

## Research Article

**Sleep quality and daytime sleepiness in medical students of a state university of Sri Lanka: a cross-sectional study**Gunathilaka MRKM<sup>1\*</sup>, Rajapakse RMSI<sup>1</sup>, Senevirathne NK<sup>1</sup>, Ekanayake BA<sup>1</sup>, Gunathilaka MGRSS<sup>2</sup>, Chinthani D<sup>1</sup>, Ekanayaka TD<sup>3</sup>, Warnasekara JN<sup>4</sup>, Wickramage SP<sup>1</sup><sup>1</sup>Department of Physiology, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka<sup>2</sup>Department of Microbiology, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka<sup>3</sup>Department of Pathology, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka<sup>4</sup>Department of Community Medicine, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka\*Corresponding author,  <https://orcid.org/0000-0002-9975-7884>**Abstract**

An adequate amount of good quality sleep is essential for better cognitive performance and to maintain good physical and mental health. Poor sleep quality is related to poor academic achievement in medical students. The objective of this study was to describe the sleep quality of the undergraduates of the Faculty of Medicine and Allied Sciences (FMAS), Rajarata University of Sri Lanka (RUSL).

All medical students of FMAS, RUSL were recruited for the study. A questionnaire comprised of the original, untranslated versions of the Epworth Daytime Sleepiness Scale (ESS) and Pittsburgh Sleep Quality Index (PSQI) were used with written permission from relevant authorities.

The response rate of this study was 82.7% (662/800). After excluding participants with missing information, data of 649 were analysed. The mean age of the participants was 23 ( $\pm 1.7$ ) years and the majority were females ( $n=460, 70.8\%$ ). The median duration of sleep per night was 6 hours (IQ range: 4 - 8 hours). According to PSQI and ESS 25.9% ( $n=168$ ) of the study, participants had poor sleep quality ( $PSQI > 5$ ) while 35% ( $n=227$ ) had abnormally high levels of daytime sleepiness ( $ESS \geq 11$ ). A weak positive correlation was observed between the Global PSQI score and ESS ( $r = 0.099$ ,  $p = 0.012$ , Pearson correlation). The academic year showed significant differences in the sleep quality among medical students, where the percentages of students with poor sleep quality are comparatively higher in the first two academic years and the final year. The academic year and gender of the students showed a statistically significant association with excessive daytime sleepiness

**Keywords:** Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), medical students, sleep quality, daytime sleepiness

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## Introduction

The transition of a person from school education to university encompasses a critical period due to separation from the family, the establishment of new social relationships, autonomy, and the acquisition of individual and social responsibilities (1). Undergraduate medical students, being a unique group among university students, are not without similar mental and social changes. As medical students experience a comparatively high academic workload in terms of study hours and examinations, they have been identified as a group of a young population with common and specific physical and psychosocial health issues (2).

Poor sleep quality, less actual sleep duration, excessive daytime sleepiness are among the already identified non-psychiatric psychosocial issues among undergraduate university students (2). Evidence shows that poor sleep quality was related to poor academic achievement in medical students (3). People with poor quality sleep also reported significantly high physical and psychological health-related problems than people with good quality sleep. Furthermore, anxiety and depressive symptoms were high in people with poor quality sleep (4). Though few studies are available on sleep and its related issues among undergraduate medical students, our country remains in a dearth of research on this particular aspect. Studies on different medical student communities revealed that a significantly high proportion of university students suffer from sleep deprivation and poor quality sleep (5,6). Sri Lanka, which hosts eight state medical schools accommodating more than 5,000 medical students, has not produced a report on any aspect of their sleep quality. In this study, we describe the prevalence of low sleep quality (SQ) and excessive daytime sleepiness (EDS) among undergraduate medical students of the Faculty of Medicine and Allied Sciences (FMAS), Rajarata University of Sri Lanka (RUSL), Saliyapura, Sri Lanka.

## Methods

A cross-sectional study was conducted in the year 2016 by recruiting all the undergraduate medical students in FMAS, RUSL). Ethical approval was obtained from the Ethics Review Committee, FMAS, RUSL (ERC/2016/31). A self-administered questionnaire comprised of the Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) was used to assess sleep quality and daytime sleepiness, respectively. The authors obtained permission to use PSQI and ESS through email communications with the relevant

authorities. Data were first entered into the MS Excel spreadsheet and subsequently exported to a beta version of SPSS statistical analysis software for analysis. The component scores are summed to produce a global score (range 0 to 21). According to PSQI and ESS, poor-quality sleep was defined as PSQI  $\geq 5$  (7), while an abnormally high level of daytime sleepiness was defined as ESS  $\geq 11$  (8).

