Polysomnographic Characteristics of Depression

Lotaief F.; Ghanem M.; Ashour A.; Asaad T. and Abdel-Samei A.

Abstract

20 patients suffering from a depressive episode diagnosed according to ICD 10 Research Diagnostic Criteria aged from 20-50 years of both sexes and not under drugs or ECT, were divided into 2 groups. The first group included mild cases while the second included moderate and severe cases. The control group-10 individuals- matched the studied group as regards to age and sex. The cases were subjected to full psychiatric examination, Hamilton scale for depression and an over night Polysomnogram. The results showed decreased sleep efficiency, shortened REM latency in both groups compared to the control group, decreased SWS % in moderate and severe cases only. Sleep disturbances were more obvious with severe cases and those with psychotic features. Shortened REM latency was not specific for depression as it occurs with other psychiatric disorders. More significant findings are prolonged first REM period, increased REM density and higher REM sleep proportion in the first half of the night which need further evaluation. So, sleep studies in depression may add to the diagnosis and help in prediction of prognosis as regards quick evaluation of treatment efficacy and prediction of recurrence.

Introduction: Major depression is a common disorder and is reported to have a life time prevalence of 8-12 percent in men and 20-26 percent in women (Benca, 1994).

Disturbed sleep is characteristic of patients with mood disorders and most patients with major depression complain of insomnia. Specific features may include difficulty falling asleep, early morning awakening, decreased total sleep and disturbing dreams (Claghorn et al, 1981).

The discovery of rapid eye movement sleep by Aserinsky and Kleitman in 1955 initiated the era of sleep research. Standardization of terminology and techniques for polysomnographic recording and scoring have been documented in (Rechtschoffen & Kales, 1986) since then, many sleep researches have been done in different laboratories for different psychiatric disorders. Studies in depressed patients revealed polysomnographic abnormalities which may include; disturbed sleep continuity, shortened rapid eye movement latency and reduced slow wave sleep (Benca et al, 1992).

Sleep studies in major depression may add to the diagnosis by detecting occult primary sleep disturbance as sleep apnea which may hinder the treatment of depression (Kaplan, 1992). Also it may help in the management via manipulation of the sleep-wake cycle as REM deprivation which can be used as an adjuvant to pharmacologic treatment (Sandyk, 1992).

The aim of this study is to identify the sleep patterns in depression disorder in patients with different severities.

Subjects and Procedures: Twenty patients suffering from a depressive episode (according to the ICD 10 criteria)

were selected from outpatients and inpatients at the Institute of Psychiatry, Ain Shams University, according to the following parameters:
1. Age between 20-50years.
2. Both sexes were included.
3. All patients were not on drugs or ECT for at least 2 weeks.
All patients were subjected to:
-Full psychiatric sheet according to the Institute of Psychiatry, sheet model.
-The severity of the episode was specified according to the ICD 10 Research Diagnostic Criteria and through the Hamilton Scale for depression.
- An over night polysomnogram.(PSG)

The patients were compared to a control group of 10 individuals with no evident psychiatric disorder and matched as regards age and sex. The control individuals were also subjected to an over night polysomnogram.

The subjects were classified into 3 groups:

Group I: The control group (5 males and 5 females). Mean age was 37.7±7.58 years.
Group II: Mild depression episode group. 6 individuals (2 male and 4 females). Mean age was 39.6±9.91 years.
Group III: moderate and severe depressive episodes group 14 individuals : 12 moderate and 2 severe cases (9 males and 5 females). The mean age was 39.3±7.96years.

The apparatus of PSG used Sleep Trace 2000 with built-in analysis capabilities. Its compact 30 Lb. weight and 16 channel recording capabilities enables the unit to be portable.

The PSG was scored for sleep stages following the traditional stage scoring definitions introduced originally by Rectshaffen and Kakes (1968).

The capabilities of the PSG are those of data acquisition, data review, data analysis and report generation. Report generated by the unit includes apean analysis, sleep analysis and sleep efficiency index (total sleep time to total recording time, sleep latency, re latency, percent of REM sleep, stage I, II, III and IV to total sleep time and number of arousal).

