Abstract

Objective:
Sleep is part of the rhythm of life. Without a good sleep the mind is less adapted, mood is altered and the body loses the ability to refresh. The sleep wake cycle of the students is quite different and characterized by delayed onset, partial sleep deprivation, poor sleep quality, insufficient sleep duration and occurrence of napping episodes during the day. The aim of the present study is to know sleep wake pattern in medical student, role of residence and individual characterization on sleep wake cycle.

Design:
Cross-sectional Study.

Participants:
There are 131 first year medical students of the Smt. NHL Municipal Medical College.

Measurements and Results:
All the students answered the Portuguese version of the Horne & Östberg Morningness and Evenningness questionnaire, the Pittsburgh sleep quality index (PSQI) and kept a sleep diary for two weeks. We analyzed 131 students, 51 residing at hostel and 80 residing at home, with mean PSQI 6.55 and 7.48 respectively (PSQI >5 = poor sleep quality). Sleep diary analysis of morning and evening type group shows delayed sleep onset in later group (23.45 ± 1.14 vs. 1.15 ± 0.50 hrs). We also found reduced sleep duration during weekdays and extended sleep duration during weekends in evening type students and vice-a-versa in morning type of students.

Conclusion:
We found poor sleep quality in medical student irrespective of residence. Poor sleep quality and sleep deprivation is more pronounced in evening type of the students and partial compensation found on weekends. Morning type students adjust their life better than evening type and manage their academic schedule.

Introduction
The sleep-wake cycle, one of our biological rhythms, is driven by a circadian rhythm and influenced by physiological functions, the light-dark cycle, school and work schedules and other activities. Human beings organize their activities according to a 24-h cycle. This temporal organization is the result of the interaction of endogenous and environmental factors. Among them social factors seem to be the most important. The Chronotype, morning type and evening type also plays an important role in this cycle. Morning types tend to begin their activities earlier in the morning and evening types tend to delay the initiation of activity. The most widely accepted model representing the sleep-wake cycle consists of two components, the circadian and the homeostatic processes. The first depends on the biological circadian timing system and is synchronized by environmental cues and the second depends on the duration of the previous wake or sleep phase.

Medical students are submitted to a lot of pressure due to academic demands. Moreover, the sleep-wake cycle of the students is characterized by insufficient sleep duration, delayed sleep onset and occurrence of napping episodes during the day.

Sleep deprivation can be harmful to students. A high correlation has been demonstrated between sleep duration and performance in some activities, as well as subjective alertness. Sleep deprivation can be harmful to students. In college students, the stress from academic demands may have a negative impact on sleep and the need to adjust the sleep schedule to the college schedule may contribute to restricted sleep time. Sleep and sleep-related health issues in this period of life also have received relatively little attention, despite the presence of sleep complaints and disorders.

The importance of sleep duration was also found, which demonstrated a correlation between sleep...
deprivation and academic performance in medical students. One of the important functions of sleep is to preserve and optimize waking brain function. Sleep deprivation in humans and animals is associated with decrease in subjective alertness, vigilance, and decision making. Sleep may affect not only cognitive function, but also the ability to accumulate experience and to learn—both in cognitive and affective domains. Sleep deprivation is associated with impaired glucose metabolism and relative insulin insensitivity (Spiegel et al. 1999). Sleep deprivation is also associated with altered measures of immune function (Spiegel et al. 2002), suggesting that sleep may play important host defense roles as well.

Material and Method-
In the present study we investigated the pattern of the sleep wake cycle in a natural condition. The subjects were medical students from Smt. NHL municipal medical college. The participants filled out an identification form with their general information and signed a written informed consent form. They answered Pittsburgh Sleep Quality Index (PSQI) and Östberg Morningness/Eveningness Questionnaires. The Pittsburgh Sleep Quality Index (PSQI), which contains 10 questions, related to normal sleep habits. A value above 5 on this test indicates a poor sleep quality. To classify the subjects according to their Chronotype, we used the Portuguese version of the Horne and Östberg Morningness/Eveningness Questionnaire. A value above 59 on this test indicates morning type.

To study the sleep habits, we used the sleep diary. This subjective record is frequently used in sleep related research and is highly correlated with polysomnography and Actigraph measures. All students kept a sleep diary for two consecutive weeks, including three weekends, in which they recorded their sleeping time and wake up time. Total scores of Östberg Morningness/Eveningness Questionnaire; PSQI and sleep diary data were computed and compared. Mean and standard deviation will be computed for each variable. Comparison of means was done by t- test.

Results-

<table>
<thead>
<tr>
<th>Table -1 Distribution of PSQI in study groups.</th>
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<tr>
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<tr>
<td>Number of students</td>
</tr>
<tr>
<td>Mean PSQI</td>
</tr>
<tr>
<td>PSQI score &gt;5</td>
</tr>
<tr>
<td>Mean ± SD PSQI in score &gt;5</td>
</tr>
</tbody>
</table>

As depicted in the Table-1, out of 131 students, 80 students are in home group and 51 are in hostel group. The mean PSQI score is 7.48 in home group and 6.55 in hostel group. In home group 55% have PSQI >5 with mean 9.63 ± 3.51 and in home group 70.5 % have PSQI >5 with mean 9.61 ± 4.95. No significant difference was found between students having PSQI score >5 in hostel and home groups (p=0.98). PSQI >5 indicates poor sleep quality and in the present study both groups have PSQI>5 suggesting poor sleep quality.

