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THE EFFECT OF SLEEP DURATION AND HABITS ON ACADEMIC PERFORMANCE OF PHARMACY STUDENTS

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ABSTRACT

It is necessary to promote optimal health and well-being by having more than 7 hours of sleep a day for adults. In modern society, sleep deprivation is a big concern. Students at colleges experience at least twice as many sleep disorders as the general public due to their engagement in many social-, work-, and academic-related activities.

The study aims to assess sleep behaviors and the degree of daytime sleepiness and examine the connection between pharmacy students' sleep period and academic success.

This cross-sectional research was carried out at the Duhok University pharmacy college on 169 students from first-year to fifth-year. For a given course, students filled out a questionnaire involving demographic variables, sleep habits, sleep length during the regular school week and at night before the test, daytime sleep frequency, and the final score.

The results revealed that most pharmacy students had under-optimal sleep durations, described as less than 7 hours. Early sleep and sufficient sleep the night before the test were favorably correlated with student grades and academic success.

KEYWORDS: Sleep, Students, Academic, College, Pharmacy, Degree**.**

1. INTRODUCTION

Sleep, like nutrition, is a fundamental natural requirement the body needs to work and sustain and is vital for consolidating memory, understanding, making decisions, and rational reasoning. Therefore, sleep is necessary for the proper functioning of core cognitive functions relevant to higher education academic – and possibly social – success (Gilbert & Weaver, 2010).

Sex, age, and status of recent sleep decide how much sleep the body requires. Bonnet and Arand (2010) have described sufficient sleep as “a sleep duration that is followed by a spontaneous awakening and leaves one feeling refreshed and alert for the day”. When an individual is not getting sufficient sleep, multiple problems arise. It has been shown that reduced sleep decreases efficiency, cognition and short-term memory, and mental concentration. It has been found that sleep disorders have detrimental effects on general wellbeing, effectiveness, mood, learning and memory (Breus, 2004).

Among the most common concerns of college students was not having an adequate sleep at night (Yang et al., 2003). Kalat's (2009) study has shown that the performance of a freshly-learned activity is often better on the next day if adequate sleep is made throughout the night. Sleep deficiency not only has a detrimental effect on performance and psychological state; it is also biologically dangerous (Mitru et al., 2002). Intermediate sleep deprivation contributes to impaired focus, restlessness, illusion, confusion, discomfort, and reduced functioning of the immune system (Akerstedt, 2007; Kalat, 2009).

Extended lack of sleep in animal models led to a higher metabolic rate, decreased appetite and body temperature, the immune system's failure, and reduced cognitive function (Kalat, 2009). Besides, in the sleep, Gamma-aminobutyric acid transmitter (GABA) output usually increases, allowing GABA to concentrate inside neurons in case of poor sleep. The subsequent rise in GABA releases resulted in lower emphasis, lengthy gaps in response, and a significant cause of workplace injuries (Gvilia et al., 2006; Kalat, 2009). Sleep deficiency is also close to alcohol-influenced driving (Falleti et al., 2003). For this reason, individuals taking sleep aids that enhance GABA activity, like benzodiazepines, were usually excluded from

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studies linking sleep with academic performance.

Edens (2006), Gilbert and Weaver (2010), Gomes et al. (2011), Howell et al. (2004), Medeiros et al. (2001), Noland et al. (2009), and Thacher (2008) proposed that the shorter amount of sleep recorded by a college student will be the lower the grade point average (GPA). Similarly, in a study of college students, Kelly et al. (2001) observed that those deemed short sleepers (sleeping less than six hours) recorded slightly lower GPAs than long sleepers (sleeping over seven-and-a-half hours).

In checking the following predictors, Gomes et al. (2011) capped whether sleep variables had influenced the academic performance: study involvement, study period, and substance usage. The findings indicate that: night, morning or evening choice, sleeping lack, sleep consistency and sleep irregularity are substantially related to academic success. This research is like Killgore and Killgore (2007), who noticed the importance of Morningness for increased academic results. Sleep quality impacts not only the academic success of college students but also on the physical and mental well-being of those who claim a low quality of sleep (Lund et al., 2010). To conclude, the standard of sleep and the amount of adequate sleep recorded by a student are the key predictors of academic achievement; a lack of sleep and an erratic sleep schedule is a big concern and has been commonly documented in college students and also teenagers.

