

2. Рубцовый эндометриоз (РЭ) в большинстве случаев развивается после кесарева сечения, особенно при разрезе по Пфанненштилю. В исследуемой группе 75,8% пациенток с РЭ имели в анамнезе кесарево сечение.

3. Локализация эндометриозных очагов коррелирует с разрезом, выполненным при кесаревом сечении, что подтверждает важность правильной техники операции для предотвращения осложнений.

4. Симптомы, такие как хронические тазовые боли и пальпируемые узлы, могут быть ненадежными для диагностики, так как болевой синдром не всегда соответствует локализации очагов, что подчеркивает важность комплексного подхода в диагностике и лечении.

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## **МЕДИКО-БИОЛОГИЧЕСКИЕ НАУКИ**

УДК: 613.79:159.953 – 057.875

## **ОСВЕДОМЛЕННОСТЬ СТУДЕНТОВ УРАЛЬСКОГО ГОСУДАРСТВЕННОГО МЕДИЦИНСКОГО УНИВЕРСИТЕТА О ВЛИЯНИИ РЕЖИМА СНА НА КОГНИТИВНЫЕ СПОСОБНОСТИ СТУДЕНТОВ**

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## **Аннотация**

**Введение.** В данной статье рассматривается осведомленность студентов медицинских вузов о влиянии режима сна на когнитивные способности и успеваемость. Проблема недостаточного сна среди студентов – медиков актуальна в связи с высокой учебной нагрузкой и необходимостью усвоения большого объема информации. **Цель исследования** – изучить понимание студентами взаимосвязи сна и умственной работоспособности, а также определить уровень осведомленности о гигиене сна среди студентов УГМУ. **Материал и методы.** В исследовании использовался метод анкетирования. В исследовании приняли участие студенты Уральского государственного медицинского университета Минздрава России с 1 по 6 курс разных факультетов. Опрос проводился в феврале – марте 2024 года. Полученные данные были обработаны с помощью статистических методов и представлены в виде процентов. **Результаты.** Большинство респондентов (72%) осознают важность

полноценного сна для когнитивных функций, однако только 38% студентов соблюдают рекомендуемый режим сна. Выявлена корреляция между продолжительностью сна и субъективной оценкой когнитивных способностей. Студенты, которые спят менее 6 часов в сутки, чаще отмечают проблемы с концентрацией внимания (64%), запоминанием информации (58%) и снижением успеваемости (47%). **Выводы.** Несмотря на высокий уровень теоретической осведомленности о важности сна, практическое применение этих знаний среди студентов – медиков остается недостаточным. Необходимо разработать образовательные программы по гигиене сна и организации режима дня для студентов медицинских вузов.

**Ключевые слова:** сон, когнитивные способности, студенты – медики, успеваемость, гигиена сна, умственная работоспособность.

## **AWARENESS OF STUDENTS OF THE URAL STATE MEDICAL UNIVERSITY OF THE MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION ABOUT THE INFLUENCE OF SLEEP PATTERNS ON COGNITIVE ABILITIES OF STUDENTS**

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### **Abstract**

**Introduction.** This article examines the awareness of medical university students about the impact of sleep patterns on cognitive abilities and academic performance. The problem of insufficient sleep among medical students is relevant due to the high academic load and the need to assimilate a large amount of information. **The aim of the study** is to examine students' understanding of the relationship between sleep and mental performance, as well as to determine the level of awareness about sleep hygiene among USMU students. **Material and methods.** The study used a questionnaire method. Students of the Ural State Medical University of the Ministry of Health of the Russian Federation from 1st to 6th year of various faculties participated in the study. The survey was conducted in February – March 2024. The data obtained were processed using statistical methods and presented as percentages. **Results.** The majority of respondents (72%) are aware of the importance of adequate sleep for cognitive functions, however, only 38% of students follow the recommended sleep pattern. A correlation was found between sleep duration and subjective assessment of cognitive abilities. Students who sleep less than 6 hours a day more often report problems with concentration (64%), information memorization (58%), and decreased academic performance (47%). **Conclusions.** Despite the high level of theoretical awareness about the importance of sleep, the practical application of this knowledge among medical students remains insufficient. It is necessary to develop educational programs on sleep hygiene and organization of daily routine for students of medical universities.

