

Sleep quality and sleep associated problems in female pharmacy students

Abstract

Background: Sleep is an essential element for adolescent mental and physical growth and development, but today's young adolescents are deprived of this. Earlier studies in Europe and America showed pitiable sleep quality of young college students, which affect their academic growth. However, as per our literature search there is a lack of such studies in Indian context especially, within pharmacy education. **Objective:** The present study was designed to investigate the interrelation between the demographic characteristics, life-style, and academic progress with sleep quality and sleep problems along with daytime and nighttime habits in young female pharmacy students of India. **Materials and Methods:** Questionnaire on sleep and daytime habits (QS and DH) was prepared. Our sample survey consists of 226 female pharmacy students of Banasthali University. QS and DH of multiple choice type, covered demographic characteristic (3 questions) sleep and daytime habits (25 questions), life-style and academic progress (3 questions), and one question of course curriculum. Parameters were co-related by point scale method using the SPSS 16.0 software. **Results:** Data derived and analyze from survey illustrated that quality of sleep was as: Excellent - 20.4%, good - 38.5%, satisfactory - 35.8%, poor - 4%, and very poor - 1.3% of participants. Living condition ($\rho=0.168$, $P=0.011$), academic progress ($\rho=0.151$, $P=0.023$), leisure activity ($\rho=0.133$, $P<0.05$), and daytime naps ($\rho=0.160$, $P=0.016$) were significantly correlated with sleep quality. In addition, daytime sleepiness caused a significant problem for students and created a number of sleep disorders. Nevertheless, Sleep quality was not associated with age, body mass index, and coffee in the late evening. **Conclusion:** Study reported that sleep associated problems were common complaints in female pharmacy students.

Key words:

Academic progresses, course curriculum, living conditions, pharmacy students, sleep quality, sleep related problems

Introduction

Sleep is an essential component for adolescent growth and development, but today's young adolescents are deprived of this. Although, from 8 h 30 min to 9 h 15 min are the recommended sleep durations for adolescents college student's sleep has decreased from 7 h 45 min in 1969 to 7 h in 2009.^[1,2] Low sleep quality, sleep disturbances, and at least occasional sleep dissatisfaction are prevalent among most college undergraduates.^[3] Poor academic performance, depressed mood, irritation during the day, and daytime sleepiness (DS) is the consequences of insufficient sleep.^[4]


Several studies have revealed that age, sex, socio-economic status, daily life habits, and psychological aspect are contributory factors for sleep disturbances.^[5] Additionally, life-style, sleeping habits, and course curriculum affects the sleep quality. Nevertheless, the quality of sleep affects the leisure activity and academic progress. All the risk factors of sleep disturbances are well-documented for their link with sleep quality and academic progress along with some contrary findings.^[6] Furthermore, the study on German population has shown that the prevalence of global dissatisfaction with sleep increased with age and was

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higher in women.^[7] However, there is a lack of such kind of studies in Indian context. Further due to huge changes in the educational system of India in the last decade, need of the hour is to find the effect of course curriculum, work load, and life-style on sleep quality of students. To target diversified young women population of India Banasthali University students were selected as the study population. Additionally following reasons also encouraged us to do study on pharmacy students.

- In the last decade, various universities had changed the pharmacy syllabus
- Increase in number of pharmacy institutions in India
- Due to huge changes in life-style, inclination of students towards electronic media and mobiles until late night.

On the other hand from this until study, we have tried to emphasize the importance of proper sleep in academic life and also to assess the effect of course curriculum and student's life-styles on their sleeping hours and sleep quality. Therefore, the present study envisaged to investigate the interrelation between demographic characteristics, life-style and academic progress with sleep quality and sleep problems along with daytime and nighttime habits in young female pharmacy students of India.

Materials and Methods

Constitution and training of the survey team

The survey team consists of four data collectors and the principal investigator who co-ordinate the overall assessment. The training of data collector was given by the principal investigator.

Study area and study population

Banasthali University (Rajasthan, India) is the largest residential women's university in Asia. It has 8500 students from all over the India, including 340 pharmacy students. Data collection occurred during a period from October to December 2011. This study covered all pharmacy UG and PG students. A total of 324 pharmacy students (living in hostels) participated (Seven students were on medical leave during the study period and remaining nine students refused to take part in the survey) in an in-class survey, out of whom, 226 were considered for the study due to completely filled questionnaires. Informed consent was obtained from participating students and the study protocol was approved by the institutional ethics committee. The participants had an age of 15-26 (mean age 19.82) with a body mass index (BMI) of 15.30-26.90 kg/m² (mean BMI 19.89).