Study on insufficient sleep and academic achievement has taken place extensively. Few studies investigated the pattern of sleep in groups of health and medical undergraduates (Medeiros et al., 2001; Veldi et al., 2005). Research which involves pharmacy students with insights into sleep patterns is much less comprehensive (Zeek et al., 2015). However, to our knowledge, there has been no study examining the effects of sleep duration on academic performance in the Duhok University System. This study's objective was to find out the potential link between sleep status and academic performance (represented by Course Grades) among the students from the College of Pharmacy - University of Duhok.

2. METHODS

This cross-sectional study was carried out in March 2016. A confidential, optional paper questionnaire was issued to students from Duhok University's College of Pharmacy for the First-year to the Fifth Year (P1-P5).

The study consisted of three sections: the students' features (age, gender, and current class) and the sleep cycle over a normal school week and the pre-examination night, and rate of daytime sleepiness. Academic accomplishments were assessed for a single course for each subsequent occupational year by self-reported grade earned in the first half of 2015-2016. Human biology course grades were chosen for first-year students, Human Physiology for second-year, Pharmacology I for third-year, Therapeutics I for fourth-year, and Therapeutics III for fifth-year. More students normally faced challenges with these courses in comparison with others in the same semester.

In our study, questions were adapted from the validated Basic Nordic Sleep Questionnaire (Veldi et al., 2005). This study received approval by the College of Pharmacy and the University of Duhok for undergraduate research.

The following participant-reported variables assessed sleep habits over a normal school week of the semester: (1) time to go to bed, (2) number of hours spent at night, (3) time to get up, and (4) incidence of naps. The night before the test, participants also commented on sleep habits with somewhat different factors: (1) the number of hours slept each night, (2) waking up early than normal nights, and (3) going to bed later than average nights. Finally, the daytime sleepiness level was assessed after awakening, during the day, at study time, and throughout the classroom setting by self-reported sleepiness.

Students who had missed classwork for some cause or taking at least one prescribed drug for a sleep condition (e.g., insomnia or narcolepsy) is exclusion conditions. Such omission was to reduce causative factors that may have an impact on academic performance and sleep habits. SPSS for Windows, v17 (SPSS Inc., Cary, NC) was used to evaluate the results.

3. RESULTS

Among 281 of the P1-P5 registered students, 214 students received the self-administered paper questionnaire. A sum of 199 doctoral students handed back the filled questionnaires with almost no missing of data. Thirty of these were omitted from the sample and, thus, from future data analysis through the exclusion criterion. No data were obtained from students

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who were unavailable or declined to join. The final number of pharmacy students included in this study was 169.

The characteristics of students and their academic results are seen in Table (1). The highest number of participants is 20 or younger (56.2%), female (63.3%), and second-year (26.6%). The highest proportion of students received a final score of 60-69.9 (38.5%) in the first semester of 2015-2016 in terms of academic results.

Table (1): Students features

Participant Characteristics	n (%)
Age	
20 or younger	95 (56.2)
21	19 (11.2)
22	22 (13.0)
23	22 (13.0)
24 or older	11 (6.5)
Sex	
Male	62 (36.7)
Female	107 (63.3)
Current Class	
First-year	44 (26.0)
Second-year	45 (26.6)
Third-year	22 (13.0)
Fourth-year	32 (18.9)
Fifth-year	26 (15.4)
Course Grade	
Less than 60	35 (20.7)
60-69.9	65 (38.5)
70-79.9	51 (30.2)
80 or higher	18 (10.7)

As seen in Figure (1) and Figure (2), the age and current year factors were substantially correlated with course grades (p = 0.012 and 0.013, respectively). There was no substantial gap between male and female students correlated with grades.

