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(RESEARCH ARTICLE)

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To study the sleep pattern in the adolescent age group in Raipur District

Shahina Parveen * and Namita Gajendra

Department of Life Science, Shri Rawatpura Sarker University, Raipur, Chhattisgarh, India.

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Abstract

Introduction: India has the largest adolescent population in the world, and every fifth person is between 10 and 19 years old. Adolescence is the phase between childhood and adulthood it is a dramatic period showing drastic physical and mental change. It is an important time for laying the foundation of good physical and mental health. To analyze the sleeping patterns of adolescents in different high schools, this is a cross-sectional questionnaire-based study survey studies have been conducted throughout the world related to sleep patterns in adolescents, but very few studies have been conducted in Chhattisgarh and almost negligible studies have been reported from Chhattisgarh.

Methodology: A total number of 250 school students from class 9th to 12th aged 12 to 19 years were included from different high schools in Raipur. The Pittsburgh sleep quality index is a questionnaire-based method used to access sleep during the past month it is based on seven components of a score each score has a value ranging from 0-3. A value greater than 3 indicates poor quality sleep and a value less than 3 indicates good quality sleep. The seven component scores are 1. Sleep quality, 2. Sleep latency, 3. Sleep duration, 4. Sleep efficiency, 5. Sleep disturbance, 6. Use of sleep medication, 7. Day time dysfunction

Result and Discussion: The mean age of the adolescents included in this study was 15.4 years, and the mean total sleep was 7.5 hours per day. Adolescents of higher Grades had lesser total sleep time (9th=8.5 hours; 10th=7.9 hours; 11th=7.6 hours; 12th=7.4 hours), and more frequent nocturnal awakenings (9th=34.8%; 10th=46.3%; 11th=40.3%; 12th=33.3%). Daytime leg pain (9th=13.2%; 10th=16.7%; 11th=9.7%; 12th= 20.6%), daytime napping (9th=46.2%; 10th=38.2%; 11th=50.2%; 12th=69.8%), and daytime sleepiness (9th=36.4%; 10th=40.1%; 11th=39.3%; 12th=55.6%) increased progressively among higher Grades. Adolescents in higher Grades were more prone to not follow their weekly schedule on weekends. Sleep debt of roughly 1.5 hours per day was seen in all adolescents and progressed with advanced Grades.

Conclusion: Adolescents of higher Grades had lesser sleep time, and frequent awakenings; suffered daytime leg pain, and felt sleepy during the day. These factors suggest increasing sleep deprivation among higher Graders. This study is needed to concrete the need for sleep hygiene and practice mental and emotional programs.

Keywords: Adolescents; Sleep pattern; Sleep latency; Pittsburgh sleep quality index; Sleep debt

1. Introduction

Adolescence is considered as the age period between 10-19 years where the child enters into adulthood. It could also be considered as the pre-teen years of an individual's life, in which diverse physical and psychological changes start to arise from the age of 12 years (Agrawal *et al*., 2020). Thus, it could be explained as the period of exploration, development, disorientation and experimentation. In this phase of life rapid changes occur in a person's body starting from the physiological development, onset of puberty and flood of hormones in the body (Crosnoe and Johnson, 2011).

* Corresponding author: Parveen

Psychological and emotional ups and down are also observed in this time period. Different behavioral traits are observed in the adolescents, higher stress, change in nature and behavior specially in boys is a hallmark sign of adolescence (Browning *et al*., 2005). These factors along with the rising academic stress leads to social stress, environmental stress, loneliness and depression in adolescents.

There have been several research reports that suggest that sleep time and the need of sleep changes with age and it is a necessity specially in the developmental stages of life. Adolescence is a very sensitive period of an individual's life and hence affects the sleep patterns, metabolic functioning, cognitive performance, psychological behavior and social life (Gariepy *et al*., 2020). Also, as the child reaches the adolescent stage the parental control also decreases and with the increase of the academic pressure the sleep rhythm gets disturbed (Carskadon, 2011). Thus, with the onset of the adolescent age rising hormonal changes, behavioral changes affect sleep health, social-emotional behavior and cognitive functioning. All these factors are closely associated with the sleep behavior of the child (Wheaton *et al*., 2016). Thus, adolescent sleep is a public health concern in all the major countries. Poor sleep habits, insufficient sleep, overexposure to screen disturbs the circadian sleep-wakeup cycle. Late sleeping habits and early school timings play a crucial role in disturbing the sleep cycle of the adolescent children (Gariepy *et al*., 2020). Also, different sleep cycle in school days and non-school days have been observed in many children. Children tend to sleep for longer hours during weekends as compared to weekdays this creates a jet lag like effect causing headaches, anxiety, and poor sleep (Gariepy *et al*., 2017).