Questionnaire on sleep and daytime habits

Before implementation, the survey was pilot-tested (with a previously used pre validated questionnaire in European study) on a sample of 14 pharmacy students. It suggested the need of minor modification according to the study population. Questions related to the course curriculum and

sleep timing on weekends included to make sure

- The effect of course curriculum on sleep
- The effect of sleeping habits on sleep.

Additionally, question of the smoking habit removed due to its non-relevancy with Banasthali Campus environment. Finally, the study was carried out using a modified questionnaire.^[7] The questionnaire comprised of 29 questions (In English language) including information about socio-demographic characteristics, parasomnias, sleep and daytime habits, life-style, academic progress along with the course curriculum.

The majority of questions have been framed considering whole week while one question related to weekdays and from weekends only. Moreover, sleep and daytime habits, which included the average time needed for falling sleep, bedtime hour, the average number of nocturnal awakenings and sleep duration, were expressed as continuous variables on an interval scale. Two questions assessing the quality of sleep (usual sleep quality on the whole week and on the night before an exam) were ranked on a five point scale as 1 - excellent, 2 - good, 3 - satisfactory, 4 - poor, 5 - very poor.

Furthermore, In multiple choice questions which were considered as discontinuous variables on a nominal scale the students were asked to estimate the frequency of different symptoms during the week on a five point scale: 1 - never or almost never; 2 - less than once a week; 3 - once or twice a week; 4-3 - 5 nights or days a week; 5 - almost every day or night.

Nevertheless, academic progress, leisure activity and living conditions were expressed on a 4 point scale, 1 - excellent; 2 - good; 3 - satisfactory or 4 - unsatisfactory. One question enlightened effect of course curriculum on sleep quality marked on a 4 point scale as 1 - high, 2 - moderate, 3 - low and 4 - nil. The symptoms of insomnia Difficulty in initiating sleep, Difficulty maintaining sleep were also evaluated.

Statistics

For statistical analysis, SPSS 16.0 software package was used. The relationship between sleep quality, nighttime and daytime habits, sleep problems, living condition, leisure activity have studied with age and BMI (Not between age and BMI) using the Spearman Rank Order Correlations. All tests were used in the two-tailed version and $P \leq 0.05$ were considered as statistically significant.

Results

Demographic status

Among the 226 participants in the questionnaire with valid data on sleep assessment, Student's distribution within course was: 26.99% ($n=61$) in post-graduate courses and 73.01% ($n=165$) in under graduate courses of pharmacy.

They had age of 15-26 years (mean age 19.82±1.52) with a BMI of 15.30-26.90 kg/m² (mean BMI 19.89±1.48).

Sleep quality

Distribution of sleep quality for 226 participants were as (excellent - 20.4%, good - 38.5%, satisfactory - 35.8%, poor - 4.0%, very poor - 1.3%). Spearman Rank Order Correlation strongly suggested that subjective sleep was correlated with difficulty initiating and maintaining sleep including morning tiredness sleeps during the day and other daytime activities. Sleep quality was not associated with student's age and BMI. Among parasomnias items found wake up due to noise ($\rho=0.257, P=0.000$), nightmares (NM) ($\rho=0.167, P=0.012$), talking during the sleep ($\rho=0.140, P=0.036$), wake up too early and have difficulty in getting to sleep again ($\rho=0.217, P=0.001$), feel tired when waking up ($\rho=0.202, P=0.002$), daytime naps ($\rho=0.160, P=0.016$), academic progress ($\rho=0.151, P=0.023$), living conditions ($\rho=0.168, P=0.011$) and leisure activity ($\rho=0.133, P=0.045$) were mainly associated with sleep quality of pharmacy students of Banasthali. Possibly habits such as habitual time of going to bed, drinking

coffee, walking during sleep, nocturnal eating habits (NE), leg movement (LM) or disagreeable leg sensations, snore, grind teeth, etc., were not associated with sleep quality. All data with respect to sleep quality is shown in Table 1.

