

Sleep Quality among Adolescents of Three Districts of Central Kerala

Joyalyn Joy¹, Anju Abraham^{1,*}, Anna Maria Jose¹, Bhagia Anna Manoj¹, Dona Maria Jetto¹, Shaji George²

¹Department of Pharmacy Practice, Nirmala College of Pharmacy, Muvattupuzha, Kerala, INDIA.

²Department of Pharmacy Practice, Holy Grace Academy of Pharmacy, Irinjalakuda, Kerala, INDIA.

ABSTRACT

Background: Sleep is a vital human need that must be satisfied in a sufficient quantity and in a suitable quality. Because of the possible effects on memory reorganization, learning, decision-making, critical thinking, academic achievement, social conduct, and the cardio metabolic system, adolescent sleep patterns deserve special consideration.

Objectives: To Assess the quality and pattern of sleep among adolescents. **Materials**

and Methods: The study included 604 adolescents aged 10 to 18 carried out in three districts of central Kerala. Students were given a questionnaire that included PSQI scale items as well as demographic information. Seven components such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction were the major parameters assessed. **Results:** The group as a whole had a mean age of 14.4 years (SD: 0.40). The male students participated in this study were 307 (50.8%) and female students 297 (49.1%). Stressful life situations occurred for 90 (14.9%) students, of which 37 (6.1%) male and 53 (8.7%) female students. 126 students (20.8%) reported presence of medical condition among which 61 (10.1%) were males and 65 (10.7%) were females. Students who had stressful life events 36 (39.56%) and those who had medical issues 36 (28.57%) were shown to have lower sleep quality. Sleep disturbances were reported higher in students with stressful life events 2 (2.19%) and medical condition 2 (1.58%). Students with medical conditions reported a higher percentage of stressful life events 20 (21.97%). **Conclusion:** Majority of adolescents has good quality sleep and a few are facing sleep related difficulties.

Keywords: Sleep latency, Stressful life events, Sleep duration, Daytime dysfunction, Sleep disturbances.

Received: 03-10-2022;

Revised: 18-11-2022;

Accepted: 21-12-2022.

INTRODUCTION

Sleep is an essential human requirement that must be met in an adequate amount and of acceptable quality.¹ It is essential for physical, mental, and emotional well-being and is one of the most important determinants of life satisfaction.² A child's natural development depends on his or her ability to sleep well.¹ Studies have documented the clear consequences of insufficient and inconsistent sleep for developing adolescents, such as poor academic performance, school absenteeism, and emotional regulation difficulties.³ Research on children shows that the

prevalence of sleep difficulties range from 14 to 45 percent.¹ Short sleep duration and insomnia are rather frequent among teenagers for a variety of reasons, including the use of mobile phones, social media, video games, lack of regular exercise, a poor diet, skipping breakfast etc.⁴ Epidemiological evidence suggests sleep duration in both children and adults has been decreasing over the past half-century.⁵ Further studies in different stages of adolescence are needed to better identify determinants of poor sleep quality⁶ as it is important to address sleep deficit and poor sleep quality to minimize the adverse impact of poor sleep on the health and development of adolescents.⁷ In this

DOI: 10.5530/ijopp.16.2.15

Address for Correspondence:

Ms. Anju Abraham,
Student, Nirmala College of Pharmacy, Nirmala College JN, Kizhakkekkara, Muvattupuzha-686661, Kerala, INDIA.

Email id: anjuabrahamre@gmail.com



www.ijopp.org

study we aim to assess the sleep quality among adolescents of three districts of central Kerala.

MATERIALS AND METHODS

A descriptive cross-sectional survey was undertaken in three districts of central Kerala among adolescents aged 10 to 18 years. Data collection was carried out from November 2021 to April 2022.

Study Population

All adolescents in the sample population in the defined age group were included, and those who refused to participate were excluded. Students in grades 5 to 12 were included. The study included 604 adolescents, consisting 175 from Idukki, 195 from Kottayam, and 237 from Ernakulam Districts. Six of the 15 schools were aided, three were private unaided, five were private CBSE, and one was government. All adolescents in the defined age group (10-18 years) were included and adolescents who were unwilling to participate in the study were excluded from the study.

