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Evaluation of polysomnography changes in patients using antidepressants

Mehmet Kara[1], Soner Kılıç[2]

[1]Department of Medical Pharmacology, Kayseri City Hospital, Kayseri, Turkey
[2]Department of Neurology, Kayseri City Hospital, Kayseri, Turkey

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ABSTRACT

Aim: In patients followed up with sleep disorders and receiving antidepressant treatment, the choice of antidepressant should be appropriate to the characteristics of the patient and the drug. The aim of this study is to show the effects of antidepressant drug selection on polysomnography results.

Material and Method: This study was planned retrospectively and was conducted by scanning patient files. Between 01.06.2018 and 01.06.2022, the files of patients who underwent polysomnography in the sleep laboratory of our hospital and were using antidepressants were scanned. Differences between antidepressant groups and polysomnography results were analyzed with IBM SPSS v23.

Results: 103 patients (43 women/60 men) were included in the study. It was determined that 56 of these patients used selective serotonin reuptake inhibitors and 47 of them used serotonin and norepinephrine reuptake inhibitors. Yates correction was used in the comparison of gender according to the groups, and there was no statistically significant difference between the distributions of gender according to the groups (p=0.248). According to the drug groups, the results of the polysomnography examined in the study do not differ according to the groups.

Conclusion: It was shown that the antidepressant groups examined in the study did not differ in terms of affecting the results of polysomnography. Other clinical characteristics of the patient can be taken into account in the selection of antidepressants in these groups.

Keywords: Polysomnography, antidepressants, serotonin, norepinephrine

INTRODUCTION

Polysomnography, during sleep; It is the process of recording many neurophysiological, respiratory, cardiovascular physiological and physical parameters during the night, at a certain period, simultaneously and continuously. Polysomnography is the gold standard test used in the diagnosis of many sleep disorders, especially sleep breathing disorders (1). With polysomnography, electrical signals produced by different tissues of the human body are recorded and visualized through electrodes and sensors (2).

Sleep is not a homogeneous process. It is divided into two stages, REM and NREM sleep, which show quite different characteristics in terms of neurochemical, electrophysiological and neurobiological aspects. The word REM is formed from the initials of the words "rapid eye movement". The characteristic feature of the REM period is rapid eye movements. NREM sleep is also divided into three substages, N1, N2, and N3. In a healthy adult, sleep begins with NREM (3). The onset of sleep with REM is pathological. An individual who goes to sleep at night passes from awake to Stage N1 within 15-20 minutes at the latest. Stage N1 is a short transitional period and continues with Stage N2. After this stage, sleep deepens and Stage N3 begins. This NREM process, which lasts around 90-100 minutes and gradually deepens, is followed by the first REM period, which lasts no more than 3-5 minutes. NREM and REM then continue in cycles of about 90-110 minutes throughout the night, and there are usually 4-6 NREM-REM cycles per night of sleep. It is pathological that the first REM period occurs earlier than 30 minutes. Another feature of these cycles is the decrease of NREM deep sleep from the first half of sleep to the second half of sleep and the prolongation of REM sleep (4). The first half of sleep is dominated by NREM deep slow sleep, while the second half of sleep is

Corresponding Author: Mehmet Kara, dr.mehmetkara@hotmail.com
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dominated by REM sleep. The graph showing the change of sleep stages over time is called a hypnogram. Sleep follows a certain sequence within itself and changes NREM / REM periods as it progresses. (5-6).

The use of antidepressant drugs began in the 1950s with monoamine oxidase inhibitors and tricyclic antidepressants. Since it has been suggested that the beneficial effect of antidepressants may be due to their ability to block noradrenaline and/or serotonin reuptake, pharmaceutical companies are exploring potential antidepressants for neurotransmitter reuptake blocking. Partly as a result of this consideration, agents have been developed that can specifically block noradrenaline reuptake, serotonin reuptake, or both (7).

The choice of antidepressant is based on the person's medical history. Drug safety, side effect profile, tolerability and drug interaction potentials should be considered; because these variables directly affect participation in treatment (8).

The selection of antidepressants in patients with sleep disorders should be in accordance with the characteristics of the patient and the drug. In this study, it was examined whether the antidepressant drugs used by the patients and the results of polysomnography were related by retrospective file scanning.

MATERIAL AND METHOD

This retrospective study was carried out in a tertiary hospital with a total of 1607 beds and also includes 253 intensive care beds. Between 01.06.2018 and 01.06.2022, the patient files who underwent polysomnography in the sleep laboratory of the neurology clinic of our hospital were scanned. This research was approved by the local Ethics Committee (Date: 30.06.2022, Number: 661). No funds were used from any institution. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The files of those using antidepressants were selected from these patients. Patients were divided into 2 groups as those using selective serotonin reuptake inhibitors (SSRI) and those using serotonin and norepinephrine reuptake inhibitors (SNRI). The present study was designed retrospectively and no additional tests or blood tests were performed on the patients. Polysomnography results; Age, Total recording time (min), Total time in bed (min), Sleep period time (min), Total sleep time (min), Sleep activity (%), Sleep onset time (min), Waso (min), Rem latency (min) (after onset of sleep), Rem latency (min) (after lights off), N1(min), N2(min), N3(min), R(min) were recorded. Differences between antidepressant groups and polysomnography results were analyzed.