## Results

There were 800 medical students following the undergraduate medical degree in the year 2016. Of them, 82.7% (n = 662) responded to the questionnaire. After excluding participants with missing information, data from 649 students were selected for the analysis. Of them, 70.8% were females and was consistent with the current gender proportion in FMAS, RUSL student community. The age ranges from 19 years to 30 years, with a mean age of 23 years (SD $\pm$ 1.7). The basic demographic characteristics of the study participants are shown in Table 1.

**Table 1: Demographic characteristics of the study participants (n=649)**

Variable		Number	Percentage of participants (%)
<b>Gender</b>	Male	189	29.1
	Female	460	70.9
<b>Academic Year</b>	First-year	145	22.3
	Second-year	161	24.8
	Third-year	101	15.6
	Fourth-year	135	20.8
	Fifth-year	107	16.5

## Sleep quality and its associated factors

The median duration of sleep per night was 6 hours (IQ range: 4 - 8 hours), and about 76% of the students have reported that they go to bed before 12 midnight.

The mean global PSQI score (computed using the component scores) was 4.19 (SD $\pm$ 2.54). Overall, 25.9% (168/649) of students were classified as having poor sleep quality (PSQI $>$ 5). The academic year has shown a significant association with poor sleep quality (Table 2). In the final year, the proportion of students with poor quality sleep has risen to a level almost similar to that of the first two years (Figure 1). But the gender did not show a significant association (Table 2).

**Table 2: Associated factor with the quality of sleep of medical students, FMAS, RUSL**

Variable		PSQI <5		PSQI >5		Chi squared value	P value
<b>Total</b>		481	74.1%	168	25.9%		
<b>Gender</b>	Male	134	70.8%	55	29.1%	1.91	0.231
	Female	347	75.43%	113	24.5%		
<b>Academic year</b>	1 <sup>st</sup> year	99	68%	46	31.7%	14.82	0.003
	2 <sup>nd</sup> year	111	68.9%	50	31.0%		
	3 <sup>rd</sup> year	81	80.1%	20	19.8%		
	4 <sup>th</sup> year	115	85.1%	20	14.8%		
	Final year	75	73.5%	32	33.0%		

**Day time sleepiness and associated factors**

The mean ESS in the total sample was 8.91 (±4.19). Thirty-four per cent of (227 out of 649) students had abnormally high levels of daytime sleepiness (ESS ≥11). Table 3 shows the significant levels of associations between the tested factors and the excessive daytime sleepiness. The students' academic year showed a statistically significant association (Chi-squared value = 15.87, P=0.002). The highest percentage of students with excessive daytime sleepiness, which is 46.8%, was seen in the final year.

Among female medical students, 37.8% reported excessive daytime sleepiness, whereas only 28.6% of male students had excessive daytime sleepiness (Chi-squared value = 4.37, P=0.022). The time of going to bed and the total hours of actual sleep did not show statistically significant associations with daytime sleepiness.

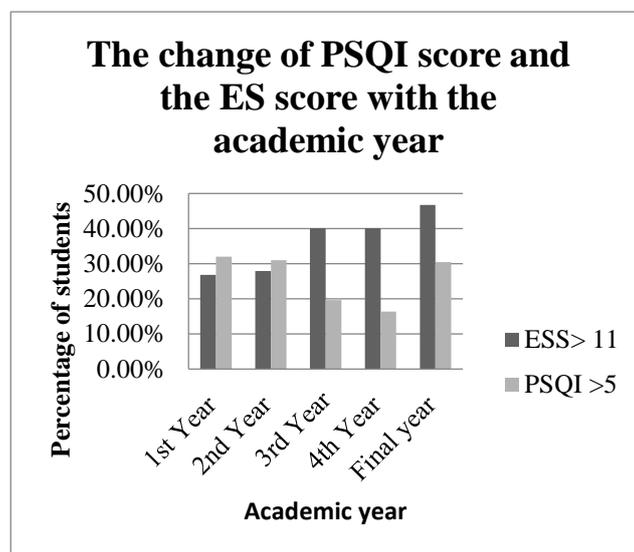
**The correlation between the quality of sleep and excessive daytime sleepiness.**