Poor sleep, in adolescents results in sleep disturbances, frequent sleep awakenings, body aches, anxiety, risky behavior, depression, poor academic and cognitive performance, and suicidal

thoughts (Carskadon, 2011). Thus, sleep is an integral part of an individual's life necessary for the proper functioning of the body and brain; and in the adolescent stage of life where the body undergoes a number of physical and hormonal changes proper sleep cycle and sleep behavior is the key for healthy life.

In the present study, sleep pattern of school going adolescents have been studied residing in Raipur district. The study aims to provide an insight of the changing sleeping patterns of the adolescents and its impact on the health of the children.

2. Materials and Methods

The present study was conducted in four blocks of Raipur district including Dharsiwa, Arang, Abhanpur and Tilda. The study was conducted among Government higher secondary school-based students. For the research work around 250 school going student studying in class 9^{th} to 12^{th} aged between 12 to 19 years were selected randomly from different high schools in Raipur. The selected students were ascertained to have no chronic disease or disability, no recent serious acute illness, no medications, did not smoke and had regular sleep habits. Written consent was taken from the school authorities and parents before starting the experiment. A questionnaire- based study based on Pittsburgh sleep quality index was designed to evaluate the sleep patterns of adolescent students during the past month. The study was based on seven components and for each component score was given with value ranging from 0-3. A value greater than 3 indicated poor sleep quality and a value less than 3 indicated good sleep quality. The seven-components included for scoring were 1. Sleep quality, 2. Sleep latency, 3. Sleep duration, 4. Sleep efficiency, 5. Sleep disturbance, 6. Use of sleep medication, and 7. Day time dysfunction. The observations noted during the study were further used for statistical analysis.

3. Result and Discussion

In the present study sleeping patterns of adolescent school going children in the age group of 12-19 was evaluated in four blocks of Raipur district (Dharsiwa, Arang, Abhanpur and Tilda). The adolescents studying in Government higher secondary schools with regular sleep habits were selected randomly for the research work. A questionnaire based on Pittsburgh sleep quality index was used for the assessment of sleep patterns in adolescent students during the past month. Sleep components like Sleep quality, Sleep latency, Sleep duration, Sleep efficiency, Sleep disturbance, Use of sleep medication, and Day time dysfunction were evaluated and further used for statistical analysis.

The observations noted during the study showed that the average age of all the selected candidates was approximately 15.4 years while, the average sleep was observed to be 7.5 hours per day. The sleep time study of the adolescents showed that 9^{th} graders showed 8.5hrs of sleep, 10^{th} graders showed an average of 7.9hrs of sleep, 11^{th} graders showed 7.6hrs of sleep while, the 12^{th} graders showed 7.4hrs of sleep. Thus, it was observed that the higher the academic grade the lesser the sleep the students were getting. The lowest sleep time was observed in the 12^{th} grade adolescents while, the highest sleep time was observed in the 8^{th} grade adolescents (Table 1; Figure 1).

Table 1 Sleep time study of adolescents

Average sleep time of adolescents	
Class	**Sleep time (Hrs)**
9th	8.5
10th	7.9
11th	7.6
12th	7.4

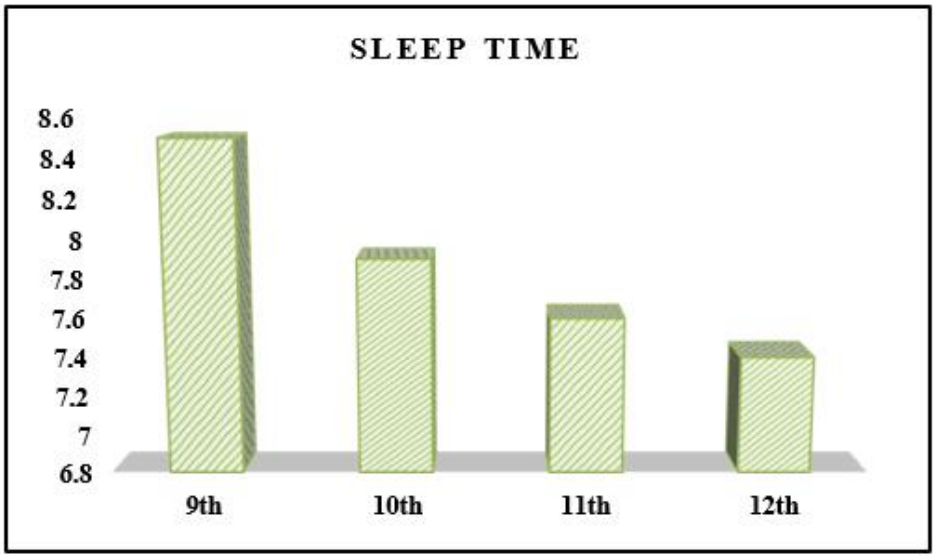

Figure 1 Study of average sleep time of adolescents

The average frequent nocturnal awakenings were also analyzed during the study, it was noted that the 9th grade candidates showed 34.8% nocturnal awakenings, 10th graders showed 46.3% nocturnal awakenings, 11th grade candidates experienced 40.3% nocturnal awakenings while, the 12th grade students experienced 33.3% nocturnal awakenings. In this study, highest nocturnal awakenings were observed in 10th graders followed by 11th graders, and 9th graders. The 12th grade experienced the least frequent nocturnal awakenings (Table 2; Figure 2).