Exclusion criteria from the study; Patients under the age of 18, insomnia patients, patients using hypnotic and sedatives were determined as patients with irregular sleep due to shift work. Patients aged 18 and over and who had previously undergone polysomnography in the sleep laboratory of the Neurology clinic and who also used antidepressants were included in the study.

Statistical Analysis

Data were analyzed with IBM SPSS V23. Conformity to the normal distribution was evaluated using the Shapiro-Wilk test. Yates correction was used to compare gender by groups. Independent two-sample t-test was used to compare normally distributed data according to paired groups, and Mann-Whitney U test was used to compare non-normally distributed data. Analysis results mean ± s for quantitative data. Categorical data as deviation and median (minimum – maximum) were presented as frequency (percentage). Significance level was taken as $p<0.050$. Significance level was taken as $p<0.050$.

RESULTS

103 patients (43 women/60 men) were included in the study. It was determined that 56 of these patients used SSRI and 47 of them used SNRI (**Table 1**).

Table 1. Comparison of gender by groups

	SSRI	SNRI	Test is.	p*
Gender			1.333	0.248
Women	20 (35.7)	23 (48.9)		
Men	36 (64.3)	24 (51.1)		

* Yates fix

There was no statistically significant difference between the distributions of gender according to the groups. (p=0.248).

The differences between the antidepressant groups and polysomnography results are shown in **Table 2**.

The mean age values did not differ according to the groups (p=0.846). While the mean value was 45.6 in the 2 group, the mean value was 46.1 in the 1 group. The median values of the total recording time did not differ according to the groups (p=0.123). While the median value was 405.0 in the SNRI group, the median value was 396.8 in the SSRI group. The median values of total time in bed did not differ according to the groups (p=0.223). While the median value was 402.9 in the SNRI group, the median value was 396.8 in the SSRI group. The median values of sleep period duration did not differ according to the groups (p=0.253). While the median value was 370.5 in the SNRI group, the median value was 365.5 in the SSRI group. The median values of total sleep time did not differ according to the groups (p=0.431). While the

Table 2. Comparison of quantitative data by groups

	SNRI		SSRI		Test is.	p
	average ± SS	median (Min - Max)	average ± SS	median (Min - Max)		
Age	45.6±12.3	46 (22-71)	46.1±12.2	48 (18-71)	0.195[2]	0.846
Total recording time (min)	471.6±492.9	405 (246.6-3767.1)	394.8±32.2	396.8 (259.4-463.9)	1082.500[1]	0.123
Total time in bed (min)	399.2±41.2	402.9 (246.6-457.1)	394.8±32.2	396.8 (259.4-463.9)	1131.500[1]	0.223
sleep period duration (min)	351.8±73.1	370.5 (74.5-432)	348.7±52.6	365.5 (222.5-458)	1143.000[1]	0.253
Total sleep time (min)	298.6±85	307 (35.5-430.5)	313.4±68.6	325.3 (113-422.5)	1435.500[1]	0.431
sleep activity (%)	78.2±13.4	77.3 (39.1-95.5)	79.4±13.3	82.8 (47.8-99.4)	1370.500[1]	0.721
sleep start time (min)	47.2±69.1	30.5 (3-352.5)	39±34.9	33.5 (1-185.5)	1347.500[1]	0.837
Waso (min)	53±38.8	46.2 (1.2-157.8)	45±42.4	34.5 (1.2-230.1)	1101.500[1]	0.157
REM latency (after sleep onset)	195.9±84.6	198.5 (52.6-345)	245.2±459.5	180.3 (21.5-3253)	879.000[1]	0.470
rem latency (after lights off)	229.3±86.4	229 (76-388)	214.6±79.1	215.5 (66.5-357)	882.500[1]	0.488
N1 (min)	4.7±2.4	4.1 (1.1-12.8)	4.6±3	3.9 (0.7-16.6)	1239.000[1]	0.612
N2 (min)	49±15.3	48.8 (6.9-76.4)	50.3±10.2	51.3 (22.6-71.8)	0.488[2]	0.627
N3 (min)	14.4±10	12 (0-41.4)	15.6±7.9	15.9 (0-37.8)	0.656[2]	0.513
R (min)	11.2±9.1	9.9 (0-37)	9.6±7.6	9.1 (0-31.3)	1217.500[1]	0.516

