

ASSESSMENT OF SLEEP QUALITY AND PATTERNS SUGGESTIVE OF SOMNIO-PATHIES AMONG STUDENTS OF ARMY MEDICAL COLLEGE, RAWALPINDI

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ABSTRACT

Objective: To assess sleep quality and sleep patterns among students of Army Medical College, Rawalpindi.

Study Design: Cross sectional study.

Place and Duration of Study: Army Medical College, Rawalpindi, from Mar to May 2017.

Material and Methods: Pittsburgh sleep quality index (PSQI) questionnaire was administered to a total of 567 students. PSQI component and global scores of male and female students were statistically correlated. Excel 2013 was used for statistical analysis of the collected data.

Results: Out of the 567 administered questionnaires, complete responses amounted to 362 (Response Rate: 63.8%); among them, 217 (60%) were females and 145 (40%) were males. Class-wise distribution of the students was as follows: 170 (47%) students from 1st year, 140 (38.7%) from 2nd year, 32 (8.8%) from 4th year and 20 (5.5%) from final year. Mean age of the participants was 19.57 ± 1.48 years (range: 17-25 years). Overall, 124 (34%) students were bracketed as 'Good Sleepers' whereas 238 (66%) fell into the category of 'Poor Sleepers' with a mean PSQI score of 6.67 ± 2.275 . This percentage frequency distribution and mean PSQI score did not differ significantly ($p=0.33$) between genders. Female students reported significantly lower sedative usage ($p<0.001$) but greater daytime dysfunction ($p<0.001$) than their male peers. Furthermore, mean nocturnal sleep period was significantly shorter ($p=0.046$) for 1st year students as compared to 2nd year students.

Conclusion: Prevalence of poor sleep quality is high among students of Army Medical College and mean nocturnal sleep period appears to be the most deranged sleep component.

Keywords: Sleep quality, medical students, Pittsburgh sleep quality index.

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INTRODUCTION

Throughout history, sleep has been identified as a necessary physiological process required for fueling up the human body. Substantial amount of data underpins the role of sleep in maintenance of optimal neurocognitive and psychomotor performance as well as physical and mental health¹. Poor sleep quality is implicated in a number of psychiatric illnesses like psychosocial stress and depression, and is also known to act as a pivotal modulator of cardiovascular, endocrine, immune and nervous health.

Sleep disturbances are endemic in our modern world; approximately one-third of adults report some form of insomnia². Medical students

constitute a particularly vulnerable population which is subjected to various stressors that include large academic load, tight schedules, long study hours, examination stress, peer pressure, high parental expectations and competitive environment¹. Sleep deprivation among medical students not only subjects them to psychiatric illnesses but also adversely impacts their cognitive skills, emotional intelligence, academic performance, clinical skills and ability to empathize².

This cross-sectional study was designed to assess sleep quality among the students of Army Medical College, Rawalpindi. Being under the military umbrella, AM College has a strictly disciplined environment in general. Cadets undergo military training which further contributes to stress above and beyond that already experienced by medical students. Previous studies have demonstrated a high

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incidence-rate of poor sleep quality among medical students in general³⁻⁴. However, sleep quality assessment of a military-run medical institute's students could not be found in the existing literature^{1,5-16}. Thus, our study is first of its kind which seeks to assess sleep patterns prevalent among Army Medical College students and any gender differences in this regard.

MATERIAL AND METHODS

This cross-sectional study was conducted from Mar to May 2017 and data was collected after written and informed consent from Army Medical College, Rawalpindi. Prior approval was obtained from the Ethical Review Committee of

responses received amounted to 362. PSQI is a 19-item self-reported questionnaire that evaluates sleep quality over the past month. It yields seven sleep components related to sleep habits and overall sleep quality. The first component score, subjective sleep quality, is determined by one item (Q6). The second component, sleep latency, is determined by two items (Q2 and Q5a). The third component, sleep duration, is determined by one item (Q4). The fourth component, habitual sleep efficiency, is determined by two items (Q1 and Q3). The fifth component, sleep disturbance, is determined by sum of nine items (Q5b, Q5c, Q5d, Q5e, Q5f, Q5g, Q5h, Q5i and Q5j). The sixth component, sleep medication usage, is

Table-I: Comparison of various components of PSQI between female and male cadets of AM College.

