ORIGINAL ARTICLE

Factors Leading to Late Sleeping Habits and its Effects on Academic Performance

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ABSTRACT

Background: For an adolescent the requirement of sleep does not decline though the opportunity to sleep is limited on account of lifestyle predilections, academic schedules, and compelling changes in the biological processes. Sleep affects physical growth, performance and emotional thinking in addition to influencing the cognitive functioning and attention span.

Objective: The primary purpose of this study was to know the effects of late sleeping habits on academic performance in school girls aged 10-13 years and to identify the factors leading to late sleeping habits in school girls aged 10-13 years.

Methods: A cross sectional survey was conducted on 355 girls studying in girls only schools. Multistage sampling technique was used. Sleep and academic performance questionnaire was administered after taking written informed consents from principals, students and their parents/guardians. Chi square test was applied for finding association between sleep habits and academic performance. *P* value less than 0.05 was taken as significant. .

Results: No significant association was found between *late* sleeping habit and academic performance since majority of the students i.e. 267 (75%) students slept before 11pm, the time which demarcates the late sleeping time with normal time. Significant association was found between habit of book reading before bed time and above average academic performance. Around 43% students drink milk before sleeping and majority watch television before sleeping. Likewise students who wake up fresh in the morning and do breakfast have above average academic performances.

Conclusion: Study findings conclude that majority of the girl students in the age group of 10-13 years sleep at an appropriate time and satisfy the day's requirement of 9 hours sleep. Therefore it does not affect their academic performance as majority of the students in the survey secured good grades.

KEY WORDS: *Late Sleeping Habit, Academic Performance, Sleep Behavior, Bedroom Environment.*

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INTRODUCTION

As children grow and mature through the ages of adolescence their requirement for sleep does not decline substantially, although the opportunity to sleep is restricted on account of lifestyle predilections, academic and practice schedules, and compelling changes in the biological processes. Sleep affects physical growth, performance and emotional thinking in addition to influencing the cognitive functioning and attention span.[1] On an average a 12 year old child needs 9 hours of sleep[2] but research has shown that biological changes during puberty affect an adolescent's internal sleep-wake clock and many adolescents are physiologically not ready to fall asleep until 11:00 pm or later.[3] Scientific studies have demonstrated that sleep contributes significantly to several important cognitive, emotional and performance-related functions.[4] A deprivation or excess of sleep may lead to detrimental effects as has been displayed by numerous studies. The phenomena has been demonstrated by Carskadon MA that insufficient sleep leads to daytime sleepiness, poor self-rated sleep quality, increased vulnerability to accidents and poor school achievements.[5] This claim was further validated by *Dahl R.E et al.,* in his study "Effects of sleep restriction in normal adolescents" and *Laberge L et al.,* "Development of sleep patterns in early adolescence".[6,7] Lack of sleep cause feelings of "sleepiness," decreased levels of alertness or concentration, and, in many cases, unanticipated sleep. Therefore this deprivation in sleep hours leads not only to poor academic performance but also to unintentional injuries, negative moods and increases chances of stimulant use.[4] *Carskadon MA et al.* in their study "Sleep loss in young adolescents" reported that when sleep duration is reduced below this level, alertness and school performance becomes objectively impaired.[7,8] Same observation was made by. *Randazzo AC et al,* in their study "Cognitive function following acute sleep restriction in children ages 10-14 years".[5,9] While on one hand sleep deprivation

has harmful consequences excessive sleepiness is also associated with reduced short-term memory and learning ability, negative mood, inconsistent performance, poor productivity and loss of some forms of behavioral control.[4] *Liu X et al.*, in 2004 conducted a comparative study on American and Chinese children. The results showed positive association between decrease sleep duration and delayed bedtime and daytime sleepiness affecting school performance in both groups. The results also reported that delayed sleeping and short duration of sleep is also linked to sleep problems in the form of sleep talking, difficulty in falling asleep, having a trepidation of sleeping in the dark and restless sleep.[10] Sleep patterns and sleep problems in children and adolescence are not only influenced by a large number of biological and psychological factors but also by cultural, social, and family factors. *Rona RJ et al.,* in her study "Disturbed sleep: effects of socio cultural factors and illness", pointed out that family and cultural principles play a pivotal role in development of certain habits.[11]

