Journal of Public Health and Development
Vol. 16 No. 1 January-April 2018

GENERAL ARTICLE

Sleep quality among students at a high school in Sisaket Province, Thailand

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Received: *13 September 2018* ***Revised:*** *18 January 2018* ***Accepted:*** *2 April 2018*
Available online: *April 2018*

Abstract

Pimpak T, Yoobua C, Yuenying P and Limpiteeprakan P.
Sleep quality among students at a high school in Sisaket Province, Thailand.
J Pub Health Dev. 2018;16(1):63-74

At present, only 20 percent of adolescents get adequate sleep of 8 hours up to nine hours. Inadequate sleep affects overall physical and mental health, including changes in behavior, personality, emotions, and classroom performances. This cross-sectional research aimed to evaluate the sleep quality of high school adolescents and related factors that affect it. The participants were 125 high school students from a selected secondary school in Sisaket Province. Data were collected by a questionnaire that focused on socio-demographic information, health perceptions, sleep hygiene, a Thai stress test, and the Thai version of the Pittsburgh Sleep Quality Index questionnaire (Thai-PSQI). This data was analyzed by descriptive statistics and multiple logistic regression.

Results showed that 75.2% of the students had "poor" sleep habits (global score of PSQI >5), 48.0% of the students slept more than 7 hours each night, and 85.7% had a mild level of stress. Most of them woke up in the middle of the night or early, and experienced cold or overheating sensations and nightmares. Other factors that interfered with their sleep were stress and hunger. Multiple logistic regression showed that the factors that affected the students' quality of sleep were gender, using a smart phone before going to bed, and stress levels (p-value = 0.026, 0.025 and 0.048, respectively). Female had 3.71 times higher risk of poor sleep quality compared to male (95% CI = 1.17-11.76). Mild stress had 3.18 times higher risk compared to normal one (95% CI = 1.16-8.75). Using a smartphone before bed every day had 2.85 times higher risk compared to not using a smartphone everyday (95% CI = 1.01-8.02).

This result recommends that parents should control the use of smartphones before sleeping and promote cognitive coping strategies for stress to improve their children's sleep quality. In addition, schools and departments of health should promote healthy activities to reduce students' stress.

Keyword: sleep quality, stress, sleep hygiene, high school adolescents

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คุณภาพการนอนหลับของนักเรียนชั้นมัธยมศึกษาตอนปลายในโรงเรียนแห่งหนึ่ง ในจังหวัดศรีสะเกษ ประเทศไทย

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บทคัดย่อ

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คุณภาพการนอนหลับของนักเรียนชั้นมัธยมศึกษาตอนปลายในโรงเรียนแห่งหนึ่ง ในจังหวัดศรีสะเกษ ประเทศไทย
ว. สาธารณสุขและการพัฒนา 2561:16 (1):63-74

ในปัจจุบันมีเพียงร้อยละ 20 ของวัยรุ่นที่มีการนอนหลับที่เพียงพอ (มากกว่า 8 ชม.) และหลับถึง 9 ชั่วโมง ซึ่งการนอนหลับไม่เพียงพอทั้งในด้านปริมาณและคุณภาพนั้น ส่งผลกระทบต่อร่างกาย และจิตใจ ก่อให้เกิดการเปลี่ยนแปลงทั้งทางพฤติกรรม บุคลิกภาพและอารมณ์ รวมถึงประสิทธิภาพการเรียนในห้องเรียน การวิจัยครั้งนี้เป็นการวิจัยเชิงพรรณนาภาคตัดขวาง โดยมีวัตถุประสงค์เพื่อศึกษาคุณภาพการนอนหลับและปัจจัยที่มีความสัมพันธ์กับคุณภาพการนอนหลับของนักเรียนชั้นมัธยมปลายในโรงเรียนแห่งหนึ่ง เก็บข้อมูลโดยการใช้แบบสอบถามจากกลุ่มตัวอย่างนักเรียนชั้นมัธยมศึกษาตอนปลาย ในจังหวัดศรีสะเกษ จำนวน 125 คน เก็บข้อมูลในเดือนมกราคม 2559 เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูลเป็นแบบสอบถาม ประกอบด้วย แบบสอบถามข้อมูลส่วนบุคคล การรับรู้ภาวะสุขภาพ สุขนิสัยการนอนหลับ แบบประเมินความเครียดของคนไทย และแบบประเมินคุณภาพการนอนหลับของ Pittsburgh ฉบับภาษาไทย วิเคราะห์ข้อมูลโดยใช้สถิติพรรณนา และวิเคราะห์ปัจจัยที่มีความสัมพันธ์โดยใช้การวิเคราะห์ถดถอยลอจิสติกพหุคูณ