1Mann Whitney U test, 2Two independent samples t-test, Mean ± s. deviation, median (minimum – maximum)

median value was 307.0 in the SNRI group, the median value was 325.3 in the SSRI group. The median values of sleep efficiency did not differ according to the groups (p=0.721). While the median value was 77.3 in the SNRI group, the median value was 82.8 in the SSRI group. The median values of sleep onset time (min) did not differ according to the groups (p=0.837). While the median value was 30.5 in the SNRI group, the median value was 33.5 in the SSRI group. Waso (min) median values did not differ according to the groups (p=0.157). While the median value was 46.2 in the SNRI group, the median value was 34.5 in the SSRI group. Median values of rem latency (after onset of sleep) did not differ between groups (p=0.47). While the median value was 198.5 in the SNRI group, the median value was 180.3 in the SSRI group. Median values of rem latency (after lights off) did not differ between groups (p=0.488). While the median value was 229.0 in the SNRI group, the median value was 215.5 in the SSRI group. N1 median values did not differ according to the groups (p=0.612). While the median value was 4.1 in the SNRI group, the median value was 3.9 in the SSRI group. N2 mean values did not differ according to the groups (p=0.627). While the mean value was 49.0 in the SNRI group, the mean value was 50.3 in the SSRI group. N3 mean values did not differ according to the groups (p=0.513). While the mean value was 14.4 in the SNRI group, the mean value was 15.6 in the SSRI group. R median values did not differ according to the groups (p=0.516). While the median value was 9.9 in the SNRI group, the median value was 9.1 in the SSRI group.

DISCUSSION

Sleep; It is a state of unconsciousness that can be reversed with various environmental stimuli such as sound, light, and contact. An average of one-third of human life is spent in sleep (9-10). PSG is a test used in the diagnosis of sleep disorders such as respiratory arrest, snoring, and periodic leg movements during sleep (11).

There was no statistically significant difference between the polysomnography results determined in the present study and the antidepressant groups. However, the most different value from the polysomnography results compared to the two antidepressant groups was found in the WASO (wake after sleep onset) value. WASO; It is the sum of the waking hours in the time period from the onset of sleep until the last awakening. It is obtained by subtracting sleep latency from the total wakefulness time. Any technical malfunctions or the time spent by the patient in the toilet are also included in this statement. It is important in terms of showing sleep continuity and divisions. In this study, while the median value was 46.2 in the WASO, SNRI group, the median value was 34.5 in the SSRI group. It is an important finding in terms of showing that the patient group using SNRI has more sleep continuity and fragmentation.

In addition, REM latency after the onset of sleep and REM latency after the lights were turned off, a shorter time (in minutes) was determined in the SSRI group in both parameters. We see that the SSRI group is more effective in terms of sleep efficiency (%). It was determined that the total sleep time was higher in the SSRI group.

Insomnia is a common psychiatric disorder that severely affects the daily lives and quality of work of affected individuals (12). Psychiatric disorders, particularly anxiety and mood disorders, are a common cause of insomnia symptoms (13-14).

It is well known that certain classes of antidepressant drugs can impair sleep quality, mainly due to activation of serotonergic 5-HT2 receptors and increased

noradrenergic and dopaminergic neurotransmission. The most prominent among them are SNRI, norepinephrine reuptake inhibitors, monoamine oxidase inhibitors, SSRI and tricyclic antidepressants. It is important to note that SSRIs in particular can cause disruption of sleep continuity, which is clinically expressed as increased insomnia complaints. Increased amounts of serotonin are likely responsible for the effects on REM sleep. The effect of the SSRI and SNRI group on sleep appears to be related to the increase in noradrenergic neurotransmission and activation of serotonergic 5-HT2 receptors. It significantly suppresses REM sleep, and this effect may decrease in the later stages of treatment (15). Commonly, SSRIs and SNRIs can be used for the clinical treatment of depression and insomnia. However, their role in the treatment of insomnia in patients with anxiety and mood disorders is controversial. It has been shown that SSRI treatment can lead to anxiety and insomnia (16-17).

In contrast, it showed that antidepressant treatment initially resulted in lower sleep quality, but resulted in greater improvement in sleep duration several weeks later and when used at lower doses. In the present study, similar to other studies, patients' sleep efficiency decreased, WASO and rem latency increased, stage 3 and rem sleep decreased (18-19) . However, as a limitation of the study, we should state that the doses and duration of use of antidepressants used by our patients were not specified in our study.

SSRI and SNRI are drugs used to treat depression. Sleep disturbances are an integral feature of depressive disorders. It ranges from hypersomnia to difficulties in maintaining sleep (20-21). Difficulties in maintaining sleep are evaluated as early onset of the first episode of REM sleep and increased phasic REM sleep in polysomnography.

Similarly, the early onset of the first episode of REM sleep was shortened in both groups.