Internationally a great deal of work has been done on the effects of late sleeping habits specifically in context to unintentional injuries and deaths and also with poor academic performances and increase use of stimulants. Since not much work has been done on this issue in school children within Pakistan hence the topic was selected to analyze this issue of late sleeping and its effect especially on academic performance in ages 10 to 13 years. Our basic aim was to identify the effects of late sleeping habits on academic performance in female school children aged 10-13 years and factors leading to late sleeping habits in school children within the same age group.

METHODOLOGY

This cross sectional study was conducted from February 2012 to October 2012 within East district of Karachi. For the purpose of our study we included girls aged 10-13 years from two private schools of Karachi. This age group was

specifically selected as this is a phase of early adolescence where children start showing signs of independence. A sample size of 384 was selected at 50% prevalence through the standard WHO sample size calculator. Sampling technique was multistage in which two girls school in district east were randomly selected out of a total of 14 girls only school. Lists of the schools were taken from Education Department. In the second stage 200 students were selected from each school through systematic sampling technique. Final data was collected from 355 students who fulfilled the inclusion criteria which consisted of girls' school from District East Karachi aged 10-13 years receiving education at private schools only. Girls having single parents, those suffering from disability and those suffering from chronic disease that may interfere with their sleep pattern were excluded from the study. Cut off for late sleeping time was taken as 11 pm.[2] Whereas academic performance was classified as poor if students scored C D and E grades whereas A and B grades were taken as good performance.

The academic performance was assessed through school records. Survey was conducted after taking written informed consents from Principals, students and their parents/guardians. Students of grades V to VII were requested to complete a pre-tested self administered questionnaire to assess the late sleeping habits and their effects on school performance. Questionnaire was simultaneously given to all students of the class and they were not allowed to discuss questions with each other. The questionnaire was collected from them before leaving classroom. The purpose of study was explained to the students and they were informed that the data will not be used for any other purpose. The questionnaire was based on the literature search and the validated School Sleep Habits Survey Questionnaire[12] and included a wide array of questions regarding bedroom environment, sleep behavior, sleep problems and activities before bedtime. Concerning the categorical nature of the variables Chi square was applied for associations between frequency of late sleeping with bedtime activities, sleep disturbance, problems and academic performance. Before analysis, data was cleaned for possible data entry errors. The data entry and analysis was done on Epi Info 6. P value was calculated at 95% confidence level.

RESULTS

A 100% response rate was observed since prior information was provided to the school administration; all students in grades V to VII were present on the chosen day for data collection. The education level of the parents revealed 59% fathers to have qualification equal or greater than graduate level. Similarly 44% mothers were found to have qualification equal or greater than graduate level.

When information regarding sleep time was seen it was observed that 175(50%) students slept between 10-11 pm while almost equal numbers responded to either sleeping before 10 pm and after 11 pm. Out of the total almost half of the students 159(45%) did not take afternoon nap on a routine basis and 204(58%) responded that they slept within 20 minutes after going to bed. Regarding bedroom environment and as illustrated in Table 2, 257(72%) responded to sleeping with their siblings while only 78(22%) slept alone. One hundred and Fifty three (43%) students had a computer in their room as compared to 125(35%) students who had TV in rooms. In response to the morning waking time 296(83%) responded that they woke up before 7 am in the morning. Two hundred and Seventy Three (77%) responded that they woke up fresh in the morning while 112(32%) said that they felt irritated in the morning. Morning appetite was found to be good in 223(63%) of students (Table 2).