Variables	Statistical Characters	Female Students n=217	Male Students n=145	All Students n=362	p-value for gender
Component 1: Subjective Sleep Quality	PSQI Component Score Mean ± SD	1.037 ± 0.844	0.910 ± 0.781	0.986 ± 0.820	0.15
Component 2: Sleep Latency	Mean Sleep Latency (min) ± SD [Median (min)] [Mode (min)]	17.63 ± 15.83 [13][10]	15.14 ± 13.37 [10][10]	16.63 ± 14.9 [13][10]	0.12
Component 3: Sleep Duration	Mean Sleep Duration (hours) ± SD [Median (hours)] [Mode (hours)]	5.547 ± 1.48 [5.5] [6]	5.658 ± 1.30 [6][6]	5.59 ± 1.41 [5.5][6]	0.46
Component 4: Habitual Sleep Efficiency	Mean Habitual Sleep Efficiency (%) ± SD [Median (%)] [Mode (%)]	88.83 ± 21.92 [93.75] [100]	84.41 ± 24.81 [92.31] [100]	87.05 ± 23.19 [92.86] [100]	0.075
Component 5: Sleep Disturbances	PSQI Component Score Mean ± SD	0.986 ± 0.540	1.048 ± 0.518	1.011 ± 0.531	0.277
Component 6: Sleep Medication	PSQI Component Score Mean ± SD	0.106 ± 0.464	0.338 ± 0.648	0.199 ± 0.556	*<0.001
Component 7: Daytime Dysfunction	PSQI Component Score Mean ± SD	1.631 ± 0.929	1.290 ± 0.824	1.494 ± 0.903	*<0.001
PSQI Global Score	PSQI Global Score Mean ± SD [Median] [Mode]	6.788 ± 2.9 [7] [7]	6.503 ± 2.5 [6] [6]	6.67 ± 2.75 [7] [6]	0.33

*p<0.05 is considered as significant.

the institution. The study population comprised of undergraduate students enrolled in MBBS and BDS courses at AM College. A non-probability convenience sample was drawn from the above-mentioned population. Sample size was calculated using the 'Sample Size Calculator' of Creative Research System's survey software. For a population of 1100 students, a sample size of 567 was calculated (confidence level: 95%, confidence interval: 2.865).

A self-report questionnaire, Pittsburgh sleep quality index (PSQI), was administered to a total of 567 students. The number of complete

determined by one item (Q7). While the seventh component, daytime dysfunction, is determined by two items (Q8 and Q9). These seven components yield a score ranging from 0 to 3, with three indicating the greatest dysfunction¹. The sleep component scores are summed to yield a total score ranging from 0 to 21 with higher total scores (referred to as global scores) indicating poor sleep quality. In accordance with PSQI scoring protocol, subjects with a global score above 5 are classified as poor sleepers. Those with a score of 5 or less are classified as good sleepers. PSQI instrument has a diagnostic

sensitivity of 89.6% and specificity of 86.5% ($\kappa=0.75$, $p<0.001$) in distinguishing good and poor sleepers³.

Statistical analysis of the data was performed using Excel 2013. Means and standard deviations of subjective sleep quality scores, sleep disturbances scores, sleep medication scores, daytime dysfunction scores, sleep latency, sleep duration, habitual sleep efficiency and PSQI global scores were calculated. Median and mode values for latency, duration, sleep efficiency and PSQI global scores were also computed.

used to assess whether the mean values (for sleep components and PSQI global scores) among the two genders were statistically different. Frequencies of poor and good sleepers among the two genders were also compared. Student's t-test was also employed to compare mean values for sleep components and global PSQI scores among 1st year and 2nd year students. A p -values <0.05 were regarded as statistically significant.