Academic progress

Academic progress on a four point scale was excellent - 2.2%, good - 45.6%, satisfactory - 42.9% and unsatisfactory - 9.3%. According to Spearman Rank Order Correlation, students' academic progress was linked with waking up due to noise ($\rho=-0.145, P=0.029$), feel tired when wakeup ($\rho=-0.193, P=0.004$), feel DS ($\rho=-0.146, P=0.028$), excessive sleepiness ($\rho=-0.315, P=0.000$), excessive leisure activity ($\rho=-0.204, P=0.002$) mainly, while age, BMI, day time and night time activities were not associated with academic progress.

Leisure activity

The question regarding leisure activity of students on a four point scale showed the following distribution: Excellent - 8.4%, good - 37.6%, satisfactory - 47.8%, and unsatisfactory - 6.2%.

Table 1: Spearman rank order co-relation between QS and DH, sleep quality, age and BMI

Questions	Sleep quality		Age		BMI	
	ρ	P value	ρ	P value	ρ	P value
When do you go to bed on weekdays?	0.138	0.038*	-0.030	0.648	0.075	0.262
When do you go to bed in weekends?	0.100	0.134	-0.081	0.228	-0.008	0.909
How long does it take you to fall asleep usually?	0.453	0.000*	0.014	0.830	0.010	0.880
How many times do you wake up during the night?	0.223	0.001*	0.050	0.456	-0.044	0.513
If you take daytime naps, how long are they?	-0.035	0.603	0.169	0.011*	0.034	0.611
How do you evaluate your sleep quality?			-0.061	0.360	-0.134	0.044*
How do you evaluate your sleep quality before an exam?	0.511	0.000*	-0.133	0.091	-0.079	0.240
Do you go to bed at an unusual time at night?	0.100	0.132	-0.056	0.400	-0.045	0.498
Do you have difficulty in getting to sleep at night?	0.360	0.000*	0.045	0.497	-0.056	0.399
Do you drink coffee late in the evening?	0.031	0.644	-0.013	0.847	-0.009	0.892
Do you use sleeping pills?	0.118	0.077	-0.049	0.459	-0.108	0.107
Do you wake up because of noise?	0.259	0.000*	0.055	0.406	-0.077	0.248
Do you wake up because of nightmares?	0.167	0.012*	0.004	0.951	-0.088	0.190
Do you wake up because of talking during sleep?	0.140	0.036*	0.077	0.250	-0.010	0.879
Do you wake up because of walking during sleep?	0.012	0.854	0.090	0.178	0.023	0.728
Do you wake up because of nocturnal eating habits?	0.009	0.890	-0.032	0.633	-0.029	0.664
Do you wake up because of leg movements or disagreeable leg sensations?	0.065	0.330	-0.079	0.236	-0.020	0.764
Do you snore?	-0.075	0.259	0.052	0.440	0.239	0.000*
Do you grind your teeth while asleep?	0.070	0.292	-0.035	0.603	0.027	0.685
Do you wake up too early and have difficulty in getting to sleep again?	0.217	0.001*	-0.064	0.335	-0.062	0.357
Do you feel tired when waking up?	0.202	0.002*	0.055	0.408	0.033	0.623
Do you feel daytime sleepiness?	-0.050	0.451	0.141	0.035*	-0.052	0.437
Do you feel excessive sleepiness during the lectures?	0.002	0.981	0.023	0.733	0.030	0.655
Do you feel excessive sleepiness in your free time?	-0.055	0.407	0.085	0.202	0.020	0.769
Do you take daytime naps?	-0.160	0.016*	0.216	0.011*	-0.021	0.755
How do you evaluate your academic progress?	0.151	0.023*	0.033	0.623	-0.041	0.536
How do you evaluate your leisure activity?	0.133	0.045*	-0.011	0.872	-0.052	0.434
How do you evaluate your living condition?	0.168	0.011*	0.076	0.256	0.034	0.610
Do you think your course curriculum affecting your sleep quality?	-0.059	0.380	-0.127	0.056	-0.013	0.849

QS and DH - Questionnaire on sleep and daytime habits; BMI - Body mass index; ρ - Spearman's correlation coefficient; *The correlation is statistically significant if $P < 0.05$

According to Spearman Rank Order Correlation, leisure activity of students was associated with difficulty in getting sleep at night ($\rho=0.253, P=0.000$), wake up due to noise ($\rho=0.154, P=0.021$), academic progress ($\rho=0.255, P=0.000$), living conditions ($\rho=0.339, P=0.000$), and course curriculum activity ($\rho=-0.204, P=0.002$). However, age, BMI, other day and night time activities were not associated with leisure activity.