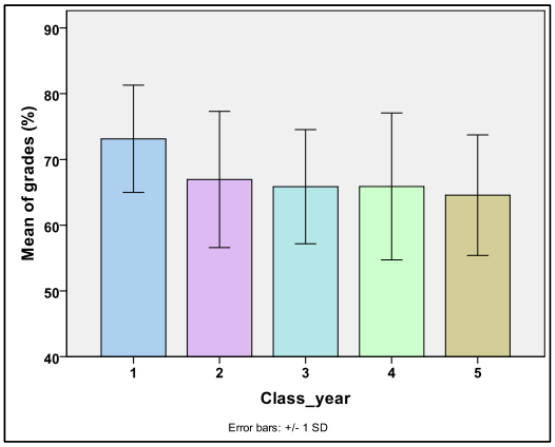

Fig. (1): Means of grades according to class.

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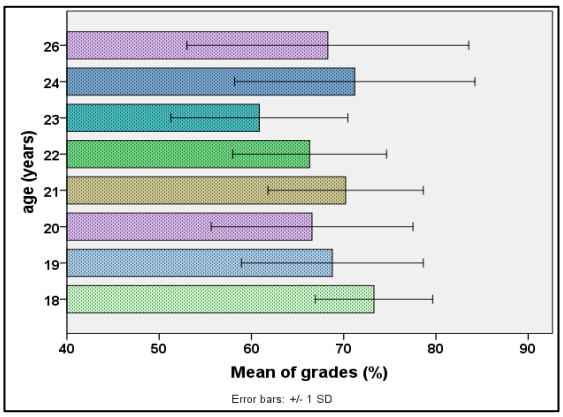

Fig. (2): Means of grades according to age.

Sleeping trends among pharmacy students are described in Tables (2) and (3). Sleep time was grouped into two types: six or fewer hours of sleep and seven or more hours of sleep. Throughout a typical school week, more than half of respondents reported getting 6 hours of sleep or less at night (64.5%) and a majority on the night before an exam (89.3%). The mean duration of sleep during a standard school week was 6.11 (SD = 1.24) hours at night and 4.69 (1.55) hours the night before exams (not shown in the tables).

Table (2): Sleep Patterns During Typical School Week

Item	n (%)
Time to go to bed	
Before 11pm	25 (14.8)
11pm-12am	20 (11.8)
12am-1am	54 (32.0)
After 1am	70 (41.4)
Time to wake up	
Before 6am	22 (13.0)
6am-7am	30 (17.8)
7am-8am	74 (43.8)
After 8am	43 (25.4)
Hours of sleep at night	
6 hours or less	109 (64.5)
7 hours or more	60 (35.5)
Taking Naps	
Yes	138 (81.7)
No	31 (18.3)

Table (3): Sleep Patterns on Night Prior to an Examination

Item	n (%)
Hours of sleep at night	
6 hours or less	151 (89.3)
7 hours or more	18 (10.7)
Wake up earlier before examinations	
Never/almost never	36 (21.3)
Occasionally	56 (33.1)
Every time	77 (45.6)
Go to bed later	
Never/almost never	29 (17.2)
Occasionally	70 (41.4)
Every time	70 (41.4)

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The majority of participant students (81.7%) took naps during the day. A large proportion of respondents have recorded getting up early (45.6%) and heading to bed later (41.4%) on pre-examination evenings. During the typical school week, students who are shown to go to bed after 1 am (41.4%), and those waking up at 7-8 am (43.8%) represent the largest number of respondents.

By using analysis of variance (ANOVA), the time to go to bed during a typical school week was strongly associated with course grade (p = 0.008) (not shown in tables). The earlier to go to bed, the higher is the grade.

The highest proportion of participating students (37.3 %) reported feeling sleepy while getting up nearly every day concerning the level of sleepiness during an average school week (Table (4)); most of them (23.7 %) had 6 hours of sleep or less. Students who slept 6 hours or less appeared to have more sleepiness than the other party that got more sleep. However, the associations between sleeping hours and sleepiness were found statistically non-significant using the chi-square test.