8 electrodes at least are needed to determine sleep stages: 2 central scalp electrodes to record an EEG 2 an outer centhi of the eyes to record eye movements (EOG), 2 chin electrodes to record mentalis EMG and 2 reference electrode in the ear lobes. Many more electrodes are usually required as sensors that measure respiratory rate and breath-by-breath air flow, an oxymeter, and surface EMG leads over the right and left tibialis anterior muscles. After electrode application, the subjects retires to in a relatively quiet and comfortable bedroom, separate from equipment room but connected to it electronically and by an intercom system.

Discussion of Results: Over the past 20 years, numerous studies have documented sleep alterations in endogenous depression (Linkowski and Mendlewicz, 1993).
Sleep abnormalities in depression have been grouped into three general categories.
1. Sleep continuity disturbances:
Claghorn et al, (1981) stated that most patients with major depression complain of insomnia. In our study 90% of cases had sleep complaints. However the 10% with no sleep complaints showed reduced sleep efficiency on polysomnographic study.

Many studies confirmed that depressed patients showed decreased sleep

efficiency (Gresham et al, 1965; Waller et al, 1989; Mendlewicz and Kerknofs, 1991), this was consistent with our results that sleep efficiency was significantly reduced in all groups of patients (mild, moderate and severe) in comparison to control group. This may be attributed to prolonged sleep latency, increase wakefulness during sleep and early morning awakening.

2. SWS deficits:
Decreased amount of SWS was described by Kupfer et al, (1985). Meanwhile our results showed that SWS% was significantly reduced in moderate and severe cases but not in mild cases which agree with Lauer et al, (1991) who stated that not all groups of depressed patients showed this abnormality.

3. REM Sleep abnormalities:
Over the years, reduced REM latency has proved to be one of the most robust and specific features of sleep in depressed patients (Benca et al, 1992). our results showed that REM latency was significantly reduced in all groups of patients in comparison to the control group. Its reduction was more in the moderate and severe groups than the mild group but the difference was notsignificant. one of the other reported abnormalities in the REM sleep was increased percentage of REM sleep (Emslie et al, 1990). Although in our study, there was no significant difference in REM % between the depressed group and control group.

The diagnostic utility of polysomnography in mood disorders is dependent on the sensitivity and specificity of the sleep abnormalities. Short REM latency showed sensitivity up to 70% (Giles et al, 1990). In this work 50% of cases showed shortened REM latency in contrast to control who did not show any REM latency abnormality. Although many patients with depressive episode showed significant sleep abnormalities, so other psychiatric patients (Benca et al, 1992).

Schizophrenic and major depressive disorder patients showed no difference in REM latency, although it was shorter than control group (Zarcone et al, 1987). Obsessive compulsive patients, too, have been reported to have a shorter REM latency than normals (Insel et al, 1982) as well as some borderline patients too (Bell et al, 1983).

So, patients with other psychiatric disorders required to be taken as a control group to determine the specificity of sleep abnormalities in depression. The fact that reduced REM latency can be found in patients with other psychiatric disorders may lead to the speculation that, presence of short REM latency may signify the presence of a concomitant depressive illness or it may indicate common biological factors in different disorders .

Moreover, other REM sleep signs must be included, as prolonged first REM period, increased REM density and higher REM sleep proportion in the first half of the night (Cartwright, 1993) which may be more specific for depression and not shared with other psychiatric disorders.

Kupfer and Frank, (1984) showed that severly ill patients, particularly those with psychotic features, had more significant sleep abnormalities. This was consistent with our results as the group of moderate and severe cases showed significant reduction in SWS% while the mild group didn't.

Although, there was no statistically significant difference in REM latency, REM sleep % and SWS % between the

two groups of depressed patients, the two severe cases showed the shortest REM latencies among all cases, in addition to increased REM sleep % and decreased SWS %. It seemed that the non-significant difference between the two groups could be attributed to the small number of severe cases.

Moreover, we found that REM sleep % was significantly higher and REM latency was significantly shorter in patients with psychotic features than those without.

In addition, the only case with severe depressive episode with psychotic features showed the shortest REM latency, the lowest SWS % and the highest REM sleep % among all cases. These results may suggest that the severity of illness and the presence of psychotic features were associated with more significant sleep abnormalities but owing to the small number of cases generalization is not possible.