Living conditions

Four point scale measurement of students on the living condition showed following distribution: Excellent - 9.7%, good - 48.7%, satisfactory - 36.7% and unsatisfactory - 4.9%.

According to Spearman Rank Order Correlation, living conditions were associated with difficulty getting to sleep at night (DGS) ($\rho=0.158, P=0.018$), grind teeth while sleep ($\rho=0.190, P=0.004$), feel tiredness while wake up ($\rho=0.203, P=0.002$), academic progress ($\rho=0.335, P=0.000$), leisure activity ($\rho=0.339, P=0.000$) while other night and daytime activities were not associated with living conditions.

Course curriculum

Study on female pharmacy students suggested that course curriculum affects a no. of sleep habits like timing of going to bed on weekdays ($\rho=-0.147, P=0.027$) and weekends ($\rho=-0.163, P=0.014$), sleep quality before exam ($\rho=-0.221, P=0.001$), going to bed at an unusual time ($\rho=-0.156, P=0.019$), wake up due to noise ($\rho=-0.145, P=0.029$), grinding teeth while asleep ($\rho=-0.133, P=0.046$), feel tired when waking up ($\rho=-0.193, P=0.004$), feeling DS ($\rho=-0.146, P=0.028$), excessive sleepiness in lectures ($\rho=-0.315, P=0.000$) and leisure activity ($\rho=-0.204, P=0.002$). Data are shown in Table 2.

Insomnia symptoms

The prevalence of nocturnal sleep disturbance symptoms were: 60.2% for sleep latency (after 1:00 am) and 4.4% for DGS every night. In addition to that waking up due to noise at night, NM, NE habits, LM or disagreeable symptoms for 3-5 nights/week were 5.8%, 0.9%, 0.4%, 3.1% respectively as shown in Table 3. Moreover, the occurrence of complaints about sleepiness such as tiredness in the morning (TM), DS, daytime sleepiness during classes and daytime sleepiness in free time for every night were found to be 8.4%, 22.12%, 7.5%, and 7.5% respectively which showed significant insomnia symptoms in the studied population.

Furthermore, the incidence of parasomnias such as snoring (S), sleep-talking (ST), and sleep walking (SW) was 0.4%, 6.6%, and 0.4% respectively taking place every day.

Discussion

According to our hypothesis course curriculum, daily

Table 2: Spearman rank order co-relation between QS and DH and course curriculum

QS and DH	Course curriculum	
	ρ	P value
Time going to bed on weekdays	-0.147	0.027*
Time going to bed in weekends	-0.163	0.014*
Time to fall asleep usually?	0.097	>0.05
Wakeup during the night?	-0.092	>0.05
Daytime naps, how long?	-0.128	>0.05
How you evaluate your sleep quality?	-0.223	0.001*
How you evaluate your sleep quality before exam?	-0.221	0.001*
Go to bed at an unusual time?	-0.156	0.019*
Difficulty in getting to sleep at night?	-0.081	>0.05
Take coffee late in the evening?	0.065	>0.05
Use of sleeping pills?	-0.012	>0.05
Wake up because of noise?	-0.145	0.029*
Wakeup because of nightmares?	0.024	>0.05
Wakeup because of talking during sleep?	-0.077	>0.05
Wake up because of walking during sleep?	0.022	>0.05
Wakeup because of nocturnal eating habits?	0.045	>0.05
Wakeup because of leg movements?	0.017	>0.05
Do you snore?	-0.071	>0.05
Grind teeth while asleep?	-0.133	0.046
Wake up too early and have difficulty in getting to sleep again?	-0.070	>0.05
Feel tired when waking up?	-0.193	0.004*
Feel daytime sleepiness?	-0.146	0.028*
Excessive sleepiness in lectures?	-0.315	0.000*
Excessive sleepiness in free time?	-0.087	>0.05
Take daytime naps?	-0.059	>0.05
Evaluation of academic progress?	-0.052	>0.05
Evaluation of leisure activity?	-0.204	0.002*
Evaluation of living condition?	-0.093	>0.05
Age	-0.127	>0.05
BMI	-0.013	>0.05

QS and DH – Questionnaire on sleep and daytime habits; BMI – Body mass index; ρ – Spearman’s correlation coefficient; *The correlation is statistically significant if $P<0.05$

Table 3: Frequency and percentage distribution of insomnia symptoms in female pharmacy students