Table 2 Study on Frequent nocturnal Awakenings

Average Frequent Nocturnal Awakenings	
Class	Frequent Nocturnal Awakenings (%)
9th	34.8
10th	46.3
11th	40.3
12th	33.3

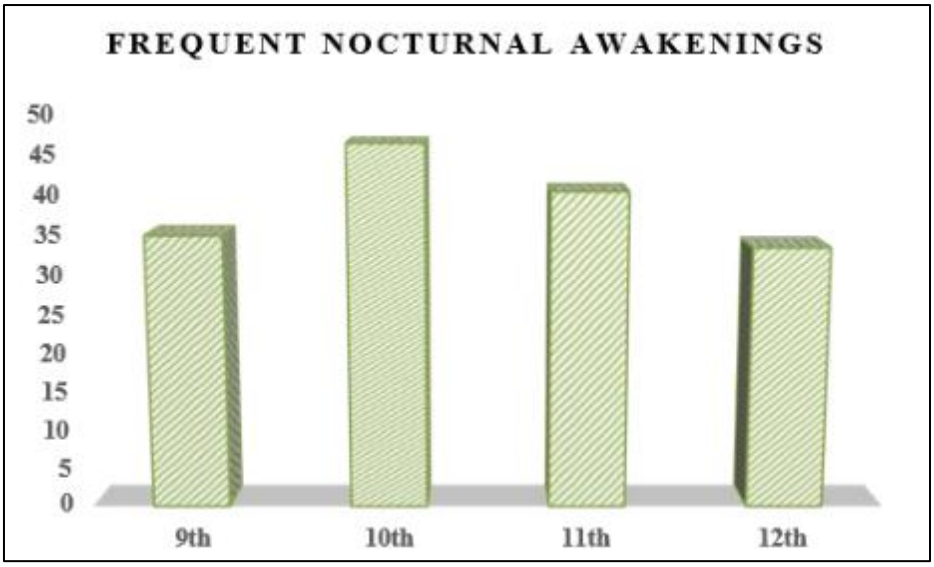

Figure 2 Study of Frequent nocturnal awakenings in adolescents

The results of the daytime leg pain study showed that 13.9% of 9th graders experienced daytime leg pain, 16.7% of 10th graders experienced daytime leg pain, 9.7% of the 11th graders experienced daytime leg pain while 20.6% of the 12th graders experienced day time leg pain. In this study, highest day time leg pain was observed in the 12th graders followed by the 10th graders while, least was observed in the 11th graders (Table 3; Figure 3).

Table 3 Study of Daytime Leg Pain

Average Daytime Leg Pain	
Class	Daytime Leg pain (%)
9th	13.2
10th	16.7
11th	9.7
12th	20.6

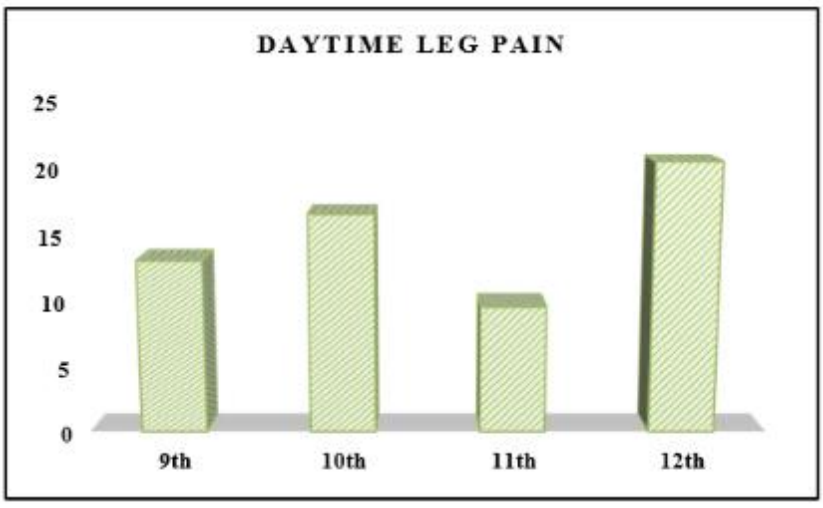

Figure 3 Study of Daytime Leg pain in adolescents

For the daytime napping study, it was observed that 46.2% of 9th grade students experienced day time napping, 38.2% of 10th grade students experienced daytime napping, 50.2% of 11th grade

students experienced daytime napping while, 69.8% of 12th grade students experienced daytime napping. The observations noted during the study show that highest percentage of daytime napping was observed in the 12th grade students followed by 11th grade students while, least was observed in the 10th grade students (Table 4; Figure 4).