ผลการวิจัยพบว่านักเรียนชั้นมัธยมศึกษาตอนปลายร้อยละ 75.2 มีคุณภาพการนอนหลับไม่ดี (ตามเกณฑ์คะแนนรวมของ Pittsburgh ที่มีค่าเท่ากับ 5 หรือมากกว่า) มีระยะเวลาการนอนหลับในแต่ละคืนมากกว่า 7 ชั่วโมง คิดเป็นร้อยละ 48.0 ร้อยละ 85.7 มีความเครียดอยู่ในระดับเล็กน้อยโดยส่วนใหญ่จะตื่นกลางดึก หรือตื่นเช้ากว่าปกติ สาเหตุของการตื่นกลางคืน คือ เพื่อเข้าห้องน้ำ มีความรู้สึกหนาวหรือร้อนเกินไป และฝันร้าย ส่วนปัจจัยอื่น ๆ ที่กลุ่มตัวอย่างระบุว่ามีผลรบกวนการนอนหลับ ได้แก่ ความเครียด และความหิว จากผลการวิเคราะห์ถดถอยลอจิสติกพหุคูณ พบว่า เพศ การใช้สมาร์ทโฟนก่อนเข้านอน และความเครียด เป็นปัจจัยที่มีผลกับคุณภาพการนอนหลับ (p-value = 0.026, 0.025 and 0.048, ตามลำดับ). นักเรียนหญิงมีแนวโน้มที่จะมีคุณภาพการนอนหลับไม่ดีเป็น 3.71 เท่าของนักเรียนชาย (95% CI = 1.17-11.76) นักเรียนที่มีความเครียดมีแนวโน้มที่จะมีคุณภาพการนอนหลับที่ไม่ดี 3.18 เท่าของคนที่ไม่มีความเครียดหรือคนปกติ (95% CI=1.16-8.75) และการใช้สมาร์ทโฟนก่อนเข้านอนทุกวันมีแนวโน้มที่จะมีคุณภาพการนอนหลับไม่ดีเป็น 2.85 เท่าของคนที่ไม่ได้ใช้ (95% CI=1.01-8.02)

ดังนั้นผู้ปกครองควรมีการควบคุมดูแลการใช้งานโทรศัพท์สมาร์ทโฟน ก่อนเข้านอน ส่งเสริมให้มีวิธีการเผชิญความเครียดที่ถูกต้องเหมาะสมเพื่อเพิ่มคุณภาพการนอนของนักเรียน รวมไปถึงโรงเรียนหรือหน่วยงานทางด้านสุขภาพควรมีการจัดกิจกรรมเพื่อลดความเครียด

คำสำคัญ: คุณภาพการนอนหลับ ความเครียด สุขนิสัยการนอน นักเรียนชั้นมัธยมศึกษาตอนปลาย

Introduction

Sleep plays a critical role in good health and well-being throughout life. Getting enough quality sleep can help reduce mental and physical problems. During sleep, the body works to support healthy brain function and repair worn parts to maintain healthy activity the following day[1]. Sleep helps maintain a healthy balance of hormones that control feelings of hunger (ghrelin) or fullness (leptin). Feelings of hunger increase during good rest. Deep sleep triggers the body to release a hormone that promotes normal growth in children and teens, boosts muscle mass, and repairs cells and tissues[2]. Insufficient sleep reduces work efficiency and increases the use of medical services due to health problems, such as a headaches, fatigue, sluggishness, feeling unwell, irritability, and lack of concentration. Among adolescents, chronic insomnia may affect the brain, causing strokes and slow-downs of learning processes, bringing the need to take short naps, and falling asleep[3]. Insufficient sleep early in life can result in inadequate sleep later as it may reduce some brain development and the efficiency of the nervous system[4].