Study Site

The research was carried out in three districts of central Kerala (Ernakulam, Idukki, and Kottayam). To obtain the samples, schools from 3 districts, 5 from each to get a total of 15 were shortlisted. From the Ernakulam district, one school each was chosen from Muvattupuzha, Kunnathunadu, Paravur, Kanayannur, and Aluva taluks, and from the Kottayam district, one school each was chosen from Kottayam, Changanassery, Kanjirappilly, Vaikom, and Meenachil taluks. From the district of Idukki, three schools from distinct parts of Thodupuzha and two schools representing two regions of Udumbanchola were chosen.

Sampling Method

The sample size for the study was calculated using Cochran's formula. Based on the previous study conducted in Pathanamthitta, the prevalence of inadequate sleep was found to be 60%.⁷ The required sample size calculated was 370. To attain a minimum of 370 samples, direct access to students has been used to conduct the study. Prior permission from the school authorities was obtained. Minimum 25 students were selected from each school. Students were given a questionnaire that included PSQI scale items⁸ as well as demographic information. Selected students were given a printed questionnaire, which they were requested to complete. The strategies for completing the questionnaire were explained to the

participants. The questionnaire took around 45 to 50 min to complete. Doubtful questions were clarified, and it was ensured that the students filled in all essential information. The students' seating arrangements were designed in such a way that there is no chance of copying each other's responses. After completing the survey, the study participants were given a brief overview on the importance of good quality sleep and sleep hygiene using leaflets. The completed questionnaires were gathered and recorded to prepare for the next steps. The PSQI scale was scored based on the criteria supplied. The data and scores were recorded into a Microsoft Excel spreadsheet.

Statistics

IBM SPSS 22.04 was used for the statistical analysis. To compare the results, Chi square test was performed. ANOVA tests for district wise comparison of global PSQI scores were done. Range, Mean and Standard deviation of global PSQI score of three districts were calculated. The prevalence of good quality sleep, abnormal sleep {which includes sleep latency, low sleep quality, sleep disturbances (Insomnia, Sleep Apnea, Nightmares, etc.), the use of sleep medications, Daytime dysfunction} were determined.

RESULTS

Out of 604 respondents, 174 were from Idukki, 194 from Kottayam, and 236 from Ernakulam. The study population had a mean age of 14.4 (SD: 0.40) y. Participants in the survey did not answer the questions about which they were unsure as instructed, which led to missed responses. However, for any of the parameters under investigation, the frequency of the missing responses had not gone above 2-3%. And the most prevalent replies in categorical variables and the series means in continuous variables were used to replace the missing values. The demographic details of students are depicted in Table 1.

The prevalence of sleep deprivation was found to be 21.7% and 18.2% responded with sleep disturbances twice a week. A very good subjective sleep quality (49.4%) and an optimum duration of sleep (77.3%) was highest reported among the age group of 10-13 y. Presence of stressful life events and medical conditions had a significant association with the sleep quality determined from the global PSQI score indicating that poor sleep quality was highest with those who had stressful events (39.5%) such as studies and exams, personal issues, family issues and with medical conditions (28.5%) such as allergy, asthma, etc. Types of Stressful life events and Medical conditions reported among study participants of the three

Table 1: Demographic details of students.

		Idukki n=174		Kottayam n=194		Ernakulam n=236	
		n	%	n	%	n	%
Age (Years)							
	10-13	77	44%	63	32.4%	54	28%
	14-16	65	37%	69	36%	139	71%
	17-18	32	19%	62	31.9%	43	1%
	Mean age	13.9		14.9		14.4	
Gender							
	Male	89	51.1%	86	44.3%	132	55.6%
	Female	85	48.8%	108	55.6%	104	43.8%
Academic Performance							
	Good	61	35%	62	31.9%	70	29.6%
	Average	108	62%	129	66.5%	156	66.1%
	Low	5	2.8%	3	1.54%	10	4.23%
Residency							
	Urban	47	27.01%	21	10.82%	35	14.83%
	Semi Urban	93	53.44%	113	58.24%	91	38.55%
	Rural	34	19.54%	60	30.92%	110	46.61%
Type of Family							
	Nuclear	107	61.4%	121	62.3%	140	59.3%
	Extended	67	38.5%	73	37.6%	96	40.6%
Distance between Home to School							
	2-5Km	96	55.17%	92	47.42%	161	68.2%
	10-20Km	75	43.10%	91	46.9%	70	29.6%
	>20Km	3	1.72%	11	5.67%	5	2.1%
Annual Income							
	<1,00,000	119	68.39%	109	56.18%	153	64.83%
	<5,00,000	48	27.58%	61	31.44%	63	26.69%
	>5,00,000	7	4.02%	24	12.37%	14	5.93%
Presence of Stressful Life Events							
Male	Had Stressful Events	17	9.7%	11	5.6%	9	3.8%
	No Stressful Events	72	41.3%	75	38.6%	123	52.1%
Female	Had Stressful Events	23	13.2%	18	10.3%	12	5.08%
	No Stressful Events	62	35.6%	90	46.9%	92	39%
Presence of Medical Condition							
Male	Have medical Condition	23	13.21%	18	9.27%	20	8.47%
	No medical Condition	66	37.93%	68	35.05%	112	47.45%
Female	Have medical Condition	8	4.59%	22	11.34%	35	0.42%
	No medical Condition	77	44.25%	86	44.32%	69	29.23%