Table (4): Comparison of Frequency of Sleepiness During a Typical School Week

Participant Characteristics	Never/Almost Never, n (%)	Once or Twice/ Week, n (%)	3-5 Days/ Week, n (%)	Almost Every Day, n (%)	p Value*
Feel tired when waking up					0.758
6 hours of sleep or less	11 (6.5)	36 (21.3)	22 (13.0)	40 (23.7)	
7 hours of sleep or more	9 (5.3)	18 (10.7)	10 (5.9)	23 (13.6)	
Feel daytime sleepiness					0.708
6 hours of sleep or less	12 (7.1)	37 (21.9)	33 (19.5)	27 (16.0)	
7 hours of sleep or more	6 (3.6)	16 (9.5)	19 (11.2)	19 (11.2)	
Feel excessive sleepiness during independent study time					0.065
6 hours of sleep or less	35 (20.7)	43 (25.4)	13 (7.7)	18 (10.7)	
7 hours of sleep or more	27 (16.0)	14 (8.3)	4 (2.4)	15 (8.9)	
Feel excessive sleepiness during class time					0.951
6 hours of sleep or less	13 (7.7)	38 (22.5)	23 (13.6)	35 (20.7)	
7 hours of sleep or more	7 (4.1)	20 (11.8)	15 (8.9)	18 (10.7)	

*Chi-square analysis

The association between academic success and length of sleep is listed in Table (5). The correlation between student academic achievement and nighttime sleep during the average school week was not relevant. However, the final course score was substantially related to sleep the night before the exam (p = 0.009).

Table (5): Association between Academic Performance and Sleep Duration

Academic Performance	Hours slept at night during Typical Week Mean (SD)	Hours Slept the Night Before Examination Mean (SD)
Course Grade		
Less than 60%	5.86 (1.06)	3.94 (1.55)
60-69.9%	6.11 (1.37)	4.60 (1.52)
70-79.9%	6.20 (1.23)	5.08 (1.37)
80% or higher	6.39 (1.20)	5.33 (1.61)
p value*	0.659	0.009

*Calculated using Analysis of Variance (ANOVA)

4. DISCUSSION

It is essential to ensure the ideal health and well-being that adults sleep more than seven hours a day (Cappuccio et al., 2010). Sleep serves different critical capacities, counting preservation of vitality, repair and rebuilding, and learning and memory union (Kalat, 2009).

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Sleep is fundamental to establish neural connections between dendritic branches allowing undergraduates to recover information more efficiently and remaining for more extended periods in memory (Yang et al., 2014).

While college students tend to participate in social, job, and academic events simultaneously, the negative consequences of such a busy lifestyle are crucial to keeping in mind. Furthermore, university students experience sleep disturbances at least two times as often as the general public (Brown et al. 2001). The sharp rise in poor sleep in the last thirty years is further exacerbating these results. 71% of students in 1992 indicated dissatisfaction with sleep patterns, compared with just 24% in 1978 (Hicks et al., 1992).

In the last decade; the pharmacy syllabus was modified by different colleges, the number of pharmacy establishments in our vicinity grew, and major lifestyle shifts increase the drift of students toward electronic media and smart phones until late at night. All these reasons are motives to research pharmacy students regarding their sleep.

Several studies found that students who sleep between seven and eight hours a night on average do higher academically than students who sleep less than seven hours a night on average (Edens, 2006; Gilbert & Weaver, 2010; Gomes et al . , 2011; Howell et al., 2004; Kelly et al., 2001; Noland et al . , 2009). However, several researchers described sleep quality rather than length as the leading academic success predictor (Gilbert & Weaver, 2010; Gomes et al., 2011; Killgore & Killgore, 2007; Meijer et al., 2000; Lund et al., 2010). Thacher (2008), Howell, etc. (2004) noticed no correlation between academic achievement and sleep quality to counter those results.

The object of the present study is to investigate the link between sleep (duration and habits) and academic achievement among students of Pharmacy undergraduates at Duhok University. We suppose that longer sleep periods will lead to improved academic results in relation to the impact of sleep on cognitive performance based upon experimental evidence.