A weak positive correlation was observed between the global PSQI score and ESS (Pearson correlation coefficient 0.099, p = 0.012). The academic year affects the quality of sleep and excessive daytime sleepiness in two different ways, as evident in Figure 01. The proportion of students having poor sleep was higher in the first two years and gradually reduced up to the fourth year. In the final year, the proportion again has risen to a level almost similar to that of the first two years. Conversely, the percentage of participants with EDS has shown a gradual increase up to the final year (Figure 1)

**Table 3; Factors associated with the daytime sleepiness in medical students of FMAS, RUSL**

Variable		ESS <11	%	ESS >11	%	Chi squared value	P value
Gender	Male	135	71.4%	54	28.6%	4.37	0.022
	Female	286	62.1%	174	37.8%		
Academic year	1 <sup>st</sup> year	106	73.1%	39	26.9%	15.87	0.002
	2 <sup>nd</sup> year	116	72.0%	45	27.9%		
	3 <sup>rd</sup> year	60	59.4%	41	40.6%		
	4 <sup>th</sup> year	82	60.7%	53	39.3%		
	Final year	57	53.3%	50	46.8%		
Time of commencing sleep	Before mid-night	320	65.3%	170	34.7%	37.83	0.94
	After midnight	104	65.4%	55	34.5%		
Total hours of actual sleep	> 6	313	66.6%	157	33.4%	2.23	0.13
	< 6	108	60.3%	71	39.6%		

**Figure 01: The changes of PSQI score and ES score with the academic year**



**Discussion**

According to the authors' knowledge, this is the first study on sleep quality and daytime sleepiness among Sri Lankan medical students. We have found that 25.9% of the tested students can be classified as having poor sleep quality. The quality of sleep is affected by the academic year of the student, possibly due to the different amounts of academic workload. As evident in this study, the proportion of students having poor sleep was higher in the first two years and gradually reduced up to the fourth year. In the final year, the proportion of students having poor quality sleep has increased again to a level closer to that of the first two years.

In contrast, the percentage of participants with EDS shows a gradual increase with the advancing academic

year. Interestingly, the proportions of third and fourth-year medical students with EDS are 40% despite the declining percentages of students with poor quality sleep. While a positive correlation is existing between the PSQI score and the EDS score as depicted by a significant value of 0.012 (9), this finding of disproportionately higher excessive day time sleepiness may draw the attention towards some other factors affecting excessive day time sleepiness which were not tested in this study. Stress level, academic workload, presence of anaemia maybe some of the factors that need further evaluation in Sri Lankan medical students, depending on the list of associated factors found in other countries (2,5,10–12). Though a statistically significant association ( $p=0.025$ ) was observed between the gender and EDS, there was no such association between gender and poor-quality sleep. Previous researches have also noted obvious differences in EDS among each sex and a higher level of EDS in females (13,14).

Nearly a quarter of medical students at FMAS, RUSL have reported poor-quality sleep. However, this is a lower rate compared to most of the other countries where data are available. For example, the percentage of students with poor-quality sleep was 55.8% and 36.9%, respectively, in Ethiopian university students and German university students (2,15). However, as current evidence says that poor quality sleep leads to various sleep disorders as well as psychiatric disorders, attention should be paid to the students with poor sleep quality and necessary steps to be taken to improve their sleep hygiene (5).

In this study, the global PSQI value of more than or equal to five was used as the cut-off value (7). A global PSQI

score greater than 5 had demonstrated a diagnostic sensitivity of 89.6%-94% and specificity of 72% - 86.5% in distinguishing between people with good-quality and poor-quality sleep in previous studies. More than or equal to 11 was the cut-off value of ESS used to detect daytime sleepiness (8). The inventors of ESS recommend using the cut-off value of 11; however, this has been debated among the researchers for long durations. Since there was no consensus on this, we used the same time-honoured cut-off established by Johns, the inventor (8).

Validated local language versions of PSQI and ESS were not available for our country at the time of starting this study. We have used the original English version of the PSQI and ESS with the justifications that the medical students' academic medium is English. However, in the same year, a Sinhalese version of PSQI was validated and published by a group of researchers (16). It would be of more value if we could have used the local language version of PSQI and ESS questionnaires

In conclusion, a considerable proportion of university students are affected by poor sleep quality and excessive daytime sleepiness. Poor sleep has been shown to associate with excessive daytime sleepiness; however, several other factors may influence excessive daytime sleepiness in medical students.

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#### **Conflicts of Interest(s)**

There are no conflicts of interest.

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