y: year, Km: Kilometers

districts are illustrated in Figure 1. Sleep quality was also observed to be poor among respondents who had sleep medications (35.8%). Percentage of study participants with poor sleep quality who reported Presence/Absence of Stressful life events, Medical conditions, and Use of sleep medications are depicted in Figure 2. Sleep disturbances such as waking in between sleep, insomnia, sleep apnea, nightmares, body pain, etc. were more

among participants who had stressful events (27.47%) and medical conditions (30.1%). Decreased sleep latency, good habitual sleep efficiency, and lowest occurrences of sleep disturbances were reported highest among the 17-19 years age group. Association of PSQI components with gender and age are depicted in Table 2. While comparing the three districts, respondents from Idukki district were observed to have a higher rate of good

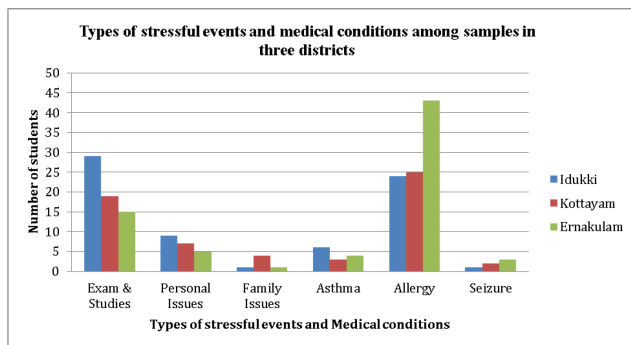


Figure 1: Depicts the number of students in each district reported to have stressful life events such as Exam and studies, Personal issues, Family Issues and Medical conditions such as Asthma, Allergy, and Seizure.

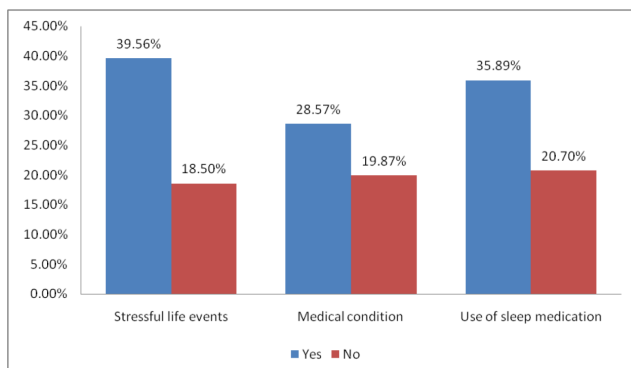


Figure 2: Depicts the percentage of respondents who had poor sleep quality (i.e., PSQI score >5) reported with/without stressful life events, medical conditions, use of sleep medications.

*Yes-Presence of stressful life events, medical conditions, use of sleep medications
No- Absence of stressful life events, medical conditions, use of sleep medications.

quality sleep according to the total PSQI score (3.44, SD: 2.36). Data also revealed that the F value obtained (6.784) was greater than the Table value (3.011) at 0.001 level indicating a significant difference of PSQI score between Idukki, Kottayam, and Ernakulam districts.

No significant association of academic performance with stressful life events and with daytime dysfunction was found. Interestingly, age and medical conditions were shown to be significantly correlated where, presence of medical conditions increased with decreasing age, i.e., 10-13 years (31.9%), 14-16 y (16.11%) and 17-19 y (14.5%). On the Chi-square test analysis gender had no significant association with sleep parameters except for subjective sleep quality where females reported poor subjective sleep quality and use of sleep medications was reported high among male study participants.