Our results showed that patients with retardation showed significant reduction in sleep efficiency than those without. on the other hand, Kumar et al, (1987) and other studies stated that clinical ratings

Table (1) Sleep Pattern in different groups

	group I	group II	group III	T &P value between group I & group II	T &P value between group I & groupIII
Stage I %	1.88 ± 1.48	2±0.63	2.73±1.97	0.19 / 0.86	1.15 / 0.26
Stage II %	51.34±5.74	53.87±7.33	54.05±7.35	0.77 / 0.46	0.97 / 0.34
Slow wave Sleep %	19.73±3.79	16.82±4.81	16.15±3.2	1.35 / 0.19	2.25 / 0.03*
REM %	27.14±5.37	28.83±9.35	27.37±9.95	0.46 / 0.65	0.07 / 0.95
REM Latency	74.95±18.22	56±10.31	55.43±20.65	2.31 / 0.04*	2.39 / 0.03 *
Sleep efficiency	77.76±11.4	61.42±13.66	59.04±11.41	2.58 / 0.02*	3.96 / 0.001*
SWS latency	41.96±20.68	66.17±42.89	47.93±22.94	1.15 / 0.28	0.51 / 0.62
No. of arousal	38.5±81.05	20.33±12.03	27±37.83	0.54 / 0.59	0.47 / 0.65

P = significant (<0.05)

Table (2) Apnea and Hypoapnea profiles in different groups

Variable	Group I	GroupII	GroupIII	T value between group I & II	T value between group I &III
Apnea/ night	217.4 ±121.03	140.33 ±147.9	127.71 ±83.63	1.14	2.15 *
Apnea/ hour	38.2 ±13.27	20.53 ±17.38	23.46 ±13.73	1.86	2.08
Total obstructive apnea	213.8 ±125.05	116 ±150.87	111.71 ±81.08	1.39	2.43*
Total mixed apnea	3.6 ±6.3	23.33 ±44.71	16.39 ±20.09	1.14	1.93
Total central apnea	———	0.33 ±0.82	0.36 ±0.49	1.32	2.26*
A+H per hour	52.94 ±15.95	38.75 ±24.47	44.24 ±22.12	1.11	0.8
A+H Total	433 ±104.26	249.67 ±229.25	249.5± 135.24	1.64	2.74*
No. of desaturations	98 ±189.25	61.33 ±36.48	66.67 ±49.94	0.04	0.39
% of desaturations	15.82 ±27.46	46.25 ±87.59	12.85 ±12.15	0.74	0.32
Desaturation /hour	18.8 ±34.52	9.22 ±3.47	11.52 ±10.72	0.68	0.73
Mean desaturation	94.4 ±2.6	86.67 ±20.92	93.64 ±3.03	0.81	0.5

Table (3) Correlation between duration of illness and sleep parame-

Variables	Duration of illness	
	r-value	p-value
Stage II %	0.027	0.887
Slow wave S%	0.202	0.393
REM %	-0.265	0.258
Sleep efficiency	-0.017	0.941
REM latency	0.286	0.221
No. of arousals	-0.133	0.574
Apnea/night	0.135	0.568

P-value insignificant if >0.05
No significant correlation between duration of illness and sleep parameters

of depression did not significantly correlate with sleep abnormalities.

Giles et al, (1989) failed to find correlations between overall duration of illness and severity of sleep disturbances. This work, could not define also correlation between duration of illness, and REM latency, SWS % or REM % or any other sleep parameter.

Giles et al, (1990) did not find more significant REM latency reductions in patients suffering from recurrent versus single episode of depression, which was consistent with our findings. In contrast Kupfer et al, (1991) suggested that more significant REM abnormalities were associated with the recurrent episodes .

Our study showed no significant differences in sleep parameters between patients with positive family history of mood disorder and those without, between patients with sleep complaint and those without and between patients with suicidal tendency and those without. These findings may suggest that these clinical symptoms don't correlate with sleep abnormalities. In contrast, Giles et al, (1986) have shown that specific symptoms particularly, terminal insomnia is more strongly associated with reduced REM latency in patients with endogenous depression.

Dahl et al, (1991) studied groups of children with major depressive disorder and age-matched control group and proved that group differences for sleep variables were not significant.

