Sleep Disorders in Chronic Renal failure Patients: A Polysomonographic Evaluation

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Abstract

Sleep disorders are common complaints in end stage chronic renal disease patients whether under heamodialysis or not. The present study included 10 end stage renal disease patients on regular heamodialysis (group I) and 10 chronic renal insufficiency patients not starting dialysis yet (group II). Patients were subjected to clinical history including that of sleep disorders, clinical examination, relevant laboratory investigations as well as an over night polysomnography. The study revealed that both heamodialysied and non heamodialysied chronic renal failure patients had reduced sleep efficiency, increased sleep latency, with very prevalent sleep apnea mainly obstructive type. No significant differences has been found on the rest of the parameters related to disorderd sleep breathing between the two groups. Possible explanations for the findings have been suggested and future prospective evaluation studies are recommended.

Introduction Disordered sleep patterns with "day-night reversal"(night time insomnia, excessive day time somnolence and associated symptoms of headache, depression and decreased mental activity) are common in dialysis patients (Kimmel et al (1989) and Mendelson et al (1990)). Symptomatic patients when examined by polysomnography have a high probability of having the sleep apnea syndrome. The detrimental clinical effects of sleep apnea include arterial oxygen desaturation, cardiac athythmais, pulmonary hypertension and systemic hypertension (Parish and Sheperred, 1990). Also, untreated sleep apnea may prevent long term haemodialysis patients from fully achieving maximal rehabilitation and improvement in quality of life (Kimmel et al, 1989). Probable causes include the effect of chronic metabolic acidosis, the high incidence of hypertension, effect of a uraemic toxins on the sensitivity of respiratory control centres and perhaps are increased incidence of anatomical upper airway narrowing.

Optimcal management is undefined; conventional modalities such as nasal cont inuous positive airway pressure seem to be effective (Pressman, 1993).

The aim of the present study is to evaluate sleep patterns in chronic renal failure patients with and without heamodialysis , with special emphasis on sleep related respiratory problems in those patients.

Materials and Methods: The study included 10 end stage renal disease patients on regular haeuodiaysis (Group I) and 10 chronic Renal insufficiency patterns not stuting dialysis get (Group II). Group I included 8 females and 2 males, aged from 17 to 60 years, while Group II included 7 males and 3 females, with ages ranging from 13 to 63 years.

All patients were subjected to full clinical history especially that of sleep disorders, clinical examination, laboratory investigations including serum creatinine, BUN and blood haemoglobin, ECG and chest X-ray. All night polysomnography was done for all patients in Ain Shams University Psychiatric Institute.

Arterial blood gas assessment was done on the day (morning) next to polysomnograhpy. Patients of group I had their polysomnograhpy over the night following their haemodialysis session.

Results: a)Demographic, clinical and laboratory data: These are shown in the following table (table I).
b) Disordered breathing events and desaturation:
sleep apnea has been found in all patients of group I(under haemodialysis) and of patients of group II(not on haemodialysis).
The following table illustrates the disordered breathing events in the two groups (table II)
c)Sleep pattern:
The following table illustrates the sleep pattern in the two groups (table III)

Discussion: The results of the present study do confirm that sleep disturbance (including abnormal sleep pattern and sleep apnea) is very common in the entire end stage renal disease population, either those on regular heamodialysis or those not starting heamodialysis yet. This is consistent with what had been found by other studies as those by Kimmel et al (1989).

Patients under heamodialysis were found to have less sleep efficiency, higher sleep latency and higher percentage than undialysed patients, meaning that sleep tends to have a poorer quality under the effect of heamodialysis , or at least no improvement in sleep patterns is expected to occur with heamodialysis in chronic renal failure patients. This finding does not go with what had been found by Strub et al (1982) who reported that underdialysied patients were more likely to complain of disturbed sleep. However, abnormal sleep architecture had been documented by electroencephalogram in presumably well dialyzed patients with end stage renal disease, as reported by Passourt et al (1968).

Sleep apnea was found highly prevalent in patients with end stage renal failure, with and without heamodialysis , with positive correlation between apnea and serum creatinine in both groups and between apnea and BUN in haermopatients only Fien et al (1987) suggested that dialysed sleep disorders associated with chronic renal disease may be mediated by the effect of ureamic toxins on the central nervous system resulting in excessive reduction of circulatory muscle tone during sleep, instability of respiratory control secondary to central effects of uraemic or airway narrowing secondary to volume overload. If such an explanation was true, one would subsequently expect amelioration of sleep complaint and normalization of sleep profile, with treatment of those patients with end stage renal disease. However, in the present study no significant difference was found between both groups (with and without heamodialysis), regarding apnea and desaturation events, which means that a better treatment for rather than that provided by out patient-heamodialysis may be requested. Sever anemia, which is routinely found in uraemic patients, has been shown to enhance the peripheral chemoreceptor mediated response to transient hypoxia (Sartiago et al 1975), thus potentially increasing the instability of the vertilatory control systems (Longobordo et al, 1982). This finding was not supported by Millman et al, (1985) who found little correlation between haematocrite valve and sleep disorders breathing index. The same also was found in our study which showed no correlation between hemoglobin and number of desaturation.