During adolescence, it is important to have good quality sleep to promote good memory, concentration, and efficiency in learning and the acquisition of good grade results in school. The average duration of sleep for teenagers aged 12 to 17 years is 8 hours or more[5-7]. However, it was reported that one-third of Canadian youth failed to meet the average number of hours (around 26%[8]), especially from Mondays to Fridays[4]. Despite going to bed earlier, adolescents typically sleep less on school nights and "catch up" by sleeping later on the weekend,[4,8-9]. This behavior goes against recommendations for consistent sleep schedules which interfered with their health[7]. Inadequate sleep results in drowsiness during the day more than 40% among high school students[4], which affects their learning and behavior of children[10] and may be a contributing factor to overweight and obesity[11-12]. The factors that have been linked to poorer sleep outcomes in adolescents are : gender, health status, such as underlying disease, chronic illness, mental state, personal sleep characteristics, and the time to start school each day[10,13]. Other factors include caffeine consumption before bed, inconsistent bed time routines, nighttime screen use[14], medications, environmental chemicals, and sleep patterns[4]. Families who sleep together in the same room have many distractions, and these cause low quality sleep. Also, daily routines that changed with technology, such as watching television and using the internet before bed, also cause obesity problems[14-15].

High school is a critical time for students who wish to study at a higher level and/or make important career choices. In addition to studying, school also includes socialization and the desire for academic success. Children may change their way of life to achieve their goals, and this may affect the quality of their sleep. Adjustment of sleep behavior is one way to solve some of these problems. Good sleep is highly important for behavioral and emotional development, learning, attention, and cognitive functioning[16]. Many studies done in other countries, such as Egypt[17], Saudi Arabia[18-19] and Oman[20] have found the prevalence of poor sleep quality using Pittsburgh Sleep Quality Index (PSQI) among secondary school student exceeding 50%. In Canada, it was reported that 26% among the youth have insufficient sleep[4] while the prevalence of insufficient

sleep in Asian students was 75.7% compared to Native American students[21]. In Thailand, the prevalence of sleep quality and correlated factors in high school students are limited, especially in the out city area.

This study aimed to investigate students' health in terms of sleep quality among high school students in Sisaket Province which is located in the Northeast of Thailand using the PSQI, Thailand stress test and to examine related factors that affected poor sleep quality. Data from this study will be used by local health organization and school administrators in order to organize health promotion activities and students' health development activities, particularly those related to a better sleep quality among adolescents in the Northeast of Thailand.

Methods

The population is students in a high school in Kantharak District, Sisaket Province in the academic year 2015 with a total number of 2,051. The sample size was calculated from the formula[22] for simple random sampling which was estimated using a confidence interval of 95%, and acceptance error of 7.6% and a prevalence of poor sleep quality of 76.3[23]

Thus, the required sample size was at least 115. One high school was purposively selected as a sample group because this school represents a school outside the city. Classes were selected using simple random sampling. Data was collected by self-administered questionnaires from all the students in the selected classrooms. There were 45 students in grade 10 (room 4/5), 38 students in grade 11 (5/7), and 42 students in grade 12 (6/5), making a total of 125. Before the main data collection procedure, pre-testing was done in the personal information part. Some changes were made to suit the target group.

The instruments used for data collection consisted of three questionnaires:

1. Personal data questionnaire included gender, class level, academic plan, cumulative grade point average, underlying diseases, marital status of parents, monthly income of the family, and sleep disturbance factors, such as sleeping style, keeping the light on while sleeping, drinking tea/coffee, watching TV before bed, using a smart phone before bed, and using a computer before bedtime.

2. Stress refers to a person's feelings, conditions of moods, and/or emotional responses to stimulus. A sense of uneasiness, fear, boredom, and anxiety can be assessed by using Thai stress test (TST)[24]. It was a three-level Likert scale consisting of 24 items. Questions 1-12 are negatives scales while questions 13-24 are positive scales. Both sides fully scored are 36 points. If there is a high score in negatives scales it means very stressful. If high scores in positive questionnaire, it means very good mental health (no stress). If the scores are both balanced or the same, it shows that there is a normal level of mental health or mild stress. Highlights of the answer were assigned to "often," "sometimes," and "never". The Alpha coefficient of the TST total test was 0.84.

3. Sleep quality refers to an individual's perception of sleep assessed by the PSQI version Thai language[25] adapted from PSQI[26]. It consisted of seven elements: subjective sleep quality, sleep latency, sleep duration, sleep effectiveness, sleep disturbances, sleep medications, and daytime dysfunction. Each item had a score of 0-3 points. In all cases, a score of "0" indicates no difficulty, while a score of "3" indicates severe difficulty. The total score was between 0-21 points

based on seven components. A total score of less than or equal to 5 indicated good sleep quality, and a total score of more than 5 indicated poor quality sleep. The PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.72[26].

