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ASSOCIATION OF BIOLOGICAL RHYTHM IMPAIRMENT WITH LEVELS OF ANXIETY, DEPRESSION, DREAM ANXIETY AND OTHER SOCIODEMOGRAPHIC CORRELATES IN TURKISH MEDICAL STUDENTS

TÜRK TIP ÖĞRENCİLERİNDEKİ BİYOLOJİK RİTİM BOZUKLUKLARININ; ANKSİYETE, DEPRESYON, RÜYA ANKSİYETESİ VE DİĞER SOSYODEMOGRAFİK BİLEŞENLERLE İLİŞKİSİ

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Abstract

Purpose In this study, we investigate association of biological rhythm impairment with levels of anxiety, depression and dream anxiety and other sociodemographic correlates of Baskent University medical students.

Methods 193 students who accepted to participate in the study from Baskent University School of Medicine Grades 1, 2, 3, 4 and 5, were enrolled to our study. Participants were administered the Beck Anxiety Inventory, Beck Depression Inventory, Dream Anxiety Scale, Biological Rhythm Scale and Sociodemographic Data Form.

Results Participants' biological rhythm (impairment) scores were found to be significantly associated with the Dream Anxiety Scale, Beck Depression Inventory and Beck Anxiety Inventory scores. Female students were found to have higher biological rhythm, activity rhythm, sleep rhythm, anxiety and dream anxiety scores, which means that they have higher anxiety levels and more impaired biological rhythms. Students who drowse in the lectures were found to have higher sleep, activity, social and dominant rhythm patterns with higher levels of dream anxiety and Beck Depression Inventory scores as well.

Conclusions Biological rhythm impairment is related to dream anxiety, anxiety and increased depression levels. Smoking, alcohol consumption and having pet are factors negatively effecting biorhythms and increasing dream anxiety in medical students. Drowsing during the lectures is a common complaint of medical students and can be a sign of irregularity in the biological rhythms and psychiatric disorders like anxiety and depression as well. Encouraging medical students for having more regular biorhythms can help them ensuring their own mental health.

Keywords: Sleep, biorhythm, dream anxiety, anxiety, depression, medical education

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Öz

Bu çalışmada Başkent Üniversitesi Tıp Fakültesi öğrencilerinin biyolojik ritimleri ve rüya anksiyete düzeylerinin saptanması ve bu verilerin birbirleriyle ve öğrencilerin sosyodemografik özellikleriyle ilişkisinin ortaya konması amaçlanmıştır.

Başkent Üniversitesi Tıp Fakültesi 1, 2, 3, 4 ve 5. sınıflardan çalışmaya katılmaya gönüllü 193 öğrenciye Biyolojik Ritim Değerlendirme Ölçeği, Beck Anksiyete Ölçeği, Beck Depresyon Ölçeği, Rüya Bunaltı Ölçeği, uyku ilişkili verileri de değerlendiren sosyodemografik veri formu uygulanmıştır. 6.sınıf öğrencileri nöbet tutmaları nedeniyle çalışma dışı bırakılmıştır. Veriler SPSS.22 dosyasına girilmiştir.

Biyolojik ritim değerlendirme ölçeği puanları ile rüya bunaltı ölçeği, Beck anksiyete ve depresyon ölçeklerinin puanları arasında pozitif korelasyon saptandı. Biyolojik ritimdeki bozulma arttıkça rüya bunaltı düzeyi, anksiyete ve depresif belirtiler de artmaktaydı. Kız öğrencilerin erkek öğrencilerle karşılaştırıldığında, biyolojik ritimleri daha düzensiz, anksiyete ve rüya anksiyete düzeyleri daha yüksek saptandı. Derste uyukladığını belirten öğrencilerde, uyuklamayan öğrencilere göre; uyku, aktivite, toplumsal ve baskın ritim örüntüsü puanları, rüya bunaltı ve Beck depresyon puanları daha yüksek saptandı.