Insomnia symptoms	3-5 days/week		Every night	
	Frequency	%	Frequency	%
DGS	10	4.4	15	6.6
NN	13	5.8	52	23
NM	2	0.9	2	0.9
NE	1	0.4	4	1.8
LM	7	3.1	2	0.9
TM	18	8.0	19	8.4
DS	32	14.2	50	22.1
DSC	28	12.4	17	7.5
DSF	19	8.4	17	7.5
Snoring	0	0	0.9	0.4

DGS – Difficulty getting to sleep at night; NN – Noise at night; NM – Nightmares; NE – Nocturnal eating; LM – Leg movements; TM – Tiredness in the morning; DS – Daytime sleepiness; DSC – Daytime sleepiness during classes; DSF – Daytime sleepiness in free time

lifestyle activities, sleeping habits, environment during sleep affects the sleep quality. Sleep may also affect the academic progress. Therefore, the principle aim of this study was to get access to the relationship between sleep quality, daytime and nighttime habits, academic performance living condition effect of course curriculum on sleep quality in female pharmacy students. The sample size used in the present study was small but included the most students of UG and PG course of Pharmaceutical Sciences enrolled at the university. The study revealed that complaints about sleep problems are common in young female pharmacy students at some extent. It was found that excessive DS due to insufficient sleep was associated with poor academic progress, and living conditions.

Our study revealed that environment during sleep ($\rho=0.257$, $P=0.000$), sleeping habits ($\rho=0.217$, $P=0.001$), living conditions ($\rho=0.168$, $P=0.011$), daily life style activities ($\rho=0.160$, $P=0.016$) affects sleep quality. However, 9.3% students are not satisfied with academic progress due to their sleep quality. In addition to that study also showed a lack of sleep during the night and course curriculum was highly associated with excessive sleepiness during lectures, and free time and TM.

Sleep quality of students were assessed on a five point scale as excellent, good, satisfactory, poor and very poor. It was found to be associated with academic progress, course curriculum, leisure activity, living conditions and parasomnias parameters such as nightmare and NE according to Spearman Rank Order Co-relation. On the other hand day, time and night time habit like SW, ST and S was not associated. Further, bedtime risked poor living condition because those students who sleep later did not arise commensurable later. In contrast, previous medical study an increased BMI is related to S.^[8]

Our results concluded that 1 in 3 students of studying population suffered from any of the insomniac symptom on every day. These symptoms are responsible for the poor academic progress, living condition and DS. While in a previous study on nursing students, it was found that one student in 4 reported insomnia symptoms.^[9] Similar studies reported that these symptoms were associated with an increased prevalence of various somatic disorders and were related to the perception of general health and quality of life.^[10,11]

Insomnia symptoms and DS were found to be associated with painful physical conditions. Stress, especially emotional response to it, was result to sleep aspect including sleep latency.^[12]

Nevertheless 46.5% participating Students were agreed that course curriculum highly and moderately affected their sleep quality. The relationship between naptime and awakenings suggested that longer naptime could be attributed to more

awakenings in the female college students. Irregularities in the sleeping pattern of students in the sleep schedules on a weekday and weekend may produce insufficient sleep and excessive DS as already stated by Manber *et al.* (1996).^[13] Evening oriented study of adolescents were identified as being more responsible for lowered mood and performance due to their difficulties in adapting their sleep patterns to accommodate the school schedule.^[14] Our finding suggests us that, if the Indian universities employed well managed course curriculum it will help the students in relation to the health. Further, for students who changed their sleeping habits (like late night sleeping, etc.) will also help them to improve their sleep quality.

Conclusion

All college students should be educated about the importance of maintaining good sleep habits because this population tends to develop poor sleep habits that lead to sleep deprivation, poor sleep quality, and insomnia. In our study, subjective sleep was correlated with all items of difficulty initiating and maintaining sleep including morning tiredness, sleeps during the day and other daytime activities, and it was found that wake up due to noise, NM, talking during the sleep, wake up too early and have difficulty in getting to sleep again, feel tired when waking up, daytime naps, academic progress, living conditions and leisure activity were mainly associated with sleep quality. Items, which do not affect sleep quality were habitual time of going to bed, drinking coffee, walking during sleep, NE, LM, snore, grind teeth, etc., Further, students'academic progress was found to be associated with noise, feel tired when wake up, DS and excessive leisure activity while age, BMI, day time and night time activities were not found to be associated with academic progress. Thus, sleep problems can significantly impair the student's academic performance and other daytime and night activities and can also have a negative impact on their overall performance.

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