RESULTS

Out of a sample of 567 medical students of AM College, 362 subjects completely filled the

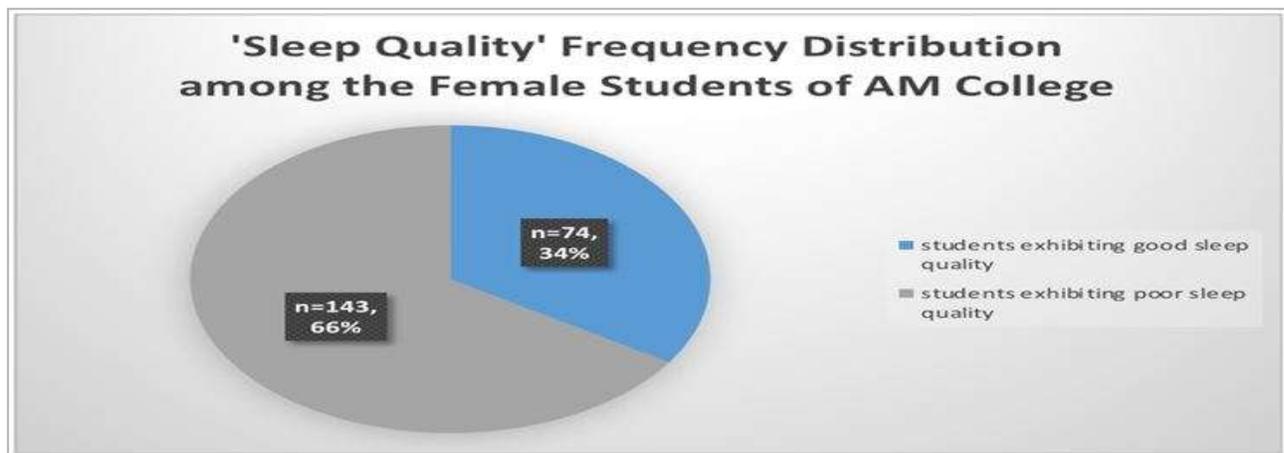


Figure-1: Frequency distribution of sleep quality among the female students of AM College.

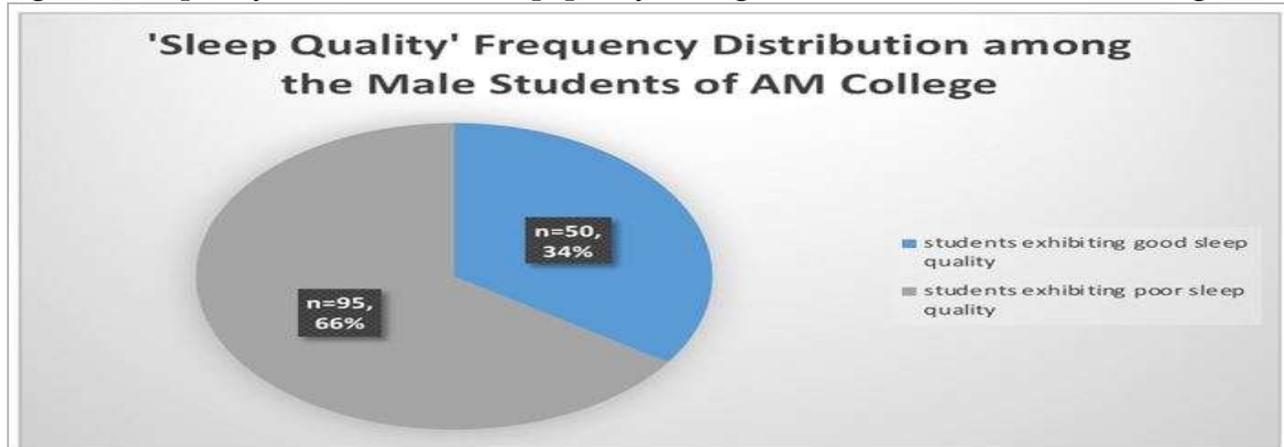


Figure-2: Frequency distribution of sleep quality among the male students of AM College.

Furthermore, frequency distribution was generated for these variables. Finally, poor and good sleepers were differentiated and their frequencies (along with percentages) were calculated. Sleep quality was statistically correlated with gender and student's t-test was

response forms. (response rate: 63.8%). Among them, 217 (60%) were females and 145 (40%) were males. Class-wise distribution of the students was as follows: 170 (47%) students from 1st year, 140 (38.7%) from 2nd year, 32 (8.8%) from 4th year and 20 (5.5%) from final year. Mean age of the

participants was 19.57 ± 1.48 years (range: 17-25 years). Comparison of various component scores and global PSQI scores between females and males (table-I) (fig 1 & 2).