Biyolojik ritim ile rüya bunaltı, anksiyete ve depresif belirtiler ilişkilidir. Tıp öğrencilerinin sigara, alkol kullanımı ve evde evcil hayvan beslemeleri biyoritimleri ve rüya bunaltı düzeyleri üzerinde olumsuz etkiye sahip etmenlerdendir. Tıp öğrencilerinde derste uyuklama yakınması yaygın olup, bu durum biyoritimdeki düzensizlik için önemli bir gösterge olabilir. Öğrencilerin daha düzenli biyolojik ritimlere sahip olmaları için teşvik edilmesi, ruhsal açıdan daha sağlıklı ve daha başarılı olmalarını sağlayabilir.

Anahtar Kelimeler: *uyku, biyoritim, rüya anksiyetesi, anksiyete, depresyon, tıp eğitimi*

1. Introduction

Biological rhythm is a determinant of intraday changes in such variables as sleep, eating habits, activity, social relations, etc. Those physiological properties are decisive for one's emotions, cognitions and moods. Mood disorders, e.g. depression, cause disturbances and irregularities in one's daily biorhythm, and this leads to impairments in sleep, appetite and social relations and activity (Aydemir et al. 2012).

Zeitgeber is the common name of the environmental and external cues, such as light and darkness, necessary for a biological organism to regulate its cycles.

The "Social Zeitgeber Theory" suggests that depressive, manic or hypomanic episodes are the consequences of life events which impair social zeitgebers such as mealtime and bedtime.

Sleep and biological rhythm disturbances have been found to be associated with the pathophysiology of mood disorders and anxiety disorders (Okajima & Chen 2017, Boland & Alloy 2013, Cretu et al, 2016, Wong et al. 2017, Furihata et al 2015).

Those temporal changes in circadian rhythms trigger the relapses. The proofs of this theory, however, underlie various treatments which are based upon this theory. Interpersonal and social rhythm therapies have been found effective in preventing relapses in bipolar disorder (Frank et al. 2005). Also, bipolar depressed patients benefit from partial sleep deprivation by up to 60% (Barbini et al.1998).

Dreams and Mood

Dreams have plenty of alleged functions such as regulating mood, ensuring adaptation, integrating newly-acquired information into memory systems, etc.

Nightmares are the long, frightening dreams. They almost always occur during the REM sleep. Occasionally, such descriptions as "sleep anxiety attack", "REM nightmare" are also used instead of "nightmare". There is a significant correlation between the recurrent adult nightmares and psychopathology. Nightmares are usually experienced as part of various anxiety disorders and mood disorders and show a high comorbidity with anxiety disorders and mood disorders (Ohayun et al. 1997, Güven et al. 2015, Genç et al. 2013, Lancee & Schrinemaekers 2013). In major depressive disorder, nightmares occur in the course of the disorder and regress with therapy.

Medical Students

Medical students have to cope with many stressful situations throughout their educational life. Among the causes of distress, depression and anxiety in medical students are long period of education, long and challenging working hours, insufficient and poor-quality sleep, smoking, alcohol consumption, being away from home and social circle and lack of social support, inconsiderate lecturers, inadequate training, proceeding on a long and uncertain academic path, presence of an examination for specialty in medicine which they are necessarily supposed to pass, fear of stigmatization, future anxiety, interacting with many distressed people like patients' relatives during the clinic work, facing death, being expected to give always more while taking less and the concept of violence against healthcare staff which tends to increase day-by-day in our country in recent years. (Mayda et al. 2014, Öncü et al. 2013, Arslan et al. 2009, Pagnin et al. 2015, Demiral et al. 2016, Yüksel et al. 2005, Çelik et al. 2016, Canbaz et al. 2007)

The most significant circadian rhythm of an individual is the rhythmic variation of sleep and wakefulness (Çalıyurt et al. 2001). Sleep is closely correlated with academic performance in physical and mental terms. Some studies show that daytime sleeping is more common in medical students receiving clinical training compared to those receiving pre-clinical training and that clinic students suffer more from distress and have poorer quality of sleep (Azad et al. 2015). On the other hand, individuals with irregular night sleep pattern tend to suffer from sleep problems (Bakotic et al. 2017, Mirghani et al. 2015). The irregular, prolonged and late sleep as well as the decrease in sleep quality play a significant role in the increase of depression symptoms (Azad et al. 2015, Wagas et al. 2015).