Ethical approval was obtained from the Ubon-ratchathani University Ethical Committee (2017/UBU-REC-25/2560). Verbal consent was obtained from study participants before the interview. Data were entered and analyzed in Statistics program. Descriptive statistics (number and percentage) were used to determine the prevalence of poor sleep quality. The univariate logistic regression was used to determine the bivariate association between personal factors and poor sleep quality based on a set level of significance of 0.05. Only individual factors with p-values less than or equal to 0.20 from the simple logistic regression will be introduced into the multiple logistic regression analysis.

Results

About three-quarters (75.2%) of the high school students had poor sleep quality scores of more than 5 points and 24.8% had good sleep quality. Most of the students (58.4%) had a fairly good subjective sleep quality. At 55.2% of the students took less than 15 minutes for sleep latency and 48.0% of them had a sleep duration of more than 7 hours each night. About 85.7% of the students had a mild level of stress. Habitual sleep efficiency of more than 85 percent accounted for 72.0%. Sleep disturbances, such as waking up in the middle of the night or waking up earlier than usual, occurred less than once a week for 38.4% of the students. Waking up in the middle of the night to go to the bathroom occurred less than once a week and accounted for 37.6%. Sleep disturbances from physical pain occurred less than once per week and accounted for 39.2%. Sensations of feeling too hot happened less than once a week and accounted for 42.4%. Most of the participants didn't have any problems during the month with breathing, coughing, or snoring loudly, feeling too cold, and having nightmares, and accounted for 68.8%, 68.8%, 46.4%, and 50.4% respectively.

Almost all (97.6%) of the students did not take sleeping medication, but 1.6% took sleeping medication one to two times a week. In terms of daytime dysfunction, 40.0% of the students had drowsiness while doing daily activities 1 to 2 times a week. There was a little problem with lack of enthusiasm to work, and this accounted for 48.0%. Details are shown in Table 1. Analysis of the simple logistic regression relationship between each factor and sleep quality found that gender, class level, sleeping in a room with others, using a smart phone before bed, and stress was significantly associated with sleep quality at a significant level of <0.05, as shown in Table 2. The results of multiple logistics regression showed that gender, use of a smart phone before going to bed, and stress were statistically significant. Women had 3.71 times higher risk of poor sleep quality compared to males. Students who used a smart phone every day before bed had 2.85 times higher risk of poor sleep quality compared to those who did not use smartphones. Those with moderate stress had a 3.18 times higher risk of poor sleep quality compared to those with normal or no stress, as shown in Table 3.

Table 1 Number and percentage of students by sleep quality and composition of sleeping

Composition of sleeping	Number	Percent
Composition 1 : Subjective sleep quality		
Very good	20	16.0
Fairly Good	73	58.4
Fairly bad	31	24.8
Very bad	1	0.8
Composition 2 : Sleep latency		
Less than 15 minutes	69	55.2
Around 16-30 minutes	51	40.8
Around 31-60 minutes	5	4.0
Composition 3 : Sleep duration		
More than 7 hours	60	48.0
Around 6-7 hours	44	35.2
Around 5-6 hours	18	14.4
Less than 5 hours	3	2.4
Composition 4 : Habitual sleep efficiency		
More than 85 percent	90	72.0
Around 75-84 percent	27	21.6
Around 65-74 percent	8	6.4
Composition 5 : Sleep disturbances		
Waking up in the middle of the night or early morning		
Not during the past month	45	36.0
Less than once a week	48	38.4
Once or twice a week	28	22.4
Three or more times a week	4	3.2
Waking up in the middle of the night for toilet		
Not during the past month	45	36.0
Less than once a week	47	37.6
Once or twice a week	26	20.8
Three or more times a week	7	5.6
Cannot breathe comfortably		
Not during the past month	86	68.8
Less than once a week	23	18.4
Once or twice a week	11	8.8
Three or more times a week	5	4.0
Cough or snore loudly		
Not during the past month	86	68.8
Less than once a week	21	16.8
Once or twice a week	11	8.8
Three or more times a week	7	5.6

Table 1 Number and percentage of students by sleep quality and composition of sleeping (Conts.)