**Keywords:** sleep, cognitive abilities, medical students, academic performance, sleep hygiene, mental performance.

## **INTRODUCTION**

Sleep is a fundamental physiological process necessary for the normal functioning of the human body. Quality sleep is particularly important for medical students, whose educational activities are associated with high cognitive loads, the need to assimilate a large amount of information, and the development of clinical thinking. Modern research in the field of neurophysiology and cognitive psychology convincingly proves that lack of sleep negatively affects cognitive functions, including attention, memory, information processing speed, and executive functions [1]. According to the US National Sleep Foundation, young people aged 18 – 25 should sleep 7 – 9 hours a day for optimal brain functioning [2]. However, numerous studies show that medical students often sleep significantly less than the recommended time. The problem of insufficient sleep among medical students has a global character. A study conducted in 2019 among students of medical universities in Russia showed that more than 65% of respondents sleep less than 7 hours a day, and 27% – less than 6 hours [3]. At the same time, sleep disorders correlate with deterioration in academic performance, increased stress levels, and decreased quality of life for students. The problem becomes particularly relevant in the context of modern educational realities, characterized by the intensification of the educational process, an increase in the volume of independent work for students, and the widespread use of digital technologies, which can negatively affect sleep patterns. Despite the fact that medical students study sleep physiology and its impact on human health as part of the educational program, the question remains open as to how much this theoretical knowledge is transformed into practical skills for organizing their own daily routine and sleep hygiene.

**The aim of this study** is to examine the awareness of students of the Ural State Medical University of the Ministry of Health of the Russian Federation about the influence of sleep patterns

on cognitive abilities, as well as to analyze students' understanding of the relationship between sleep quality and mental performance.

## **MATERIAL AND METHODS**

The study was conducted at the Ural State Medical University of the Ministry of Health of the Russian Federation from February to March 2024. The method of anonymous questionnaire was used for data collection, using a specially developed questionnaire that included 20 closed and open – ended questions.

The questionnaire consisted of several blocks:

1. Socio – demographic characteristics (gender, age, year of study, faculty);
2. Subjective assessment of sleep quality and duration;
3. Awareness of the impact of sleep on cognitive functions;
4. Practical aspects of organizing sleep patterns;
5. Self – assessment of cognitive abilities and their relationship with sleep patterns.

The study involved 320 students from the 1st to 6th year of various faculties of USMU. The distribution of respondents by year of study was as follows: 1st year – 68 people (21.3%), 2nd year – 72 people (22.5%), 3rd year – 65 people (20.3%), 4th year – 58 people (18.1%), 5th year – 34 people (10.6%), 6th year – 23 people (7.2%). Gender distribution: 228 women (71.3%) and 92 men (28.7%). The survey was conducted using the Google Forms online platform. Participation in the study was voluntary and anonymous. Before starting the survey, respondents were informed about the objectives of the study and gave consent to data processing. Statistical processing of the results was carried out using SPSS Statistics 25.0. Descriptive statistics methods, correlation analysis (Pearson correlation coefficient), and chi – square test were used to assess the statistical significance of differences between groups. Differences were considered statistically significant at  $p < 0.05$ .