A general trend towards poor sleep quality is found to be prevalent among the students of Army Medical College as indicated by mean global PSQI score (6.67 ± 2.275). Overall, 124 (34%) students were bracketed as 'Good Sleepers' whereas 238 (66%) fell into the category of 'Poor Sleepers'. This percentage frequency distribution did not differ significantly ($p=0.33$) between the two genders. Among females, 143 (66%) were

this duration ranged from (16-30) minutes for 26% ($n=95$), (31-45) minutes for 5% ($n=17$) and (46-60) minutes for 4% ($n=15$) of the respondents; only 1% ($n=2$) of them had sleep latency above 60 minutes. 'Sleep duration' was found to be the most flawed sleep component (mean score: 1.589). About 17%, ($n=62$) of the total students slept for more than 7 hours, 31% ($n=112$) for 6-7 hrs, 28% ($n=101$) for (5-6 hrs) whereas 24% ($n=87$) students had a sleep duration below 5 hrs. About 240 (66%) of the total students went to bed at/after midnight. 'Habitual sleep efficiency' measured in most of the students ($n=257$, 71%) was greater than 85%. Frequency of 'sleep

Table-II: Comparison of various components of PSQI between 1st year and 2nd year students of AM College.

Variables	Statistical Characters	1st year students n=170	2 nd year students n=140	p-value for class level
Component 1: Subjective Sleep Quality	PSQI Component Score Mean \pm SD	1.070 ± 0.881	0.957 ± 0.738	0.228
Component 2: Sleep Latency	Mean Sleep Latency (min) \pm SD [Median (min)] [Mode (min)]	15.088 ± 12.938 [10] [10]	17.05 ± 15.496 [15][15]	0.225
Component 3: Sleep Duration	Mean Sleep Duration (hours) \pm SD [Median (hours)] [Mode (hours)]	5.368 ± 1.305 [5.5] [6]	5.688 ± 1.513 [6] [6]	*0.046
Component 4: Habitual Sleep Efficiency	Mean Habitual Sleep Efficiency (%) \pm SD [Median (%)] [Mode (%)]	88.892 ± 22.188 [94.286] [100]	84.593 ± 25.446 [91.987] [100]	0.105
Component 5: Sleep Disturbances	PSQI Component Score Mean \pm SD	1.029 ± 0.538	0.986 ± 0.523	0.479
Component 6: Sleep Medication	PSQI Component Score Mean \pm SD	0.247 ± 0.553	0.143 ± 0.531	0.088
Component 7: Daytime Dysfunction	PSQI Component Score Mean \pm SD	1.588 ± 0.940	1.393 ± 0.895	0.064
PSQI Global Score	PSQI Global Score Mean \pm SD [Median] [Mode]	6.923 ± 2.715 [7] [7]	6.536 ± 2.744 [6][6]	0.215

* $p<0.05$ is considered as significant.

poor sleepers and 74 (34%) were classified as good sleepers. While among males, 95 (66%) were poor sleepers and 50 (34%) had good-quality sleep.

Most of the students ($n=173$, 48%) considered their 'subjective sleep quality' to be 'fairly good'. About 56.6% (158/279) of the students who regarded their sleep quality as very good/fairly good were actually classified as 'poor sleepers' based on their global PSQI scores. Thus, poor sleep quality was greatly under-reported. 'Sleep latency' scores (mean score: 0.818) were more towards the positive side of the scale and it just took a maximum of 15 minutes for most of the students ($n=233$, 64%) to accomplish transition from wakefulness to sleep; however,

disturbances' for most of the students ($n= 263$, 72.6%) was less than once a week. Occurrence of bad dreams was found to be the most recurrent sleep intrusion. 'Usage of sleep medications' was significantly higher ($p<0.001$) in males than that in females, however the trend was more towards non-usage in both genders. 'Daytime dysfunction' was perceived to be quite pronounced among the students. Furthermore, its prevalence was higher in females ($p<0.001$). A comparison between 1st year and 2nd year students was also done for PSQI global score and its sub-scores. First year students had significantly shortened sleep hours ($p=0.046$). However, the two groups did not differ significantly in other components of sleep.

Moreover, their PSQI global scores were also similar. Comparison between the two groups is shown in table-II.