Composition of sleeping	Number	Percent
Feeling too cold		
Not during the past month	58	46.4
Less than once a week	44	35.3
Once or twice a week	19	15.2
Three or more times a week	4	3.2
Feeling too hot		
Not during the past month	47	37.6
Less than once a week	53	42.4
Once or twice a week	20	16.0
Three or more times a week	5	4.0
Having a nightmare		
Not during the past month	63	50.4
Less than once a week	44	35.2
Once or twice a week	9	7.2
Three or more times a week	9	7.2
Having pain		
Not during the past month	44	35.2
Less than once a week	49	39.2
Once or twice a week	25	20.0
Three or more times a week	7	5.6
Composition 6 : Using of sleeping pills		
Never	122	97.6
Less than once a week	1	0.8
Once or twice a week	2	1.6
Composition 7 : Effect on daytime activity		
Sleepy or fall asleep		
Never	10	8.0
Less than once a week	26	20.8
Once or twice a week	50	40.0
Three or more times a week	39	31.2
Problem to maintain enthusiasm to get work done		
Never	28	22.4
Fair problem	60	48.0
Much problem	28	22.4
Very much problem	9	7.2

Table 2 The association between each independent variable and sleep quality

Variables	Sleep Quality		Crude OR	95%CI	p-value
	Poor n (%)	Good n (%)			
Gender					
Female	80 (80.8)	19 (19.2)	3.14	(1.24 , 7.96)	0.016
Male	14 (56.0)	11 (44.0)	1		
Class levels					
Grade 12	33 (78.6)	9 (21.4)	2.23	(0.86 , 5.77)	0.015
Grade 11	33 (86.8)	5 (13.2)	4.01	(1.31 , 12.25)	0.099
Grade 10	28 (62.2)	16 (37.8)	1		
Academic plan					
Arts-Language/ Arts-Math	50 (79.4)	13 (20.6)	1.57	(0.69 , 3.57)	0.279
Science-Math	44 (71.0)	18 (29.0)	1		
Cumulative Grade point average					
≤ 2.50	6 (75.0)	2 (25.0)	1.50	(0.15 , 15.46)	0.999
2.51-3.00	43 (75.4)	14 (24.6)	1.54	(0.25 , 9.30)	0.999
3.01-3.50	41 (75.9)	13 (24.1)	1.58	(0.26 , 9.62)	0.999
≥ 3.51	4 (66.7)	2 (33.3)	1		
Residential type					
Doesn't own home	6 (85.7)	1 (14.3)	2.05	(0.24 , 17.69)	0.516
Own home	88 (74.6)	30 (25.4)	1		
Live with parents or not					
No	27 (81.8)	6 (18.2)	1.68	(0.62 , 4.55)	0.308
Yes	67 (72.8)	25 (27.2)	1		
Underlying disease					
Have	6 (75.0)	2 (25.0)	0.99	(0.19, 5.17)	0.989
None	88 (75.2)	29 (24.8)	1		
Parental status					
Not living together	22 (81.5)	5 (18.5)	1.59	(0.55 , 4.63)	0.396
Live together	72 (73.5)	26 (26.5)	1		
Sleeping in same room with others					
Sleep with others	8 (57.1)	6 (42.9)	0.39	(0.12 , 1.22)	0.106
Sleep alone	86 (77.5)	25 (22.5)	1		
Light on while sleeping					
On	10 (90.9)	1 (9.1)	3.57	(0.44 , 29.09)	0.234
Not on	84 (73.7)	30 (26.3)	1		
Drinking tea-coffee					
Drink	39 (78.0)	11 (22.0)	1.29	(0.56 , 2.99)	0.554
Do not drink	55 (73.3)	20 (26.7)	1		
Stress levels					
Mild stress	54 (85.7)	9 (14.3)	3.30	(1.37 , 7.93)	0.008
Normal	40 (64.5)	22 (35.5)	1		
Watch television before bed					
Every day	40 (74.1)	14 (25.9)	1.00	(0.42 , 2.41)	0.993
Not every day	37 (74.0)	13 (26.0)	1		
Use computer before bed					
Every day	9 (69.2)	4 (30.8)	0.98	(0.254 , 3.75)	0.971
Not every day	30 (69.8)	13 (30.2)	1		
Use smart phone before bed					
Every day	77 (80.2)	19 (19.8)	2.86	(1.17 , 6.99)	0.021
Not every day	17 (58.6)	12 (41.4)	1		

