JP, Delahaye C, Paillard M: Prevalence of insomnia in a survey of 12,778 adults in France**.** J Sleep Res 2000, 9 (1): 35-42.
12- Iliescu EA, Yeates KE, Holland DC: Quality of sleep in patients with chronic kidney disease**.** Nephrol Dial Transplant 2004, 19(1):95-9
13- Roth T: Insomnia: definition, prevalence, etiology, and consequences**.** J Clin Sleep Med 2007, 3 (5 Suppl):S7-10.
14- Trenkwalder C, Hogl B, Winkelmann J. Recent advances in the diagnosis, genetics and treatment of restless legs syndrome. J Neurol 2009; 256: 539–53.
15- Gigli GL, Adorati M, Dolso P et al. Restless legs syndrome in end-stage renal disease. Sleep Med 2004; 5: 309–315.
16- Meyer TJ, Eveloff SE, Kline LR . One negative polysomnogram does not exclude obstructive sleep apnea. Chest 1993; 103: 756–760.
17- Soreide E, Skeie B, Kirvela O et al. Branched-chain amino acid in chronic renal failure patients: respiratory and sleep effects. Kidney Int 1991; 40: 539–543.
18- Shayamsunder AK, Patel SS, Jain V, Peterson RA, Kimmel PL. Sleepiness, sleeplessness, and pain in end-stage renal disease: distressing symptoms for patients. Semin Dial 2005; 18 : 109-18.
19- Zoccali C, Mallamaci F, Tripepi G. Traditional and emerging cardiovascular risk factors in end-stage renal disease. Kidney Int 2003; 85 (Suppl) : S105-10.
20- Chan CT, Floras JS, Miller JA, Richardson RM, Pierratos A. Regression of left ventricular hypertrophy after conversion to nocturnal hemodialysis. Kidney Int 2002; 61 : 2235-9.
21- Shneerson J, Wright J. Lifestyle modification for obstructive sleep apnoea. Cochrane Database Syst Rev 2001; (1).
22- Hanly P. Sleep apnea and daytime sleepiness in end-stage renal disease. Semin Dial 2004; 17: 109–114.
23- Hughes JR. Correlations between EEG and chemical changes in uremia. Electroencephalogr Clin Neurophysiol 1980; 48: 583–594.
24- Al-Jahdali et al. Insomnia in chronic renal patients on dialysis in Saudi Arabia . Journal of Circadian Rhythms 2010, 8:7.
25- Sabbatini M, Minale B, Crispo A et al . Insomnia in maintenance haemodialysis patients . Nephrol Dial Transplant 2002 ; 17: 852-856.
26- Kutner , NG; Bliwise , DL ; Brogan , D and Zhang , R. Race and restless sleep complaint in older chronic dialysis patient and nondialysis community control . J Gerontol B Psychol Sci Soc Sci ; (2001) 56 (3) :170-175.
27- Holley JL, Nespor S, Rault R . A comparison of reported sleep disorders in patients on chronic hemodialysis and continuous peritoneal dialysis . Am J Kidney Dis 1992; 19: 156-161.
28- Parker KP,Sleep disturbances in dialysis patients . Sleep Med Rev 2003; 7:131-143.
29- Giovanni M. , Antonella P. Sleep disorders in patients with end-stage renal disease undergoing dialysis therapy. Nephrol Dial Transplant 2006;21:184-190.