DISCUSSION

Our study is the first on reporting sleep quality and somniopathies in students of Army Medical College. It indicated a poor sleep quality prevalence rate of 66% among the students of AM College (mean PSQI score: 6.67 ± 2.75). It was in contrast to a national study⁴ conducted at five medical colleges in Karachi which reported a prevalence rate of 39.5% using the same PSQI instrument; however their sample size was larger (n=504) as compared with our sample of 362 medical students from a single institute. Females in that study⁴ reported poorer sleep quality; however, no such gender differences existed in our study. The percentage of students going to bed after midnight (72%) was greater than that observed in our study (66%). Mean sleep latency (21 ± 16.5 min) was more delayed. Average nocturnal sleep period in their study⁴ was 6.4 ± 1.5 hours which was more than that found by our study (5.59 ± 1.41 hrs).

Another national study on medical students of CMH Lahore⁵ reported a mean PSQI score of 8.1 ± 3.12 with 77% respondents classified as poor sleepers. Thus sleep quality was shown to be even more deranged when compared to our findings. A high percentage of respondents (27.8%) got less than 5 hours of sleep per night which was in consonance with our results (24%). However, the sample size in this study was smaller (n=263). The study did not find any significant correlation between genders and sleep quality, as was the case in our study.

In Asia, epidemiological data of sleep quality (assessed using PSQI instrument) among medical students are available from China, Iran, India, Malaysia, Hong Kong, Thailand and Saudi Arabia⁶⁻⁹. The prevalence rate of poor sleep quality was 19% in a study comprising Chinese medical students⁶; 40.6% among Iranian medical students (n=224)⁷; 59% among the students (n=50) of Teerthankar Mahaveer Medical College,

India⁸; and 72.5% among the female students (n=546) of Riyadh College of Dentistry and Pharmacy, Saudi Arabia (mean nocturnal sleep period: 5.85 ± 1.853 which was similar to that in our study)⁹. In Africa, one Nigerian study (n=261)¹⁰ revealed poor sleep quality in 32.5% of medical students. In Europe, a Lithuanian study¹¹ demonstrated poor sleep quality in 40% students of medicine. Mean PSQI score was found to be 6.56 and sleep onset latency was 19 ± 16 min, both of the parameters were in consonance with our findings. Data are also available from North and South America. A survey-study of Brazilian¹² medical residents and students (n=206) revealed that poor sleep quality was more pronounced among medical residents (mean PSQI score: 6.76 ± 2.81) as compared to medical students (mean PSQI score: 5.9 ± 2.39). The scores of Brazilian medical students were better than those of our study indicating better sleep quality in them. Another Brazilian study¹³ confirmed poor sleep quality among 38.9% of medical students as compared to 66% in our students (n=27). In United States of America¹⁴ medical students' sleep quality (mean PSQI score: 6.37 ± 2.57) was significantly worse than a healthy adult population; 50.9% students were classified as poor sleepers out of a sample of 314 medical students which is less than that of our study. Another USA study¹⁵ reported a 55% prevalence rate of poor sleep quality among pharmacy students (n=253) whereas it is 66% in our study.

The findings of our study clearly indicate that sleep quality is quite poor among the students of Army Medical College and its prevalence rate is higher than that reported by most of the international studies. This might be attributable to the generally strict environment of the college. Another interesting finding of our study is that 56.6% students who consider their sleep quality to be very/fairly good are actually poor sleepers as indicated by their average PSQI global scores. This seemingly paradoxical finding suggests lack of sleep-awareness among the students. In a review article¹⁶, various studies assessing sleep awareness among students were

reviewed and it was found to be generally poor. Our study also makes a comparison between the two genders and demonstrates greater daytime dysfunction among female students which is in consonance with another Indian study⁸. However, sedative usage is much lower among this group. Moreover, mean nocturnal sleep period is found to be shorter among freshmen as compared to 2nd year students; a Taiwanese study¹⁷ shows similar findings.

Such a high prevalence of poor sleep quality is alarming and calls for our attention. Various studies have demonstrated that sleep quality among medical students is significantly correlated to academic performance^{9,13,15}, clinical skills¹⁸ and ability to empathize¹⁹. Thus, it is imperative to design further studies with an aim to dig out the factors effecting sleep quality so that effective planning can be done to combat them.