Delvenne et al, (1992) observed an increase in stage 1 sleep and a decrease in REM sleep in adolescents with major depression. In contrast, Kutcher et al, (1992) found highly significant shortening of REM latency as well as longer sleep latency but no other significant polysomnographic measures between endogenously depressed adolescents from age-matched controls. In our study the base age limit was 20 years, we excluded

Table (4) Clinical data in relation to sleep pattern

Variable tested	Stage II%				Slow wave sleep %				REM				REM-latency				Apnea/ night				No. of arousal				Sleep efficency			
	Mean	SD	T	P	Mean	SD	T	P	Mean	SD	T	P	Mean	SD	T	P	Mean	SD	T	P	Mean	SD	T	P	Mean	SD	T	P
Family H - ve	54.123	7.987	0.23	0.820	16.546	3.667	0.11	0.913	27.32	10.46	0.39	0.699	60.846	23.873	0.03	0.975	123.866	114.595	0.56	0.479	19.133	14.966	1.46	0.162	60.82	11.248	0.69	0.500
+ve	53.34	4.308			16.760	3.878			29.03	6.814			61.20	7.302			154.40	58.539			42.60	59.811			56.56	14.219		
Agitation -ve	53.968	7.486	0.03	0.975	16.225	3.76	0.92	0.369	28.35	9.947	0.49	0.629	61.95	20.22	0.43	0.674	126.0	105.65	0.47	0.645	27.75	35.3	0.76	0.458	60.225	13.185	0.35	0.73
+ve	54.100	6.576			18.10	2.962			25.675	8.676			56.875	25.672			153.5	96.625			14.00	8.446			57.875	2.735		
Retardation - ve	54.866	6.803	0.94	0.359	16.913	3.324	0.66	0.518	26.04	8.715	1.16	0.262	64.213	18.635	1.24	0.231	133.266	113.187	0.13	0.898	26.80	35.503	0.43	0.675	63.153	9.972	2.53	0.021*
+ve	51.380	8.317			15.66	4.717			32.061	1.721			51.10	25.912			126.20	73.329			19.60	20.428			49.56	11.860		
Psychotic feature -ve	54.95	6.238	1.91	0.072	17.122	3.307	2.10	0.050	26.305	7.990	2.36	0.03*	65.011	19.892	3.22	0.005 *	128.833	105.977	0.34	0.738	23.611	32.969	0.57	0.575	59.655	11.886	0.11	0.914
+ve	45.40	12.021			11.90	3.818			41.401	5.415			24.25	18.738			155.50	94.045			37.50	26.163			60.65	15.627		
Past hist of dept -ve	55.36	6.20	0.85	0.408	16.80	2.802	0.63	0.536	26.82	8.287	0.46	0.654	60.05	21.202	0.19	0.855	125.50	72.704	0.25	0.802	33.3	41.854	1.17	0.257	60.79	11.718	0.38	0.706
+ve	52.63	8.076			17.12	4.391			28.811	1.031			61.82	21.424			137.50	130.282			16.7	16.214			58.72	12.430		

REM % in patients with psychotic features was significantly higher than that of patients without psychotic features P<0.05

REM latency was also significantly shortened in patients with psychotic features than that of patients witjout psychotic features P<0.05
Sleep efficiency was significantly lower in patients with retardation than that of patients without. P <0.05

children and adolescents. So further studies of different age groups are recommended to verify their sleep characteristics.

Regarding sleep apnea, there was no statistically significant differences between patients and control groups, even it was higher in the controls. However, OSA is associated with symptoms that may be confused with symptoms of depression (Wiegand and Zwillich, 1994). In addition, OSA causes predominantly REM sleep disturbances. So discovering associated sleep apnea in cases of chronic or resistant depression and trying to treat it may make it easier to treat the depressive disorder.

Reduced REM latency has been shown to be a positive sign for response to tricyclic antidepressants and also a positive sign for spontaneous recovery (Cartwright et al, 1991) . Moreover, The amount of REM sleep suppression during the first night of treatment with tricyclic antidepressants was correlated with the eventual antidepressant response (Goetz et al, 1987)

In addition, short REM latency appeared to be correlated with earlier recurrence of illness (Giles et al,1987).