When information regarding sleep behavior was recorded majority 230(65%) responded that they did not think they sleep too little as compared to 259(73%) students who said that they did not sleep too much. Regarding a question on having nightmares 193(54%) replied in the affirmative. While only 18(5%) said they sleep walk at night as compared to only 7(2%) students complaining of bed wetting. Seventy Five (21%) children conceded that they talked during sleep as informed by their parents (Table 2).

School performance was evaluated on the basis of certain indicators made on basis of observation. It was found that headache during school hours seemed to be more common as around 191(54%) students responded of having episodes of headache during school timings as compared to nausea and vomiting which was not a frequent symptom in majority of the students 284 (80%). Approximately 257 (72%)

students replied in affirmative to the feeling of tiredness during school hours. Two hundred and fifty six (72%) stated that they fell asleep suddenly in class room especially in boring sessions.

School performance was evaluated on their grades as well as their interest in class. School Records exhibited that 251(70%) students secured A and B grades in academic performance. When an association between school performance and time of sleep was calculated the P-value was found to be insignificant since majority of the students 267 (75%) slept early that is before 11 pm and majority of them secured A and B grades (Figure 1). Table 1 highlights the activities students execute before going to sleep. Significant value (p=0.015) were observed with habit of reading books before sleeping. Students who pursued

the habit of afternoon nap everyday showed good academic performance however the p value was insignificant. When an association between academic performance and bed room environment was calculated, significant value (p value=0.04) was found between good academic performance and presence of computers and/or television in bed rooms.

Borderline significant results (p-0.07) were achieved with sleep disturbance in the form of nightmares, sleep walking and talking and poor academic performance. Out of the total 220(62%) students who woke up fresh in the morning, 161(73%) displayed good academic performance. Similarly out of 223 (61%) who had a good appetite 169 (75%) demonstrated good academic performance as confirmed by significant P values (0.018).

Figure 1. Association of Academic Performance with time of Sleep (n=355)
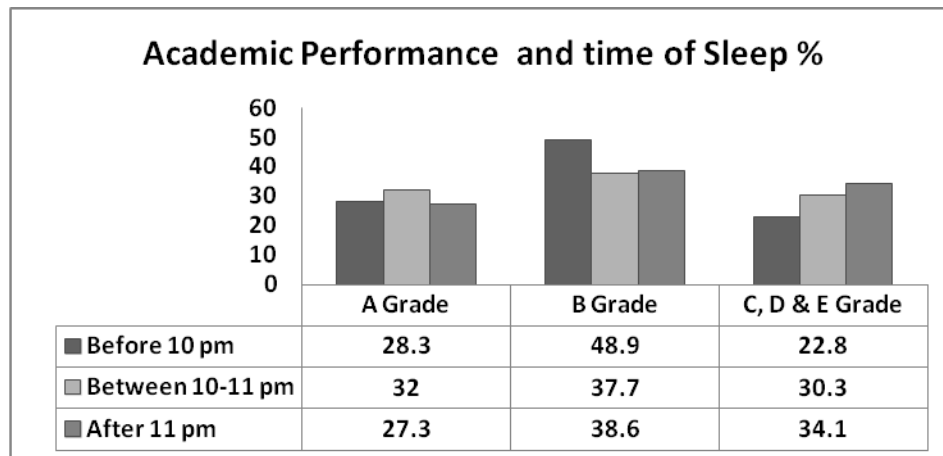

Table 1. Performance according to Time and Activities before bedtime

Time and Activities	No. of Subject	Performance			P-value
		A Grade	B Grade	C/D/E Grade	
Fall Asleep within 20 minutes					
Yes	204	65 31.9	83 40.7	56 27.5	0.389
No	151	41 27.2	62 41.1	48 31.7	
Take Afternoon Nap					
Occasionally	159	51 32.1	66 41.5	42 26.4	0.107
Everyday	80	30 37.5	27 33.8	23 28.8	