DISCUSSION

The current study demonstrated that as age of students

increased, their sleep duration decreased. The students in the 10-13 years groups had significantly higher sleep duration compared to the other two groups. Various studies have shown that adolescents require sleep of at least 8 hr and sleep deficit may result in daytime sleepiness, and this along with poor sleep duration, sleep quality has shown significant impact on school performances.⁶ Among the three groups, students of the age group 10-13 years had reported the highest of sleep disturbances, sleep latency, and poor habitual sleep efficiency. Also, students of 10-13 years reported more medical issues than the rest of the groups. Interestingly, a decrease in presence of medical conditions, and sleep disturbances was seen with increasing age.

In this study, a good subjective sleep quality and optimum duration of sleep was higher among the younger age group. Furthermore, a study in the past conducted by Dubey *et al.*⁹ reported with similar results that adolescents of older age had fewer hours of sleep compared to the younger ones and assumes that the probable reason to be an increase in the academic demands from adolescents of higher grades. Since age alone contributed less to determining the study's sleep parameters, other environmental elements that were left out of the analysis had an impact as well. It has been found that presence of media (television/internet) in the child's bedroom delays the bedtime and wake-up time, such children spend less time in bed and are more tired during the day, as compared to their peers with no such access in their bedrooms.¹¹ Even though we didn't specifically ask about it in this study, we can't rule out the possibility that it may have occurred in our sample because it was conducted at the end of the third wave of COVID, when using electronic devices had already become ingrained in daily life, particularly for teenagers. As a result, more research is needed.

Sleep disturbances (waking in between sleep, insomnia, sleep apnea, nightmares, body pain, etc.) were high among the ones who had stressful life events and medical conditions and they were found to be poor in academics. A significant association of sleep quality with presence of stressful life events and medical conditions were observed. Poor sleep quality was highest among those who had stressful events and medical conditions; also it was observed to be poor among respondents who took sleep medications. The study group also had a high incidence of daytime dysfunction (which includes daytime sleepiness) irrespective of the age and was observed to be more among the poor academic performers. Several factors influencing daytime sleepiness include age, pre-sleep activities, and sleep hygiene behavior.⁶ According to the study, poor sleep quality was prevalent

Table 2: Association of PSQI components with Gender and Age.

PSQI Components		Gender		p	Age in years			p
		Male	Female		10-13	14-16	17-18	
Subjective sleep quality	Very good	157 51.1%	118 39.7%	p= 0.006 **	96 49.48%	126 46.15%	53 38.6%	p= 0.046 *
	Fairly good	120 39.08%	147 49.49%		81 41.75%	117 42.8%	69 50.3%	
	Fairly bad	17 5.53%	26 8.75%		13 6.70%	16 5.8%	14 10.2%	
	Very bad	13 4.23%	6 2.02%		4 2.06%	14 5.12%	1 0.72%	
Sleep Latency (min)	<15 min	135 43.9%	115 38.7%	p=0.270 (NS)	72 37.1%	117 42.8%	61 44.5%	p= 0.004**
	15-30 min	95 30.9%	97 32.65%		67 34.5%	75 27.4%	50 36.4%	
	30-60 min	65 21.17%	64 21.5%		36 18.5%	70 25.6%	23 16.7%	
	>60 min	12 3.9%	21 7.07%		19 9.7%	11 4.02%	3 2.18%	
Sleep Duration (h)	>7	219 71.3%	184 61.95%	p=0.062 (NS)	150 77.3%	177 64.8%	76 55.47%	p= 0.004**
	6-7	75 24.4%	89 29.9%		34 17.5%	81 29.6%	49 35.7%	
	5-6	12 3.9%	22 7.4%		9 4.6%	14 5.1%	11 8.02%	
	<5	1 0.3%	2 0.67%		1 0.51%	1 0.36%	1 0.72%	
Habitual Sleep Efficiency n (%)	>85	286 93.15%	279 93.9%	p= 0.139 (NS)	164 84.5%	267 97.8%	134 97.8%	p< 0.001 ***
	75-84	17 5.5%	18 6.06%		26 13.4%	6 2.19%	3 2.18%	
	65-74	4 1.3%	0		4 2.06%	0	0	
	<65	0	0		-	-	-	
Sleep Disturbances n%	Better	50 16.2%	35 11.7%	p=0.339 (NS)	13 6.7%	44 16.11%	28 20.43%	p<0.001***
	Fairly better	196 63.8%	208 70.03%		123 63.4%	185 67.7%	96 70.07%	
	Fairly worse	58 18.8%	52 17.5%		55 28.3%	42 15.3%	13 9.48%	
	worse	3 0.01%	2 0.006%		3 1.54%	2 0.73%	0	
Use of Sleep medication n%	Better	279 90.8%	289 97.3%	p=0.006**	187 96.39%	253 92.67%	128 93.43%	p=0.335 (NS)
	Fairly better	15 4.8%	4 1.3%		3 1.54%	12 4.39%	4 2.91%	
	Fairly worse	5 1.6%	3 1.01%		3 1.54%	2 0.73%	3 2.18%	
	worse	8 2.6%	1 0.003%		1 0.51%	6 2.19%	2 1.45%	
Daytime Dysfunction n%	Better	172 56.02%	143 48.1%	p=0.149 (NS)	94 48.4%	142 52.01%	79 57.6%	p=0.433 (NS)
	Fairly better	93 30.2%	110 37.03%		75 38.6%	89 32.6%	39 28.4%	
	Fairly worse	35 11.4%	32 10.7%		19 9.7%	34 12.4%	13 9.4%	
	worse	7 2.2%	12 4.04%		5 2.5%	8 2.9%	6 4.3%	