From the above, it could be suggested that although diagnosis of depression can not be made solely on the basis of polysomnographic data, sleep studies can help in different ways .It may help in diagnosis of an occult primary sleep disorder as sleep apnea which causes fatigue and poor concentration during the day which are also symptoms of depression. Also sleep studies have a prognostic utility which may be suggested from their ability to aid in predicting response to antidepressant therapy .Thus playing a role in evaluating potential treatment efficacy more quickly than the clinical approach.

Moreover, sleep studies could predict an early recurrence of illness which may be useful in consideration of prophylactic treatment .

References

Bell J.; Lycakill; Jones D. et al (1983): Effect of preexisting borderline personality disorder on clinical and EEG sleep correlates of depression. Psychiatry Research, g 115-123.

Bencd R.M.; Obermeyer W.H.; Thisted R.A. et al (1992): Sleep and Psychiatric disorders: A meta analysis. Arch Gen. Psychiatry, 49:651-668.

Cartwrgiht R.D. (1993): Sleeping problems. In: Symptoms of depression. A wiley-interscience publication. Costello C.G. (ed.). New York.

Cartwright R.; Kravitz H.; Eastman C. et al. (1991): REM latency and the recovery from depression: Getting over divorce. Am. J. of Psychiatry, 148: 1530-1535.

Claghorn D.L.; Mathew R,J.; Weinman, M.L. et al. (1981): Daytime sleepiness in depression. J. Clin Psychiatry, 42:342-343.

Dahl R. ; Ryan N. ; Birmaher B. et al. (1991): Electro encephalographic sleep measures in prepubertal depression Psychiatry Res., 38:201-214.

Delvenne V.; Kerlhofs M. Appleyboom-Fondu J. et al. (1992): sleep polgraphic variable in Anorexia nervosa and depression. A comparative study in adolescents J. Affective Disorder, 25:167-172.

Emslie G.J.; Rush A.J,; Weinberg W.A. et al (1990): Children with major depression show reduced rapid eye movement latencies, Arch. Gen. Psychiatry, 47:119-124.

Giles D.E.; Roffwarg H.P.; Schlesser M.A. et al. (1986): Which endogenous depression symptoms relate to REM latency reduction? Biol. Psychiatry, 21:473-482.

Giles D.E.; Jarrett R.B.; Roffwary H.P. et al. (1987): Reduced rapid eye movement latency: A predictor of recurrence in depression Neuropsyho pharmacology, 1:33-39.

Giles D.E.; Elzel B.A., Reynolds; C.F. et al (1989): Stability of polysomnographic parameters in unipolar depression: A cross-sectional report. Biol. Psychiatry, 25:807-810.

Giles D.E.; Roffwarg H.P. and Rush A.J. (1990): A cross-sectional study of the effect of depression on REM latency Biol, Psychiatry, 28:697-704.

Goetz R.R.; Puig-Antich J; Ryan N. et al. (1987): Electroencephalograph sleep of adolescents with major depression and normal controls. Arch Gen. Psychiatry, 44:61-38.

Inseh T.; Gilin J.; Moore A. et al (1982): The sleep of patients with obsessive compulsive disorder. Archives of General Psychiatry, 39:1372-7.

Kaplan R. (1992): Obstructive sleep apnea and depression diagnostic and treatment implications. Aust-NZJ Psychiatry, 26(4) :586-591.

Kumar A.; Shipely J.E.; Eiser A.S. et al (1987): Clinical correlates of sleep onset REM periods in depression. Biol. Psychiatry, 22:1477-1481.

Kupfer D.J. and Frank E. (1984): The relation of EEG sleep to vital depression. J. Affect Disorder, 7:249-263.

Kupfer D.J.; Ulrich R.F.; Coble P.A. et al ((1985): Electroencephalograph sleep of younger depressives. Arch Gen. Psychiatry, 42:806-810.

Kupler D.J.; Ehlers G.L.; Frank E. et al (1991): EEG sleep profiles and recurrent depression. Biol. Psychiatry, 30:644-655.