The overall conclusion from the present study is that disturbed sleep is a common complication of anemia that

Table I Demographic, clinical and Laboratory data

Variable tested	Group1 Mean	SD	GroupII Mean	SD	T-value	P-value
Age	42 years	14	40.88 years	11.88	0.3199	0.3765 NS
Weight	62.8421 kgs	11.6869	66.3 kgs	13.8	1.2549	0.1133 NS
Systolic b1/P	1.35.789 mmHg	20.9	138.8 mmHg	23.6	0.6023	0.2775 NS
Diastolic b1/P	84.2 mgHg	12.1	86.6 mgHg	15	0.8277	0.2097 NS
Haemoglobin	8.78 gm\dL	1.996	9 gm\dL	1.87	0.5740	0.2868 NS
S .creatinine	8.968 mg\dL	4.679	10.76 mg\dL	5.74	1.6656	0.0571 NS
Blood urea N BUN	117.94 mg\dL	55	112.7 mg\dL	63.6	0.3789	0.3547 NS
pH 0.0146	7.326 mg\dL	0.0621	7.29 mg\dL	0.064	2.3181	Significant
Pco BUN	33.5 mgHg	4.247	34.4 mgHg	5.19	0.8889	0.1933 NS
Duration of HD in G 1 only	5.55 months	3.8				

* Data expressed as mean ±st.D

* P-value is non significant if >0.05

*Bun blood urea nitrogen B1/P= blood pressure H.D. Heamodalysis (for group I only)

Table II Disordered Breathing Events and Desaturation

Variable tested	Group1		GroupII		T-value	P-value
	Mean	SD	Mean	SD		
Central apnea per night	0.9	1.6	0.8889	0.928	0.0984	0.4164 NS
Mixed apnea per night	35.4	21.7	37	39	0.0984	0.4164 NS
Obstructive apnea per night	49.7	41.1	51.3	32.8	0.0949	0.4628 NS
Total apneas +hypopneas DBEs per night	189.8	94.29	201.2	65.8	0.3026	0.3829 NS
Mean duration event in seconds	20.5	2	20.33	3.16	0.1386	04457 NS
Percent of duration of all events to TST	27.38	19.2	28.73	13	.01774	0.4306 NS
SDB index	46.2 \hour	29.3	51.5 \hour	22.5	0.4422	0.3319

* Data expressed as mean ± standard deviation (St.D)
* DBEs = Disordered breathing events=Number of apneas and hypopneas/night
*TST = Total sleep time
*SDB = Sleep disorderes breathing index = number of apneas and hypopneas/hour sleep.
* P-value is non significant if >0.05

Table III Sleep Pattern

Variable tested	Group1 Mean	Group1 SD	Group II Mean	Group II SD	T-value	P-value
Percent of stage 3,4 to TST	18.76	5.3	15.36	6.35	1.2579	0.111
Percent of stage 1,2 to TST	43.83	10.82	58.2	6.24	3.513	<0.01 significant
Percent to REM to TST	37.3	9.36	27.1	7	2.5651	<0.01 significant
Sleep efficency means as percent of TST	54	21.84	59.1	20	0.5291	0.3018 NS
Sleep latency	64.10	22.73	60.27	16.08	0.4184	0.3405
Total number of arousal	6.4	89	10.2	13.24	0.7697	0.2240 NS

* TST = Total sleep time
* P-value is insignificant if >0.05

cannot be effectively treated by conventional heamodialysis. A prospective study for patients with chronic renal failure before and after heamodialysis is recommended for better assessment of the role of treatment in affecting the accompanying sleep disturbance.

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اضطرابات النوم فى مرض الفشل الكلوى المزمن : تقييمها باستخدام جهاز تخطيط النوم المتعدد

تعتبراضطرابات النوم من الشكاوى الشائعة فى مرض الفشل الكلوى المزمن سواء الذين يعالجون بغسل الدم أو من لم يبدأوه بعد. وقد شملت هذه الدراسة مجموعتين: الأولى ضمت عشرة مرضى بالفشل الكلوى المزمن يعالجون بغسل الدم المنتظم و الثانية ضمت عشرة مرضى بالفشل الكلوى لم يبدءوا الغسيل بعد.

وقد تم تدوين التاريخ التفصيلى لهؤلاء المرضى متضمنا ما يتعلق باضطرابات النوم مع فحص اكلينيكى كامل و الأبحاث المعملية التى لها علاقة بالموضوع مع فحص بجهاز تخطيط النوم المتعدد.

و أظهرت النتائج أن مرضى الفشل الكلوى سواء الذين بدأوا غسيل الدم أو من لم يبدأوا بعد لديهم كفاءة نوم منخفضة و زيادة فى تأخر النوم مع أنتشار عالى لتوقف التنفس أثناء النوم خاصة الناتجة عن ضيق مجارى التنفس.