*Significant at 0.05 level, **Significant at 0.01 level, ***Significant at 0.001 level, NS-Not significant
min: minute, h: hour

in 21.7% of cases. In a study conducted by Dubey *et al.*¹⁰ the prevalence of poor sleep quality was 7.3% which according to them might be due to the reason that the study was conducted in an urban settlement colony with interviews conducted during vacation. Evidence from previous studies in India among adolescents aged 12–17 years had shown the prevalence of poor sleep quality to be around 37.6%⁹ which is near in range to the findings in the current study. District wise comparison of the PSQI score revealed that good quality of sleep was more prominent in students of Idukki district and poor sleep quality was in Kottayam. Environmental factors could be an advantage for the district Idukki.

Certain restrictions that occurred in this investigation were: firstly, due to the study's cross-sectional nature and small sample size, it was unable to draw broad causal conclusions. Secondly, because the studies were done in specific geographic areas and school systems, they may not accurately reflect the entire adolescent population. Moreover, we couldn't analyze other factors affecting sleep such as use of caffeine and nicotine which could induce alertness, living conditions such as crowded homes, sharing rooms, watching television and anticipated academic stress. The combination of these elements could result in a lengthy questionnaire that might make it tedious for responders to provide all the necessary information. These areas should undoubtedly be the subject of additional research, especially in light of the Indian population. Also, we were unable to acquire information from parents about their children's sleep patterns. To improve the results of sorting pupil's sleep disorders, both parents and children should provide information in routine and clinical contexts. Some students failed to respond or left some questions unanswered and some of the questions were harder for the children to understand. The findings may be affected as a result of the misunderstanding.

Due to the associated impacts on the physiologic systems, inadequate duration of sleep and poor sleep quality have been associated with a number of undesirable health effects and hence is inevitably relevant to educate our adolescents about the significance of getting sufficient sleep.

CONCLUSION

The aim of our study was to find the quality and pattern of sleep among adolescents of three districts of central Kerala. The mean age (in years) of our study population was 14.4 (SD: 0.40). From this study the prevalence of

good quality sleep was found to be 78.3% and prevalence of poor quality of sleep was 21.7%. And 18.2% of students reported having sleep disturbances twice a week and 0.8% reported three times a week. 65.83% of adolescents were observed to have >7 hr of sleep. According to the PSQI scale, abnormal sleep (scored as >5) was high in the age group 10-13 years. Female students (23.9%) reported the highest poor quality of sleep. It was also found that students with stressful life events (39.56%) and medical conditions (28.57%) and use of sleep medications (35.89%) reported the highest abnormality. The association between sleep quality and stressful life events, presence of medical conditions, and use of sleep medications were found to be significant. It was observed that stressful life events were reported more in students who belonged to nuclear families, who had medical conditions and also in students who had poor academic performance. We also found that sleep disturbances were high in students who had stressful events and medical conditions. Daytime dysfunction was high in students whose academic performance was poor. The association between sleep disturbances and presence of stressful life events, presence of medical conditions were found to be significant.

Due to the associated impacts on the physiologic systems, inadequate sleep duration and poor sleep quality have been linked to a variety of undesirable health outcomes. In our research, we attempted to determine the sleep patterns of our teens, as well as their sleep quality and hygiene. As per our study results the majority (approximately 3/4th) of the adolescents are having a good quality sleep and a few portion is facing sleep related difficulties.