2. Objective

This study aims to reveal the association of Baskent University medical students' biological rhythm scores with their dream anxiety, anxiety, depression levels and sociodemographic characteristics.

3. Materials and Methods

The study population included 193 out of 197 participants, who fully filled out the scales.

Upon receipt of their consents, Baskent University School of Medicine Grade 1, 2, 3, 4 and 5 students were administered Beck Anxiety Inventory, Beck Depression Inventory, Van Dream Anxiety Scale, Biological Rhythm Assessment Scale and Sociodemographic Data Form. The Grade 6 students were excluded from the study since they tend to show biorhythm disorder due to their night duties. This study was approved by Baskent University Clinical Research Ethics Committee.

3.1. Beck Anxiety Inventory

The scale developed by Beck et al. in 1988 is used to determine the level of anxiety symptoms (Beck et al. 1988). The validity and reliability study of the scale's Turkish version was performed by Ulusoy et al. in 1998 (Ulusoy et al. 1988). The highest score that one can obtain from the scale is 63. A high overall score indicates a high level or severity of anxiety. According to the scores obtained from BAI, the anxiety levels of patients were grouped under three categories, namely "a score of 0 to 17 indicating a low level of anxiety", "a score of 18 to 24 indicating a moderate level of anxiety" and "a score of 25 or higher indicating a high level of anxiety".

3.2. Beck Depression Inventory

The scale developed by Beck et al. in 1961 evaluates emotional, somatic, cognitive and motivational symptoms in depression (Beck et al. 1961). The scale consists of 21 items. Each item's score ranges from 0 to 3. The increase in total score indicates severe depression. The validity and reliability study of the scale's Turkish version was performed by Hisli (Hisli et al. 1988).

3.3. Biological Rhythms Interview of Assessment in Neuropsychiatry (BRIAN)

This self-report was developed by Giglio et al. (Giglio et al. 2009). The interviewer-assessed BRIAN consists of 21 items, each of which provide a quadruple Likert-type assessment. The scale consists of sleep, activity, social and eating habits dimensions as well as a dimension of dominant rhythm pattern (chronotype). A high score obtained from the scale indicates impairment in the biological rhythm. Each item's score ranges from 1 to 4, and the total score is obtained by summing those scores. The total score ranges from 21 to 84.

The reliability and validity study of the scale's Turkish version was conducted by Aydemir et al. in 2012. It has been shown that the Turkish version of BRIAN can be validly and reliably used in all patients with mood disorder (Aydemir et al. 2012). BRIAN has also been found useful in diagnosing especially the "morningness" and "eveningness" predominance, which is decisive in the development of mood disorders, and the impairment in the biological rhythms.

3.4. Van Dream Anxiety Scale

The scale was developed by Agargun et al. The reliability and validity studies of the scale were conducted on the patients suffering from bad dreams Agargun et al. 1999).

Van Dream Anxiety Scale consists of 17 items filled in by the participant and evaluates the dream anxiety caused by bad dreams as well as the frequency of the nightmares that the participant had during the last 1 month.

Each of those 12 items is scored according to a scale of 0 to 4 (0=not at all, 1=rarely, 2=sometimes, 3=usually, 4=frequently).

Those 12 items are pertinent to bad dreams (Item 1), difficulty in falling asleep after having a bad dream (Item 2), fear of falling asleep with the worry of having a bad dream (Item 3), restless sleep with the worry of having a bad dream (Item 4), frequency of dream recall (Item 6), feeling drowsy during the day (Item 11), morning anxiety (Item 12), work-related distress (Item 13), familial distress (Item 14), distress in social relations (Item 15), mental distress (Item 16) and distress in memory/concentration (Item 17).

Four items (Item 7 to 10) are for clinical data collection purposes and are not included in the total score.