## **RESULTS**

Analysis of the survey results showed that the majority of USMU students are aware of the importance of adequate sleep for cognitive functions. To the question "Do you think that sleep quality affects your cognitive abilities?" 72% of respondents answered positively, 18% chose the option "rather yes than no", 7% found it difficult to answer, and only 3% do not see a connection between sleep and cognitive functions. At the same time, the average sleep duration among the surveyed students was  $6.2 \pm 1.1$  hours on weekdays and  $7.8 \pm 1.3$  hours on weekends. Only 38% of students follow the recommended sleep pattern (7 – 9 hours) on weekdays. The distribution of respondents by sleep duration on weekdays is shown in Figure 1. A statistically significant difference in sleep duration was found among students of different years ( $p < 0.01$ ). The shortest sleep duration is observed in 3rd year students ( $5.8 \pm 0.9$  hours) and 4th year students ( $5.9 \pm 1.0$  hours), which may be associated with an increased academic load during this period of study. Regarding the subjective assessment of sleep quality, 42% of students rated it as "satisfactory", 31% – as "good", 18% – as "poor", and 9% – as "very poor". At the same time, 64% of respondents noted that they experience difficulties falling asleep at least 2 – 3 times a week. Analysis of students' awareness about the impact of sleep on cognitive functions showed that the majority of respondents (83%) know about the importance of deep sleep phase for memory consolidation. However, only 56% of students were able to correctly indicate the recommended sleep duration for their age group. Interestingly, senior students (5 – 6 years) demonstrate a higher level of theoretical knowledge about sleep physiology and its impact on cognitive functions compared to junior students ( $p < 0.05$ ), which may be associated with the study of relevant disciplines during the educational process. Correlation analysis revealed a statistically significant relationship between sleep duration and subjective assessment of cognitive abilities ( $r = 0.68$ ,  $p < 0.001$ ). Students who sleep less than 6 hours a day more often report problems with concentration (64%), information memorization (58%), and decreased academic performance (47%) compared to students who sleep 7 – 9 hours (23%, 19%, and 15% respectively). To the question "Have you noticed a connection between your sleep quality and academic performance?" 76% of respondents answered affirmatively. At the same time, 68% of students noted that during periods of insufficient sleep, they need more time to assimilate educational material. Regarding the practical aspects of organizing sleep patterns, the following results were obtained:

- 57% of students use electronic devices (smartphone, tablet, laptop) immediately before going to bed;
- 43% regularly consume caffeinated beverages after 6:00 PM;
- 38% engage in educational activities in bed;
- 29% have a fixed time for going to bed and waking up;
- 22% practice relaxation methods before sleep.

When asked about the reasons for insufficient sleep, students most often indicated a large volume of academic workload (72%), the need to combine study with work (34%), stress and anxiety (47%), and the use of social networks and entertainment content (39%).

## **DISCUSSION**

The results of the study indicate that the majority of USMU students are theoretically aware of the importance of adequate sleep for cognitive functions, however, in practice, a significant proportion of respondents do not follow the recommended sleep pattern. This is consistent with data from other studies conducted among students of medical universities both in Russia and abroad [4, 5]. The identified correlation between sleep duration and subjective assessment of cognitive abilities confirms the results of experimental studies demonstrating the negative impact of sleep deprivation on attention processes, memory, and executive functions [6]. It is particularly important to note that 76% of students notice a connection between sleep quality and academic performance, which indicates a practical awareness of the importance of sleep for educational activities. An interesting observation is that senior students, despite having a higher level of theoretical knowledge about sleep physiology, do not demonstrate better indicators in organizing their own sleep pattern compared to junior students. This may indicate a gap between theoretical knowledge and its practical application, which is a common problem in the field of health – preserving behavior [7]. Analysis of the reasons for insufficient sleep among students shows that the key factors are high academic workload and ineffective time management. This emphasizes the need to include in the educational programs of medical universities not only theoretical knowledge about sleep physiology but also practical skills of time management and organization of daily routine. Special attention should be paid to the high percentage of students (57%) who use electronic devices immediately before going to bed, which can negatively affect sleep quality due to the impact of blue light on melatonin production. This indicates the need for educational activities on sleep hygiene, including recommendations on limiting the use of electronic devices before bedtime. The obtained results have practical significance for the development of programs aimed at improving sleep quality and, consequently, the cognitive abilities of medical students. Such programs can include an educational component (lectures and seminars on sleep physiology and its impact on cognitive functions), practical recommendations on sleep hygiene, as well as organizational measures (optimization of class schedules, creation of rest zones at the university).

