Extended Abstract

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Research paper

The Effect of Sleep Deprivation on Memory Functions in the Wechsler Scale in the Morning Sleep Pattern Students

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Introduction

The need for sleep in humans varies depending on factors such as the country they live in, their history, gender, ethnicity, physiological state, and lifestyle. The interaction between circadian rhythms and sleep-wake homeostasis regulates the sleep process in humans (Minz and Pati, 2019). The endogenous circadian system of an individual is one of the most profound biological mechanisms that affect sleep and mental health (Reppert and Weaver, 2002). Variations between individuals in the endogenous circadian system include differences in the timing of behavioral and physiological functions such as sleep-wake rhythm, alertness, core body temperature, and hormonal secretion (Czeisler and Gooley, 2007). Based on individual differences in the endogenous circadian system, people can be classified on a scale ranging from evening-oriented to morning-oriented types. (Broms et al., 2014). Since sleep plays an important role in maintaining the nervous circuit and helps to maintain overall health and well-being, neuroimaging studies show that sleep deprivation affects many aspects of the structure and function of the human brain (Elvsåshagen et al., 2019). Today, one of the most important consequences of sleep deprivation is its major impact on the brain's ability to retain new information and consolidate memory (McDermott, et al., 2003). Given the importance of sleep and learning, especially among students, and the daily challenges they face, this study investigates the impact of sleep deprivation on memory functions, as measured by the Wechsler Memory Scale, in students with a morning-oriented sleep pattern.

Method

The current research is a semi-experimental type with a pre-test-post-test design and a control group. The study population consisted of all female dormitory students during the 2019 academic year. The initial research sample consisted of 200 female dormitory students who were selected through available sampling. The research tools include the Wechsler Memory Test (WMT, Wechsler, 1939) and the Morning Evening Questionnaire (MEQ, Horn, et al., 1976). After obtaining informed consent from participants, who were also informed of their right to withdraw at any time, the participants were randomly assigned to four groups: two experimental and two control groups. Then, during a session, the purpose of the research was explained to the subjects of the experimental group, and before the intervention, a pre-test of the subjects was carried out in such a way that the Wechsler adult memory test was performed on the subjects of the experimental and control groups, and then the research intervention involved depriving the experimental group subjects of sleep for one night. The intervention involved having the subjects present at the research site at the designated time, where they were deprived of sleep for one night by watching movies and participating in

group discussions. In the end, to analyze the data in the descriptive statistics section, the mean and standard deviation were calculated, and in the inferential statistics section, the multivariate covariance analysis method was used by Spss-22 software.

Results

The covariance analysis of the data showed that there is a significant difference in the memory performance variable between the experimental and control groups ($P<0.001$). The results indicated that the experimental group, compared to the control group, showed significant effects on the dependent variable, suggesting that sleep deprivation disrupts memory functions, particularly in morning-oriented sleepers.

Table 1: The results of analysis of covariance between experimental and control groups in memory performance

Sources of changes	SS	DF	MS	F	P
Pretest	200.26	1	200.26	26.84	0.001
Group	1457.04	1	1457.04	195.31	0.001
Error	156.66	21	156.66		

Discussion and Conclusion

The present study aimed to investigate the effect of sleep deprivation on memory functions in the Wechsler scale in the morning sleep pattern students. According to the obtained results, it can be said that sleep deprivation can affect memory and cognitive functions. The findings of this study align with previous research by Peng et al. (2020), Saadati et al. (2018), Roig et al. (2022). This finding suggests that sleep deprivation directly impacts cognitive and emotional processes. If the short-term effects are more noticeable, but chronic lack of sleep can increase the long-term risk of physical and psychological problems (Cousins, and Fernandez, 2019). Neuroimaging studies have provided some of the most compelling evidence for the role of sleep in the long-term reorganization of memories in the brain (Cousins, and Fernandez, 2019). Research showed that sleep deprivation disrupts the long-term strengthening of learning and memory and disrupts gene expression and the amount of hippocampal proteins involved in memory, learning, and synaptic plasticity (Saadati et al., 2018). In conclusion, it can be said that sleep and memory have a complex relationship with each other. Adequate sleep helps people process new information, and sleep after training can consolidate this information into memories, allowing the information to be stored in your brain. Cognitive performance is affected by low sleep and circadian rhythms of sleep (Riedel et al., 2011., Fafrowicz et al., 2010). One of the limitations of this research is that the sample includes university students and girls, so caution should be exercised in generalizing the results to all members of society. It is also suggested that due to the lack of existing research in this field, other researchers should investigate circadian rhythms by controlling various gender and occupational factors to answer the research questions.

Ethical Considerations

Ethical Code

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The present study was conducted in the absence of any financial backing and Support.

Authors' Contributions

Samayeh Lorestani conducted the research, implementation of training, and wrote the manuscript. Leila Alizadeh conducted statistical analysis and, revise it critically for intellectual content, and approved the final version for publication. Saba Abbasi revise it critically for intellectual content, and approved the final version for publication.

Funding and Conflict of interest

The authors have no conflicts of interest to declare.

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