Those 4 items question the bedtime, awake time, duration of falling asleep and amount of sleep. Item 5 is related to autonomic hyperactivity and consists of a questioning on 12 symptoms. Each of those 12 symptoms questioned in Item 5 is scored from 0 to 4, and the score obtained from Item 5 is considered to be 1 if the total score is between 0 and 10, 2 if the total score is between 11 and 20, 3 if the total score is between 21 and 30, and 4 if the total score is between 31 and 40.

Thus, the scores from 13 items are summed up and a total VDAS score of 0 to 52 is obtained.

4. Statistics

The research data were transferred to and analyzed by the statistical software IBM, SBSS version 22.0. Categorical variables were presented in numbers and percentages whereas continuous variables were presented in mean ± SD and median (min-max) values. In comparison of the scores from Biological Rhythm Scale, Dream Anxiety Scale, Beck Depression Inventory and Beck Anxiety Inventory by groups, Mann-Whithney U Test was used to compare two groups where Kruskal Wallis was used to compare more than two groups. The correlation of scale scores with each other was evaluated using Spearman correlation test. In all analyzes, the level of statistical significance was adopted as "$p<0.05$".

5. Results

The mean age of 193 students who were included in our study was found to be 20.4. 64% of the participants were females and 36% were males. The participants, all of whom are medical students, were predominately Grade 3 (46.1%), Grade 1 (24.9%) and Grade 2 (11.4%) students. 86% of the participants have a nuclear or extended family. Of the participants, 18.6% were smokers and 15.5% were alcohol drinkers. The proportion of those who have no social activity is 67.9% and 22.3% of the participants have a pet (Table-1).

Table 1. Students' Sociodemographic Data

Number of participants (students)	N=193
Age Mean ± SD (Minimum-Maximum)	20.4 ± 2.0
Sex	
Female	123 (64.0%)
Male	70 (36.0%)
Grade	
1	48 (24.9%)
2	22 (11.4%)
3	89 (46.1%)
4	14 (7.2%)
5	20 (10.4%)
Family Structure	
Nuclear or extended family	166 (86.0%)
Single-parent family (divorced parents)	23 (11.9%)
Single-parent family (deceased parent/s)	4 (2.1%)
Smoking	
Smoker	36 (18.6%)
Non-smoker	157 (81.4%)
Alcohol	
Drinker	30 (15.5%)
Non-drinker	163 (84.5%)
Drug	
User	2 (1.0%)
Non-user	191 (99.0%)
Social Activity	
No social activity	131 (67.9%)
Sports	16 (8.3%)
Club events	4 (2.1%)
Dancing	12 (6.3%)
Music	10 (5.1%)
Theater	20 (10.3%)
Chronic Disease	
Yes	26 (13.5%)
No	167 (86.5%)
Pet	
Yes	43 (22.3%)
No	150 (77.7%)

Table 2. Scale Scores of Students

Number of students Mean ± SD (min-max)	N=193
Biorhythm	
Sleep score	13.7 ± 2.4
Activity Score	10.5 ± 2.8
Social Score	8.2 ± 2.3
Eating Habits Score	8.5 ± 2.7
Dominant Rhythm Score	6.6 ± 1.3
Total Biological Rhythm Score	47.4 ± 7.9
Dream Anxiety Scale Score	11.9 ± 12.4
Beck Anxiety Inventory Score	8.2 ± 7.2
Beck Depression Inventory Score	10.4 ± 8.1

The total scores of the participant students were found to be 47.4 ± 7.9 in Biological Rhythms Interview of Assessment in Neuropsychiatry, 11.9 ± 12.4 in Dream Anxiety Scale, 8.2 ± 7.2 in Beck Anxiety Inventory, and 10.4 ± 8.1 in Beck Depression Inventory (Table 2).

Table 3. Comparison Of "Female-Male" And "Drowsing-Not Drowsing" Students In Terms Of Biological Rhythm, Dream Anxiety, Depression And Anxiety Scores.