In their research, Eliasson et al. (2010) reported that sleep and wakefulness timing appear to be a more significant contributor to academic success than the overall sleep quality. The research suggests that higher-performing students had sleep onset almost 40 minutes earlier on average and awakened nearly 50 minutes more first with no significant difference in total sleeping time compared to lower-performing students. Our research showed that going to bed early during the school week was significantly correlated with higher grades (p=0.008) in a partial agreement with Eliasson et al. (2010). Still, no meaningful connection was found between the wake-up timing and the grade of the course. In the current research, most participating pharmacy students wake up during the ordinary school week at 7 am-8 am or earlier (about 74.6 percent), likely to attend lectures in college classes. On the day of the test, several students (45.6 percent) reported waking up much earlier. In the light of revising the topic before the test, this is understandable. Repeated revisions will likely help solidify the student's memory and make it simpler and quicker for the student to remember and use their information whenever appropriate (Al Shawwa et al., 2015). This should not, however, be at the cost of having a proper sleep.

Another exciting outcome of this study is the association between the student's age and academic performance (represented by course grace), which was found to be significant in favor of younger students (p = 0.012). Previous studies that examined the relationship between age and academic achievement produced contradicting results. A moderate positive connection between age and achievement was identified by one researcher (Waldman & Avolio, 1986). On the other side, McEyoy & Cascio (1989) found that age was mostly irrelevant to performance, while Sturman (2003) found that the association between age and results had an inverted-U shape. However, Ng & Feldman (2008) observed that age was not linked significantly to innovation. However, the desire for academic success, which should be explored in the future, might influence several other variables: these variables involve the internal and external orientation and others include self-esteem, self-efficacy, cognitive capacity, and intellect (Naderi et al., 2009). Besides, the participant students are of convergent ages. All these can lead us to meet this finding with suspect. The courses or subjects chosen in this study were primarily according to the students' perception of difficulty and importance. Still, the differences in the courses' difficulty vary from stage to stage, which is logically increased with advanced stages, and this factor may play a more important role than age.

In this research, most pharmacy students slept less than the recommended amount of sufficient sleep. Notably, on a regular school week, the students had an overall sleep time of a little over 6 hours. The night previous to the test, they had far more severe sleep deficits, with a

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total sleep period of around 4 hours and 40 minutes.

An overview of this study results shows that students who slept less than 7 hours had a higher incidence of excessive sleepiness, tiredness upon awakening, and excessive sleepiness during study time and class time. Although the statistics didn't show the correlation to be significant, feeling sleepy through daytime can be considered a consequence of sleep inadequacies among the students at night.

Most importantly, unadjusted associations between academic performance (as measured by course grade) and duration of sleep the night before an exam had shown to be highly significant ($p = 0.009$). This result coincides with Zeek et al. (2015) research among pharmacy students, which found that the sleep period before the test correlates positively with academic success calculated by course degree and semester GPA. Zeek et al., however, suggested that the sleep period was not associated with academic success during an ordinary school week, much as what our research showed. This outcome is also compatible with Medeiros et al. (2001) research among medical undergraduates that showed that students who recoavbgrded sleeping received higher grades on tests over longer durations, as well as Veldi et al. (2005) research that showed that sleep habits are correlated with academic development.

Sleep defects that are widespread among pharmacy students may merit consideration from representatives of the college and administrators. Previous findings have shown that sleep deficiencies have contributed to sleep-related problems, including asthma, cardiovascular disease, and impaired cognitive activity and well-being, in addition to daytime exhaustion and more inferior academic achievement (Spiegel et al., 1999; Gangwisch et al., 2006; Kamdar et al., 2004).

The value of having a sufficient sleep before an exam should be taught to pharmacy students, especially if even one-hour additional sleep may be useful to graduate than an extra hour of study. It is highly appropriate that such guidance should be given to students in pharmacies in the first year, including results from this report, and tips for safe sleep hygiene, such as refraining from consuming big meals while bedding or preventing reading or watching television in bed (Centers for Disease Control and Prevention, 2007). Moreover, increased recognition of suitable sleep adjustments could help students establish sleep habits that continue into their licensed pharmacy occupations.

5. CONCLUSIONS

The study results indicate that most pharmacy students slept less than the suggested 7 hours of sleep during ordinary nights and nights before the exams. The study also found that going to bed earlier in the night is significantly correlated with higher grades (academic performance). The period of sleep before the test is positively connected to academic progress.

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