Kutcher S. Williamson P.; Marton P. et al (1992): REM latency in endogenously depressed adolescents. Brit. J. Psychiatry, 161:399-402

Lauer C.J.; Riemann D.; Wiegand M. et al (1991): From early to late adulthood: Changes in EEG sleep of depressed patients and healthy volunteers. Biol. Psychiatry, 29:979-993.

Linkowski P. and Mendlervicz J. 1 (993): Sleep electroencephalogram and rhythm disturbance in mood disorders. Current Opinion in Psychiatry, 6:35-37.

Mendleuiecz J. and Kerkhofs M. (1991): Sleep electroencephalogram in depressive illness: A collaborative study by the World Health Organization. Br J. Psychiatry, 159:505-509.

Rechstschaffer A. and Kales A. (1968): A manual of understanding terminology and scoring systems for sleep stages of human subjects. Los Angelos- UCLA brain information service. Brain Research Institute.

Sandgk R. (1992): Melatonin and maturation of REM sleep. Int. J. Neurosci, 63 (1-2)P 105-114.

Wiegand, L. and Zuillich C.W. (1994): Obstructive sleep apnea. Dis Mon 40 (40):197-252.

Zarcone V.P. Jr; Benson K.L. and Berger P.A. (1987): Abnormal rapid eye movement latencies in schizophrenia. Arch lGen. Psychiatry, 44:45-48.

Authors

Lotaief F.
Professor of Psychiatry, Ain Shams University, Institute of Psychiatry.

Ghanem M.
Assistanr Professor of Psychiatry. Ain Shams University.

Ashour A.
Professor of Psychiatry, Ain Shams University, Institute of Psychiatry

Abdel-Samei A.
Resident , Institute of Psychiatry

Asaad T.
Dept. of Psychiatry. Ain Shama University

Address of Correspondance

Lotaief F.
P. O. Box 22 Deir El Malak, Cairo, 11657

خصائص النوم لدى مرضى الإكتئاب

اشتملت هذه الدراسة على ٢٠ حالة تعانى من مرض الإكتئاب تم تشخيصهم تبعا للتقسيم العالمى العاشر للأمراض النفسية وتراوحت أعمارهم بين ٢٠-٥٠ سنة من الأناث و الذكور. و تمت دراسة جميع الحالات قبل بدء العلاج الدوائى أو الجلسات الكهربائية. تم تقسيمهم الى مجموعتين مجموعة تشمل الإكتئاب الخفيف و المجموعة الأخرى تشمل الإكتئاب المتوسط و الحاد.
وقد تم مقارنة الحالات بعينة ضابطة مكونة من ١٠ أشخاص ليس لديهم أى مرض نفسى و تتفق مع مجموعة المرضى من حيث السن و النوع.
تم عمل الآتى لجميع الحالات:
فحص نفسى كامل
مقياس هاملتون للإكتئاب
دراسة للنوم من خلال اجهزة معمل النوم
و قد أسفرت النتائج عن قلة كفاءة النوم و قصر الفترة بين الدخول فى النوم وبدء النوم المصحوب بحركة العين السريعة فى كلا من مجموعتي المرضى بالمقارنة مع المجموعة الضابطة بينما أسفرت عن قلة كمية النوم غير المصحوب بحركة العين السريعة فى مجموعة الإكتئاب المتوسط و الحاد.
و من هنا فإن اضطرابات النوم تظهر بصورة واضحة فى حالات الإكتئاب الشديد ة و كذلك الحالات المصحوبة بأعراض ذهانية. و لا تعتبر قصر الفترة ما بين الدخول فى النوم و بدء النوم المصحوب بحركة العين علامة مميزة لمرضى الإكتئاب حيث وجدت فى امراض نفسية آخرى و من هنا فهنالك حاجة لمزيد من الدراسات لتحديد بعض الأضطرابات الأخرى والتى تبدو أكثر تمييزا لمرض الإكتئاب مثل طول الفترة الأولى للنوم المصاحب لحركة العين السريعة و زيادة كمية نفس النوع من النوم فى النصف الأول من الليل و زيادة نسبة حركة العين السريعة . و من هنا فإن دراسة النوم فى مرض الإكتئاب قد تضيف الى التشخيص كما انها تساعد فى التنبؤ بمآل المرض من حيث التقييم السريع لكفاءة العلاج و توقع النكسات