## **CONCLUSIONS**

The majority of students of the Ural State Medical University of the Ministry of Health of the Russian Federation are theoretically aware of the impact of sleep patterns on cognitive abilities, however, in practice, only 38% follow the recommended sleep pattern (7 – 9 hours). A statistically significant correlation was found between sleep duration and subjective assessment of cognitive abilities ( $r=0.68$ ,  $p<0.001$ ). Students who sleep less than 6 hours a day more often report problems with concentration, information memorization, and decreased academic performance. The main reasons for insufficient sleep among students are high academic workload (72%), stress and anxiety (47%), use of social networks and entertainment content (39%), and the need to combine study with work (34%). Senior students demonstrate a higher level of theoretical knowledge about sleep physiology and its impact on cognitive functions compared to junior students ( $p<0.05$ ), however, this is not reflected in the practical organization of their sleep pattern. The majority of students (57%) use electronic devices immediately before going to bed, which can negatively affect sleep quality due to the impact of blue light on melatonin production. It is necessary to develop comprehensive educational programs on sleep hygiene and organization of daily routine for students of medical universities, including both theoretical and practical components.

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## ВЛИЯНИЕ ЭЛЕКТРОМАГНИТНОГО ПОЛЯ ЧРЕЗВЫЧАЙНО НИЗКОЙ ЧАСТОТЫ НА КОГНИТИВНОЕ ПОВЕДЕНИЕ БЕЛЫХ МЫШЕЙ

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## Аннотация

**Введение.** Воздействие на крыс электромагнитным полем 50 Гц может быть причиной тревожных состояний или окислительного стресса. Ухудшение пространственной памяти и обучения может быть вызвано снижением экспрессии гена рецептора D2, что влияет на пластичность ингибирующих цепей. Электромагнитное поле чрезвычайно низкой частоты вызывает тревожное поведение, окислительный стресс в гипоталамусе и гиппокампе и снижает его нейропластичность. **Цель исследования** – изучить влияние электромагнитного поля частотой 50 Гц и силой 10 А на экспериментальную группу мышей, оценить их когнитивный статус после воздействия. **Материал и методы.** Пять мышей подвергались воздействию поля частотой 50 Гц и силой тока 10 А в течение 2 месяцев (по 2 часа в день). В контрольной группе пять мышей были без воздействия. Для оценки когнитивного статуса был проведен тест в открытом поле, тест на социальное распознавание и NOR – тест. **Результаты.** Мыши, получающие воздействие ЭМИ, в тесте на открытом поле демонстрируют наибольшую активность в сегменте A2, что указывает на повышенную тревожность. Мыши, получающие воздействие ЭМИ, со старым объектом проводили 22,5 с, с новым – 19,5 с; контрольная группа со старым объектом проводила – 19,8 с, с новым – 20,1 с. Мыши, получающие воздействие ЭМИ, проявляют признаки избегания по отношению к мышам. **Выводы.** Мыши избегают открытых пространств, двигаясь по периферии поля. Наблюдается поздний выход в центр, что отражает отрицательные эмоции животного. Индекс распознавания для мышей под воздействием ЭМИ ниже, чем у контрольной группы, что свидетельствует о снижении способности к распознаванию нового объекта у мышей под воздействием ЭМИ. Воздействие ЭМИ негативно влияет на социальное поведение мышей.

**Ключевые слова:** электромагнитное поле чрезвычайно низкой частоты, мыши, когнитивное поведение.

## THE EFFECT OF AN EXTREMELY LOW FREQUENCY ELECTROMAGNETIC FIELD ON THE COGNITIVE BEHAVIOR OF WHITE MICE

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