<table>
<thead>
<tr>
<th>Table - 2 Sleep variables in morning and evening type of sleep pattern.</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td><strong>Evening type</strong></td>
</tr>
<tr>
<td>Sleep onset</td>
</tr>
<tr>
<td>Sleep offset</td>
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<tr>
<td>Sleep duration</td>
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<tr>
<td><strong>Morning type</strong></td>
</tr>
<tr>
<td>Sleep onset</td>
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<tr>
<td>Sleep offset</td>
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<td>Sleep duration</td>
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</tbody>
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The two quantitative sleep variables sleep onset and sleep duration of the weekdays and the weekends of
evening type and morning type students are shown in the Table-2.

In evening type students, sleeping time is 1.15 ± 0.50 min and sleep duration 6 hr 15 min ± 1 hr 15 min during weekdays. They delay their sleeping time by 0 hr 15 min only during weekends.

In morning type, sleeping time is 23.45 ± 1.14 min and sleep duration is 7 hr 05 min ± 1 hr 20 min during weekdays. They delay their sleeping time by 1 hr 37 min during weekends. The restriction extension pattern is found in this group.

Significant difference is found in sleep duration on weekdays in evening type and morning type students (P= 0.0001).

Table- 3 PSQI in morning type and evening type sleep pattern.

<table>
<thead>
<tr>
<th></th>
<th>Evening type</th>
<th>Morning type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total participants</td>
<td>86/131 (65.6%)</td>
<td>45/13 (34.4%)</td>
</tr>
<tr>
<td>Mean PSQI</td>
<td>7.1</td>
<td>6.89</td>
</tr>
<tr>
<td>Groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=49)</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Hostel</td>
<td>(n=37)</td>
<td>(n=31)</td>
</tr>
<tr>
<td>PSQI &gt;5</td>
<td>9.26</td>
<td>10.05</td>
</tr>
<tr>
<td>Mean</td>
<td>9.59</td>
<td>10.33</td>
</tr>
<tr>
<td>SD</td>
<td>3.4</td>
<td>3.68</td>
</tr>
<tr>
<td></td>
<td>5.35</td>
<td>3.80</td>
</tr>
</tbody>
</table>

Sleep quality analysis in morning type and evening type students are shown in the table-3.

Out of total 131 students, 86(65.6%) are found evening type and 45(34.4%) are morning type. When sleep quality is compared in morning and evening type students comparatively poor found in evening type with mean 6.89 and 7.1 respectively.

Out of evening type students (86), 49 students found living in hostel and 37 students living in the home. When sleep quality is measured in hostel and home group in those having PSQI >5, it is 9.26± 3.4 and 9.59± 5.35 respectively.

Out of morning type students (45), 31 students are in home group and 14 students are in hostel group. Sleep quality in these students i.e. Hostel and home group is 10.33 ±3.80 and 10.05± 3.68 respectively in those having PSQI >5.

When sleep quality is compared in home and hostel group in those who are having PSQI>5, mean PSQI score was higher side in morning may be because of less number of students.

To know the Chronotype on sleep quality we divided the students into morning type and evening type but no significant difference was found suggesting that Chronotype is an endogenous characteristic having no effect on sleep quality.

Discussion-
PSQI measures sleep quality and value above five indicates poor sleep quality. To know the effect of residence on sleep we divided the students into home group and hostel group. Both groups show PSQI higher than five indicating poor sleep quality.

Our subjects were medical students who, like most medical students were submitted to a demanding curricular schedule. The large number of classes and the need devote much time to studying contributed to the poor sleep quality observed in this group of students.

To know the chronotype we divided the students into morning type and evening type. When PSQI analyzed in these two groups, no significant difference was found suggesting Chronotype is an endogenous characteristics not influencing sleep quality.

Morning types tend to begin their activities earlier in the morning and evening types tend to delay the initiation of activity. The most widely accepted model representing the sleep-wake cycle consists of two components, the circadian and the homeostatic processes. The first depends on the biological circadian timing system and is synchronized by
environmental cues and the second depends on the duration of the previous wake or sleep phase.\(^4\)

We did not take into account only quality of sleep but also studied the quantitative and qualitative aspects of the sleep wake cycle including the differences in the sleep wake pattern on weekdays and weekends in morning type and evening type group.

The delay of the sleep episodes on the weekends is probably due to both social and endogenous factors. Having no classes the following day, students are free to participate in night activities. Furthermore human tend to delay their sleep episode on free day because they have a 25 h sleep wake cycle.\(^1\)

If students have shorter sleep duration during weekdays and longer sleep duration on weekends, this pattern is called restriction extension pattern.

In this study group evening type students show restriction extension pattern. There is no significant difference in their sleeping time and sleep duration on weekdays and weekends but there is extension of sleep offset on weekends. They are more sleep deprived on weekdays and they try to compensate their sleep on weekends prolonging their sleeping time.

The morning type do not shows extension restriction pattern.

The total sleep duration was better in morning type and poor in evening type with one hour less than morning type.

Evening type student sleep less compare to morning type student. Poor sleep quality was there in both group but more pronounced in evening type suggesting that with poor sleep quality evening type adjust quite better to their schedule than morning type.

A relationship has been detected between sleep and measures of health and well being in college students.\(^8\) Although it has been suggested that increasing sleep duration might not directly improve quality of life.\(^11\)

Short sleeping time on weekdays combined with an irregular sleep wake schedule during the week is the most common predictor of daytime sleepiness.\(^17\)

Present study shows overall sleep deprivation. The consequences, sleepiness and poor attention during classes can influence the learning processes.

In this study group it is also found that percentage of students having PSQI greater than five, both in evening type and morning type are more in hostel group. Hostel students are free to decide their sleep wake cycle may be the cause of this difference.

Further study is needed to know the effect of sleep deprivation on performance.

**Conclusion-**

We found poor sleep quality in medical student irrespective of residence. Poor sleep quality and sleep deprivation is more pronounced in evening type of the students and partial compensation found on weekends. Morning type students adjust their life better than evening type and manage their academic schedule.

**References-**