Never	114	24 21.1	51 44.7	39 34.2	
Read Books Before Going to Bed					
Yes	179	58 32.4	81 45.3	40 22.3	**0.015**
No	176	48 27.3	64 36.4	64 36.4	
Watch TV Before Going to Bed					
Yes	231	66 28.6	89 38.5	76 32.9	0.124
No	124	40 32.3	56 45.2	28 22.6	
Drink coffee/ Milk/tea Before Going to Bed					
Coffee/Tea C Coffee/ Tea	30	11 36.7	9 30.0	10 33.3	
Milk	154	55 35.7	59 38.3	40 26.0	0.111
None	171	40 23.4	77 45.0	54 31.6	
Do home work Before Going to Bed					
Yes	182	58 31.9	70 38.5	54 29.7	0.594
No	173	48 27.7	75 43.4	50 28.9	
Use Internet/Computer Before Going to Bed					
Yes	75	24 32.0	31 41.3	20 26.7	0.829
No	280	82 29.3	114 40.7	84 30.0	

Table 2. Performance according to Bedroom environment & sleep behavior

Time and Activities	No. of Subject	Performance			P-value
		A Grade	A/B Grade	B/C/D/E Grade	
Sleep					
With Parents	66	13 19.7	32 48.5	21 31.8	
With Siblings	211	64 30.3	84 39.8	63 29.9	0.242
Alone	78	29 37.2	29 37.2	20 25.6	
Have a TV/Computer in Bedroom					
TV in room	50	8 16.0	21 42.0	21 42.0	
Computer in room	230	74 32.2	88 38.3	68 29.6	**0.040**
Both TV & Computer	75	24 32.0	36 48.0	15 20.0	
Sleep Behavior					

Sleep too little	124	**39** 31.5	**44** 35.5	**41** 33.1	
Sleep too much	90	**31** 34.4	**36** 40.0	**23** 25.6	0.338
Normal	141	**36** 25.5	**65** 46.1	**40** 28.4	
Disturbance in Sleeping					
Nightmares	142	**37** 26.1	**65** 45.8	**40** 28.2	
Sleepwalk/Talking during sleep	79	**29** 36.7	**34** 43.0	**16** 20.3	**0.076**
Normal	134	**40** 29.9	**46** 34.3	**48** 35.8	
Morning Waking Time					
Before 6 am	64	**12** 18.8	**31** 48.4	**21** 32.8	
Between 6-7 am	232	**77** 33.2	**91** 39.2	**64** 27.6	0.258
After 7 am	59	**17** 28.8	**23** 39.0	**19** 32.2	
Morning Waking Category					
Wake up fresh in the morning	220	**78** 35.5	**83** 37.7	**59** 26.8	**0.013**
Feel irritated	135	**28** 20.7	**62** 45.9	**45** 33.3	
Have good appetite in the morning					
Yes	223	**75** 33.6	**94** 42.2	**54** 24.2	**0.018**
No	130	**31** 23.8	**50** 38.5	**49** 37.7	

DISCUSSION

In this study effects of late sleeping habits on academic performance were assessed through a self administered questionnaire given to school girls aged 10-13 years.

International research has shown that adolescent sleep-wake patterns were found to be affected by increased demand of schoolwork[13,14], increased extracurricular activities and part-time jobs[4,15] pubertal development [7,16,17] and changes in circadian rhythm.[18] Many studies have consistently demonstrated that bedtime is delayed with increase in age throughout adolescence, while wake-up time remains constant due to school starting times. Consequently, total sleep time is decreased during high school, while daytime sleepiness is increased.[15,19] In our study cut off

for late sleeping was taken at 11 pm. From our study it was found that majority of students (75%) sleep before 11 pm and the trend is consistent even in higher grades. The duration of sleep at night varies from 6.5 to 7 hours. Similar findings were seen in a study conducted by Bhatia et al[20] in which the average age of the sample was 15.1 years and total sleep time was 7.8 hours per day and most of the adolescents went to bed by 11.00 pm (41.5%). In our study, around 22% students regularly take afternoon nap which adds to the total sleep duration/day. In Korea a study was carried out to examine the sleep habits and excessive daytime sleepiness in high school students and it was found out that the mean total sleep time was 6.3 h/day for male students and 6.5 h/day for female students.[21]