The sleep efficiency of the patients was decreased and it was 77% and 82% in the SSRI and SNRI groups, respectively. Waso and REM latency increased in both groups. The ratio of stage 3 sleep and REM sleep time to total sleep time decreased (22).

CONCLUSION

In this study, which was presented in patients who preferred SSRI or SNRI in their current treatment, no superiority or difference was detected in their negative effects on sleep. Placebo-controlled randomized studies are needed for the labels of SSRI and SNRI group drugs on polysomnography results in order to guide the choice of antidepressants in patients with sleep disorders.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Kayseri City Training and Research Hospital Clinical Researches Ethics Committee (Date: 30.06.2022, Number: 661).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

1. Gülbay B, Acıcan T. Obstrüktif uyku apne sendromunda medikal tedavi. Turkiye Klinikleri Journal of Pulmonary Medicine Special Topics 2008; 1: 120.
2. Berry RB, Gamaldo CE, Harding SM, et al. AASM Scoring Manual Version 2.2 Updates: New Chapters for Scoring Infant Sleep Staging and Home Sleep Apnea Testing. J Clin Sleep Med 2015; 11: 1253-4.
3. Lee KA. An overview of sleep and common sleep problems. ANNA J 1997; 24: 614-23, 77; quiz 24-5.
4. Goh DY, Galster P, Marcus CL. Sleep architecture and respiratory disturbances in children with obstructive sleep apnea. Am J Respir Crit Care Med 2000; 162: 682-6.
5. Iber C, Ancoli-Israel S, Chesson A, Quan SF for The American Academy of Sleep Medicine The AASM manual for the scoring of sleep and associated events: rules, terminology and technical specifications 2007 Westchester.
6. Butkov Nic. Atlas of clinical polysomnography Synapse Media 2010.
7. Kayaalp O. Akılcı Tedavi Yönünde Tıbbi Farmakoloji 12. Baskı Ankara: Pelikan Yayınevleri 2009: 770-95.
8. Aron H. Depression: the benefits of early and appropriate treatment. Am J Managed Care 2007: S92.
9. Saygın M, Özgüner M. Uykunun mikro yapısı ve mimarisi. Uyku Bülteni 2020; 1: 19-29.
10. Pressman M. Evaluating sleep stages. In: Primer of polysomnogram interpretation 1st edition January 14, 2002.
11. Karadağ M. Polisomnografi. İçinde: Kaya A, Karadag M, Özlü T. Göğüs Hastalıkları Propedötik İstanbul: Aves. 2004: 255-63.
12. Morin CM. Benca RM. Nature and treatment of insomnia, in Sleep Disorders Medicine Basic Science, Technical Considerations and Clinical Aspects, 2008 3rd ed. edited by S. Chokroverty, Elsevier/ Butterworth, Philadelphia.
13. Thomas R, Timothy R. Insomnia: Pathophysiology and implications for treatment, Theoretıcal revıew. Ron Pies Sleep Medicine Reviews 2007; 11: 71–9.
14. Banks S, Dinges DF. Behavioral and physiological consequences of sleep restriction. J Clin Sleep Med 2007; 3: 519-28.
15. Hutka P, Krivosova M, Muchova Z, et al. Association of Sleep Architecture and Physiology with Depressive Disorder and Antidepressants Treatment. Int J Mol Sci 2021; 22: 1333.

16. Monaca C, Boutrel B, Hen R, Hamon M, Adrien J. 5-HT 1A/1B receptor-mediated effects of the selective serotonin reuptake inhibitor, citalopram, on sleep: Studies in 5-HT 1A and 5-HT 1B knockout mice. Neuropsychopharmacology 2003; 28: 850–6.
17. Sallanon M, Buda C, Janin M, et al. Implication of serotonin in sleep mechanisms: induction, facilitation? Neurotransmitters and Neuromodulators. New York: Raven Press 1985 p. 136.
18. Mayers AG, Baldwin DS. Antidepressants and their effect on sleep. Hum Psychopharmacol 2005;20: 533-59.
19. Fava M, McCall WV, Krystal A, et al. Eszopiclone co-administered with fluoxetine in patients with insomnia coexisting with major depressive disorder. Biol Psychiatry 2006; 59: 1052–60.
20. Katerndahl D, Ferrer R. Knowledge about recommended treatment and management of major depressive disorder, panic disorder, and generalized anxiety disorder among family physicians. Prim Care Companion J Clin Psychiatry 2004; 6, 147–51.
21. Örsel, S. Depresyonda Tedavi: Genel İlkeler ve Kullanılan Antidepresan İlaçlar. Klinik Psikiyatri 2004; 4: 17–24.
22. Köktürk, Oğuz. Uyku kayıtlarının skorlanması. Türk Solunum Araştırma Derneği Solunum 2013; 15: 14-29.