However, our study is not without its limitations. PSQI inventory was used for data collection which is a self-report questionnaire, thus, the presence of social desirability bias and recall bias is unavoidable. Also, voluntary participation may induce error in the sampling technique and subject it to selection bias. Moreover, the data was collected from a single institution therefore our results cannot be generalized to the entire medical student population.

CONCLUSION

Our study concludes that poor sleep quality prevalence is high among the medical students of Army Medical College, Rawalpindi. Various steps can be taken to improve sleep quality which include increasing education about sleep-hygiene, emphasizing on the benefits of biphasic sleep, inducing flexibility in class schedules and introducing healthy routine among students. This is vital if we wish to produce mentally and physically healthy professionals for the future.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author

REFERENCES

- Giri P, Baviskar M, Phalke D. Study of Sleep Habits and Sleep Problems Among Medical Students of Pravara Institute of Medical Sciences Loni, Western Maharashtra, India *Ann Med Health Sci Res* 2013; 3(1): 51-4.
- Mellinger G. Insomnia and Its Treatment. *Arch Gen Psychiatry* 1985; 42(3): 225-32.
- Buysse D, Reynolds C, Monk T, Berman S, Kupfer D. The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Res* 1989; 28(2): 193-213.
- Surani AA, Zahid S, Surani A, Ali S, Mubeen M, Khan RH. Sleep quality among medical students of Karachi, Pakistan. *J Pak Med Assoc* 2015; 65(4): 380-82.
- Waqas A, Khan S, Sharif W, Khalid U, Ali A. Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: A cross sectional survey. *PeerJ* 2015; 3: e840.
- Feng G, Chen J, Yang X. Study on the status and quality of sleep-related influencing factors in medical college students. *Zhonghua liu xing bing xue za zhi* 2005; 26(5): 328-31.
- Ghoreishi A, Aghajani AH. Sleep quality in Zanjan university medical students. *Tehran Univ Med J* 2008; 66(1): 61-7.
- Goel D. A Prospective Study on Effect of Stress on Sleep Quality in Young Medical Students in a Tertiary Hospital. *Int Arch Bio Med Clin Res* 2016; 2(3): 43-6.
- Elagra M, Rayyan M, Alnemer O, Alshehri M, Alsaifan N, Al-Habib R, et al. Sleep quality among dental students and its association with academic performance. *J Int Soc Prevent Communit Dent* 2016; 6(4): 296-301.
- James B, Omoaregba J, Igberase O. Prevalence and correlates of poor sleep quality among medical students at a Nigerian university. *Ann Nigerian Med* 2011; 5(1): 1-5.
- Preišegolavičiūtė E, Leskauskas D, Adomaitienė V. Associations of quality of sleep with lifestyle factors and profile of studies among Lithuanian students. *Medicina (Kaunas)* 2010; 46(7): 482-9.
- Purim K, Guimarães A, Titski A, Leite N. Sleep deprivation and drowsiness of medical residents and medical students. *Rev Col Bras Cir* 2016; 43(6): 438-4.
- Medeiros A, Mendes D, Lima P, Araujo J. The Relationships between Sleep-Wake Cycle and Academic Performance in Medical Students. *Biol Rhythm Res* 2003; 32(2): 263-70.
- Brick C, Seely D, Palermo T. Association Between Sleep Hygiene and Sleep Quality in Medical Students. *Behav Sleep Med* 2010; 8(2): 113-21.
- Cates M, Clark A, Woolley T, Saunders A. Sleep Quality Among Pharmacy Students. *Am J Pharm Educ* 2015; 79(1): 09.
- Azad M, Fraser K, Rumana N, Abdullah A, Shahana N, Hanly P, et al. Sleep Disturbances among Medical Students: A Global Perspective. *J Clin Sleep Med* 2015; 11(1): 69-74.
- Ling-Ling Tsai, Sheng-Ling Pi. Sleep patterns in college students Gender and grade differences. *J Psychosom Res* 2004; 56: 231-37.
- Yeung W, Chung K, Cy Chan T. Sleep-wake habits, excessive daytime sleepiness and academic performance among medical students in Hong Kong. *Biol Rhythm Res* 2008; 39(4): 369-77.
- Killgore W, Kahn-Greene E, Lipizzi E, Newman R, Kamimori G, Balkin T. Sleep deprivation reduces perceived emotional intelligence and constructive thinking skills. *Sleep Med* 2008; 9(5): 517-26.