ACKNOWLEDGEMENT

We express our sincere gratitude to the concerned Authorities, Principals, Headmasters and Headmistresses of the respective schools of the three districts in which we were given the permission to conduct our study. We are thankful to the Teachers, staff and other related persons of each school who have supported us and provided enough help during the conduct of the study.

Last but not the least, we thankfully remember each and every Student who has provided us with their valuable and genuine responses without any hesitation for our project work.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

PSQI: Pittsburgh Sleep Quality Index; **SD:** Standard Deviation; **CBSE:** Central Board of Secondary Education; **Y:** Year; **IBM:** International Business Machines; **SPSS:** Statistical Package for Social Sciences; **ANOVA:** Analysis of variance; **Hr:** Hour; **COVID:** Coronavirus Disease.

SUMMARY

Growth and development are in a delicate stage during adolescence. Between childhood and adulthood, adolescence serves as a transitional period. This is the time when habits are inculcated, which will carry forward to adult life. Sleeping patterns among adolescents have an impact on their overall health. The trend of inadequate and declining sleep quality and poor sleep hygiene in adolescents is seen as a public health problem because of the short- and long-term unfavourable health consequences. The aim of our study was to find the quality and pattern of sleep among adolescents of three districts of central Kerala. From this study the prevalence of good quality sleep was found to be 78.3% and prevalence of poor quality of sleep was 21.7%. The association between sleep quality and stressful life events, presence of medical conditions, and use of sleep medications were found to be significant. According to the findings of our survey, most adolescents have a satisfactory sleep, while a smaller percentage experience sleep-related issues.

REFERENCES

1. Khazaie H, Zakiei A, Rezaei M, Komasi S, Brand S. Sleep pattern, common bedtime problems, and related factors among first-grade students: Epidemiology and predictors. *Clin Epidemiol Glob Health*. 2019;7(4):546-51. doi: 10.1016/j.cegh.2018.12.007.
2. Siddiqui AF, Al-Musa H, Al-Amri H, Al-Qahtani A, Al-Shahrani M, Al-Qahtani M. Sleep patterns and predictors of poor sleep quality among medical students in King Khalid University, Saudi Arabia. *Malays J Med Sci*. 2016;23(6):94-102. doi: 10.21315/mjms2016.23.6.10, PMID 28090183.
3. Lyngdoh M, Akoijam BS, S Agui RK, Sonarjit Singh K. Sleep pattern, aggressive behavior and substance use among school students of Manipur: A cross-sectional study. *Indian J Public Health*. 2019;63(3):239-42. doi: 10.4103/ijph.IJPH_334_18, PMID 31552855.
4. Gautam Prayas, et al. "Sleep Quality and Its Correlates among Adolescents of Western Nepal: A Population-Based Study." *Sleep disorders*. 2021. 5590715. doi:10.1155/2021/5590715
5. Ogilvie RP, Patel SR. The epidemiology of sleep and obesity. *Sleep Health*. 2017;3(5):383-8. doi: 10.1016/j.sleh.2017.07.013, PMID 28923198.
6. Şimşek Y, Tekgül N. Sleep quality in adolescents in relation to age and sleep-related habitual and environmental factors. *J Pediatr Res*. 2019;6(4):307-13. doi: 10.4274/jpr.galenos.2019.86619.
7. Murugesan G, Karthigeyan L, Selvagandhi PK, Gopichandran V. Sleep patterns, hygiene and daytime sleepiness among adolescent school-goers in three districts of Tamil Nadu: A descriptive study. *Natl Med J India*. 2018;31(4):196-200. doi: 10.4103/0970-258X.258216, PMID 31134922.
8. Mathew G, Varghese AD, Benjamin AI. A comparative study assessing sleep duration and associated factors among adolescents studying in different types of schools in an urban area of Kerala, India. *Indian J Community Med*. 2019;44(Suppl 1):S10. doi: 10.4103/ijcm.IJCM_19_19, PMID 31728081.
9. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28(2):193-213. doi: 10.1016/0165-1781(89)90047-4, PMID 2748771.
10. Dubey M, Nongkynrih B, Gupta SK, Kalaivani M, Goswami AK, Salve HR. Sleep quality assessment of adolescents residing in an urban resettlement colony, New Delhi, India. *Indian J Community Med*. 2019;44(3):271-6. doi: 10.4103/ijcm.IJCM_87_19, PMID 31602118.