Table 3 Multiple Logistic Regression for predictors of sleep quality

Variables	Crude OR	Adjusted OR	95%CI	p-value
Gender				
Female	3.14	3.71	(1.17 , 11.76)	0.026
Male	1	1		
Class levels				
Grade 12	2.23	0.98	(0.32 , 3.02)	0.029
Grade 11	4.01	4.13	(1.16 , 14.77)	0.970
Grade 10	1	1		
Sleeping in same room with others				
Sleep with others	0.39	0.32	(0.09 , 1.22)	0.096
Sleep alone	1	1		
Stress levels				
Mild stress	3.30	3.18	(1.16 , 8.75)	0.025
Normal	1	1		
Using smart phone before bed				
Every day	2.86	2.85	(1.01 , 8.02)	0.048
Not every day	1	1		

Discussion

The current study investigated the sleep quality among high school students in Sisaket and found that 75.2% of the students were poor sleepers. This percentage is close to the research from Assiut, Egypt which found 72.5% of poor sleepers among 829 high school students aged 15-19 years[17]. The study of factors related to multiple regression analysis revealed that gender, use of smartphones before going to bed, and stress were statistically significant in poor sleep quality. Based on Table 3, 80% of the female students had poor sleep quality, which was 56% more than the male students and accounted for 3.71 times higher than male students. This is consistent with the survey among high school students in the United States in the years 2007 to 2013 which found that female had less sleep (≤ 7 hours) than male (71.3% versus 66.4%, $p<0.001$)[26] and had more causes for insomnia[27-28]. Insomnia in females is characterized by either waking up in the middle of the night and then having difficulty getting back to sleep again, or having difficulty getting to sleep at bedtime and waking up in the middle of the night and then having difficulty getting to sleep again. Causes of this may include many factors, including discomfort from breast cramps, cramps, and headaches that precede the menstrual cycle and during the menstrual cycle. These symptoms can interfere with sleep[29]. Adding to these other two factors, it was found that girls have a mild stress level and use mobile phones before bed

more so than boys.

Based on Table 3, it was found that grade 11 students had poorer sleep quality than grade 10 and grade 12 students. Because grade 11 students had concerns about entering university and heavy loads of reading which may have affected their sleep. The use of a smart phone before going to bed was found to be related to the sleep quality of the students. This result was consistent with other studies in the UK that showed the association between mobile phone use and adolescent sleep quality increasing their difficulty to fall asleep. The primary purpose of using smart phone before bedtime is to listen to music, which demonstrated the greatest effect on sleep quality (OR, 2.85, [95%CI: 1.58,5.13])[30]. This behavior results in sleeping late and decreasing sleeping time. The use of such devices in the long-term affects physical, mental, emotional and social health[31-32]. To obtain a good night sleep, the students can practice good sleep habits, for example : going to bed and getting up at the same time each day including on the weekends, removing electronic devices, such as TVs, computers, and smartphones out of the bedroom and being physically active during the day[33].

Stress is the response of the body and mind to one or many stressors. The causes of stress in high school students involve preparation for tertiary entrance exams and high parental expectations[34]. This time is a decisive moment in decision-making that affects students' future lives and careers. Changes in students' ways of life may cause stress and affect sleep quality[35]. The results of this study were consistent with the study of Yupadee et al. which found that secondary school students in Thailand had a high level of stress at 47.7%[36]. This stress may affect social relationships and cause problems both in learning and mental health, which includes anxiety and depression. Therefore, improvement of sleep habits by relaxation and health care may promote sleep quality[23]. The sample group used in this study was from one high school which may not have represented all of the high school students in Sisaket Province; however, it shows a broad picture about what factors affect the quality of sleep among high school students outside the capital.

Recommendations

The results showed that 75.2% of high school students have poor sleep quality. The factors associated with sleep quality were gender, use of a smartphone before going to bed, and stress. Parents can help by setting bedtimes and limiting when or where their teenagers can use smartphones or other electronic devices to improve the quality of their children's sleep. School administrators should also introduce activities dealing with the reducing of stress such as providing later school start times policy. Local health organization needs to promote sleep quality among high school students through improvement of sleep hygiene and promotion of health.

Acknowledgements

The authors would like to express their greatest appreciation to all the high school students and teachers of Kantharalak School in Sisaket Province for supporting the data collection for this study, and also thanks to the staff of the Office of International Relations at Ubon Ratchathani University for their assistance with English.

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