	Female	Male	p	Those drowsing during lectures	Those not drowsing during lectures	p
Total Biological Rhythm Score	48.7±7.3	45.2±8.3	**0.003**	49.0±7.8	44.4±7.2	**<0.001**
Sleep Rhythm Score	14.3±2.2	12.8±2.5	**<0.001**	14.2±2.2	12.9±2.8	**0.001**
Activity Rhythm Score	11.0±2.8	9.8±2.8	**0.005**	11.0±3.0	9.8±2.3	**0.002**
Social Rhythm Score	8.4±2.4	8.1 ± 2.3	**0.455**	8.6±2.3	7.4±2.1	**0.001**
Dominant Rhythm Score	6.8±1.5	6.5 ± 1.3	**0.063**	6.9±1.3	6.3±1.3	**0.010**
Dream Anxiety Scale Score	13.1± 11.9	9.7± 13.2	**0.004**	13.8 ±12.9	8.3±10.7	**0.002**
Beck Depression Inventory Score	10.5 ± 8.7	10.1 ± 9.1	**0.544**	11.5±8.2	8.1±11.5	**0.007**
Beck Anxiety Inventory Score	9.6 ± 7.8	5.7 ± 5.0	**<0.001**	8.3 ± 7.2	7.9 ± 6.0	**0.075**

The total biological rhythm, sleep rhythm, activity rhythm, social rhythm, dominant rhythm, dream anxiety and Beck Depression Inventory scores of the students who stated that they drowse during lectures were found to be statistically significantly higher than those of the students who do not drowse. The averages of female medical students' total biological rhythm, sleep rhythm, activity rhythm, Dream Anxiety Scale and Beck Anxiety Inventory scores were found to be higher than those of the males (Table-3).

6. Discussion

We have included 193 participants to our study from grades 1,2,3,4 and 5 of Baskent School of Medicine. Our aim was to reveal the association of medical students' biological rhythm scores with their dream anxiety, anxiety, depression levels and sociodemographic characteristics.

The averages of female medical students' total biological rhythm, sleep rhythm, activity rhythm, Dream Anxiety Scale and Beck Anxiety Inventory scores were found to be higher than those of the males. In other words, females had a more irregular biological rhythm and higher anxiety levels in terms of the total score. The finding that the women have a higher level of anxiety is consistent with the literature. Biological rhythm is a determinant of

intraday changes in such variables as sleep, eating habits, activity, social relations, etc. Any irregularity thereof is also a reflection of impairment in circadian rhythms.

In studies investigating biorhythm differences between genders in the literature, the females are usually found to be "morning person"(Randler et al. 2007, Natale& Danesi et al. 2002, Baehr et al. 2000).

Women's probability of developing depression and anxiety, who are already at a greater risk compared to men, can increase more during medical education, which is a very challenging process in both physical and mental terms. Therefore, a psychiatric support during this period may be of great importance especially for women.

In comparison among the grades, the dominant rhythm score of the Grade 4 students (7.9 ± 1.2) was found to be significantly higher than those of the students of other grades. That is, the Grade 4 students seem to be more "night persons" than the students of other grades. Those findings may be correlated with the work and course load of Grade 4 students. In order to keep up with this busy pace consisting of clinical work and theoretical lectures which they face for the first time, the students may be studying more compared to other grades.

The social rhythm score of the Grade 4 students was found to be significantly higher than that of the students of other grades. In other terms, the Grade 4 students stated that they experience more difficulties in building social relations and carrying out daily activities in harmony with the society. During Grade 4, the students proceed to the clinic work and, accordingly, build face-to-face and more intensive relationships with the patients, patients' relatives and other health care personnel for the first time. Therefore, the Grade 4 students may have difficulties in redressing a balance between their private lives and their "hospital" lives as well as in orienting themselves "socially" due to the environment that they got involved in for the first time and the stressors as well. This difference may be thought to be caused by the facts that the Grade 4 students are in the first year of their internship and that the internship period during Grade 4 is intensively challenging. There are studies emphasizing that distress becomes greater during the period of transition from pre-clinic training to clinic training in medical education (Jadoon et al 2010, Radcliffe et al. 2003).

The Beck Anxiety Inventory score (10.5 ± 7.7) of the Grade 2 students was found to be higher than those of the students of other grades. This difference may be thought to be caused by the fact that the Grade 2 students face, for the very first time, with the lectures that are challenging and based on memorization such as anatomy.