Interesting associations were observed with certain bedtime activities and academic performance. Book reading before going to bed

at night was significantly associated with good school performance as found out by Chi- square analysis where *P* value was 0.015. It was also observed that majority of the children (46%) do not take milk or any other beverage before going to bed. Research has shown strong association of television viewing and sleep disturbance which inadvertently affects the academic performance. Owens *et al.* reported in his study that television viewing habits associated most significantly with sleep disturbance especially in the context of having a television set in child's bedroom.[22] In our study it was observed that 65% students watch television before going to bed and only 35% have a television set in their bedroom (*P value*= 0.04).

Sleep behavior was assessed on the amount of sleep the children take every day, sleep talking, walking, nightmares and bedwetting, 35% girls reported sleeping too little as compared to 26% who slept too much, Forty percent reported seeing nightmares while sleep walking was self reported by 22% respondents. Short *et.al* reported in his study conducted in 2013 that 14% of the adolescents reported too little sleep and nightmares were a reason for disturbed sleep in only 4% adolescents.[23] Significant association was observed between academic performance and disturbed sleep (*P value*= 0.01). Aguilar *et al.* also reported the same findings in his study, which stated that on average the number of subjects failed in class is higher with adolescents who complain about sleep (*P value*=.04), who are tired at waking up time (*P*=.048) and who have morning sleepiness (*P value*=.004).[24]

In our study majority of children (65%) woke up between 6-7 am. Parents in 78% cases awaken the children in the morning. 72% children sleep with their siblings. 77% children responded that they woke up fresh in the morning and this variable showed significant association with good academic performances (*P value* 0.01). Gionnotti et *al.* in his study had claimed that students who have difficulty in waking up in the morning referred more frequently the occurrence of injuries and almost 13% reported poor school performance.[25]

Sixty two percent children responded to having good appetite in the mornings and this again has shown a significant association with good academic performance.

School performance was assessed on the basis of grades and behavior in classroom. Twenty two students responded that they suffered from headache during school hours quite often. In our study day time sleepiness was observed in 72% students especially in boring class sessions.

Previous studies reported that the prevalence of daytime sleepiness ranged from 0.5 to 36%, depending upon study population, definition, and methodology.[25] In majority of the studies the range is however 10-20%. In a questionnaire survey by Saarenpaa-Heikkila *et al.*, the prevalence of daytime sleepiness was found to be 20% for boys and 22% for girls between the ages of 7 and 17 years.[26] In a sample of 1125 adolescents aged 15-18 years, using the Sleep-EVAL system, Ohayon *et al.* demonstrated that the prevalence of daytime sleepiness was 19.9%.[27]

The major strength of this study included its unique topic which has not been studied in our country. The simplicity and clarity of the questionnaire as the data collecting tool is yet another strength of this study. Then we had some new findings observed in this study which can be further researched again in future. Our limitations included the sample size which was representative neither on gender basis nor on socio economic conditions as only girl schools was taken in this survey. Another limitation was the age group. This age group should be further enlarged to include students up to 17 years of age in future studies and the cutoff time taken for late sleeping should be then shifted to midnight. Though the sample size was small, yet certain observations in this study can have a profound effect on students especially the association of book reading at bedtime and good academic performance and the significance of breakfast in good school performance. In future, this topic can be studied on a larger sample which will be representative of the population and the limitations observed in this project should be removed to bring more valid results.

CONCLUSION

Study findings conclude that majority of the girl students in the age group of 10-13 years sleep at an appropriate time and satisfy the day's requirement of 9 hours sleep. Therefore it does not affect their academic performance as majority of the students in the survey secured

good grades. Hence we can support the claim put forth by Matricciani *et.al.*[28] that there is currently insufficient high level, low risk of bias

data to support specific sleep recommendations for children that can be beneficial for their cognitive functioning.

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