The dominant rhythm score of the students who smoke was found to be significantly higher than that of the non-smokers (p=0.039).

Also, the Beck Depression Inventory score of the students who smoke was found to be significantly higher than that of the non-smokers (p=0.04). The smokers seem more to be "night persons" in terms of biorhythm compared to the non-smokers. That the smokers suffer from dominant rhythm disorder may be associated with the facts that nicotine is a ganglion blocker having a stimulatory effect on the body and, thus impairs the sleep.

According to the literature, smokers are more likely to exhibit depressive mood, major depression and previous major depression (Borrelli & Leventhal 2012). Although the exact cause thereof remains unknown; depressed people may be smoking in order to feel good since

the nicotine intake during cigarette smoking activates the award pathway through Dopamine release in nucleus accumbens and mesolimbic area, and thus the smoker feels good (Burgermeister 2009).

However, it is also possible that smoking causes depression or makes the smoker weaker against depression. Although the cause and effect are not clear yet, smoking is regarded as a sign of depression. The significant correlation between the smoking and the presence of more depressive symptoms is also consistent with the conclusion drawn by Gulec et al. in their study on medical students suggesting that smoking may be a risk factor associated with depression (Güleç et al 2005).

The activity and social rhythm scores of the students consuming alcohol were found to be significantly higher than those of the students who do not consume alcohol. Lack of energy and deterioration in socialization are among the expected symptoms caused by alcohol use. The possible reasons for this may be explained as follows:

1. Alcohol use may lead to mood disorders, especially depressive disorder, and the alcohol-related depressive disorder may cause lack of energy and social withdrawal.

2. The level of anxiety in alcohol consumers may be higher, and they may consume alcohol for self-medication purposes. A high level of anxiety may also explain the lack of energy and socialization.

3. The facts that alcohol use reduces activity due to its sedative effects on GABA receptors and thus leads to a decrease in socialization are also among the expected findings.

Preventing alcohol consumption and smoking in medical students can help regulate biological rhythms.

The biological rhythm, sleep rhythm, activity rhythm, social rhythm and dominant rhythm, Dream Anxiety Scale and Beck Depression Inventory scores of the students who stated that they drowse during lectures were found to be higher than those of the students who do not drowse. Drowsing during lectures may be considered as a sign of the impairment in biological rhythm. The facts that the biological rhythm impairment increases both the dream anxiety level and the severity of depressive symptoms are the results consistent with the literature. Given that the presence of biological rhythm disorder deteriorates the sleep quality, it is an expected result that it causes drowsiness during lectures. Yet, it is not clear which one is the cause and which one is the effect. Inasmuch as, besides the "Zeitgeber" theory suggesting that impairment of biological rhythms would lead to depressive symptomatology and depression, it is also true that lack of night sleep, unrelaxing sleep and daytime drowsiness caused thereby are among the symptoms of major depression (Salvatore et al. 2012).

The Beck Depression Inventory score of the students who live away from downtown was found to be higher than

that of the students living in downtown (p=0.017). Taking into consideration the busy pace of medical students, it can be concluded that the increase in the time spent on the road and the resulting fatigue may be correlated with the higher level of depressive symptoms in the students who live far from downtown.

The Dream Anxiety Scale and dominant rhythm scores of medical students who have a pet were found to be significantly higher than those who do not have one. This difference may be caused by the responsibilities brought about by owning a pet and the fact that the pet has different biological rhythms that can affect the night sleep pattern.

The biological rhythm score (p=0.011), sleep rhythm score (p=0.038) and dominant rhythm score (p=0.005) of those whose bedtime is after 12 am were found to be higher whereas their dream anxiety score (p=0.016) was found to be lower.

As a result thereof, it was concluded that medical students with more regular biological rhythms suffer less from dream anxiety, anxiety and depressive symptoms. Having a regular biological rhythm may increase sleep and dream quality and decrease anxiety and depression levels in medical students. Encouraging students to have more regular biological rhythms may lead them to become mentally healthier and more successful.

Patient informed consent : Informed consent was obtained.

Ethics committee approval : Ethics committee approval was obtained.

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