Table 4 Study of Daytime napping

Average Daytime Napping	
Class	Daytime Napping (%)
9th	46.2
10th	38.2
11th	50.2
12th	69.8

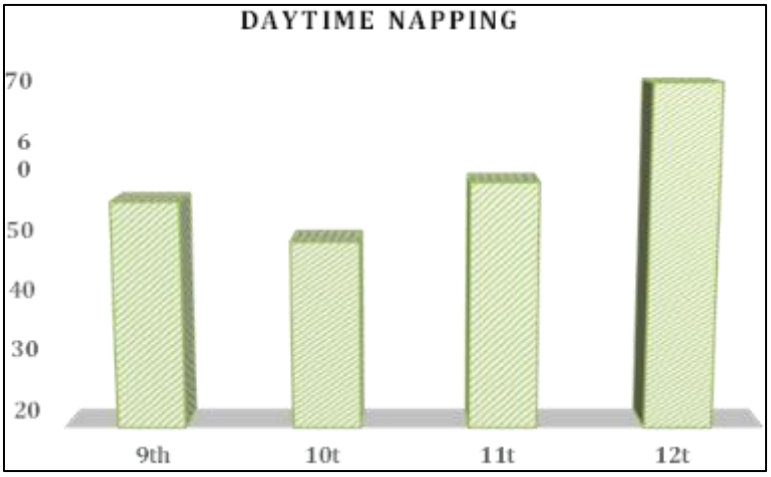

Figure 4 Study of Daytime Napping in adolescents

The daytime sleepiness study showed that 36.4% of the 9th grade students showed daytime sleepiness, 40.1% of the 10th graders showed daytime sleepiness, 39.3% of the 11th graders showed daytime sleepiness and 55.6% of the 12th graders showed daytime sleepiness. The highest incidence of daytime sleepiness was observed in the 12th grade students followed by the 1oth and the 11th grade students (Table 5; Figure 5).

Table 5 Study of Daytime Sleepiness

Average Daytime Sleepiness	
Class	Daytime Sleepiness (%)
9th	36.4
10th	40.1
11th	39.3
12th	55.6

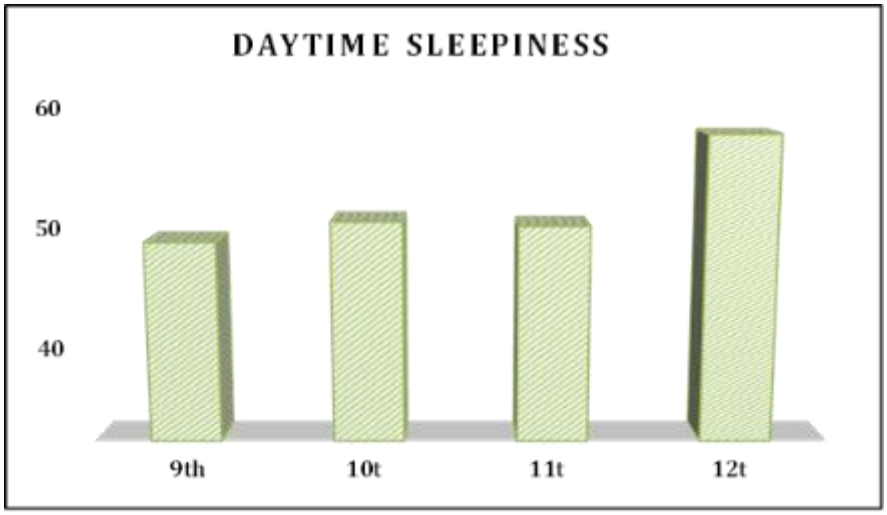

Figure 5 Study of Daytime Sleepiness in adolescents

4. Discussion

In the present study it was highly noted as the grades of the students raised the sleep time and the sleep patterns of the adolescents was highly affected. In the sleep time study, it could be asserted that the as the 12th graders have high study burden which takes a major part of their day and results in lesser sleep time as compared to the 9th, 10th, and 11th grade adolescents. While, in the frequent nocturnal awakenings study, the 12th grade adolescents experienced the least nocturnal awakenings which may be a result of their lesser sleep time. It should be suggested that due to their lesser sleep time they experience deep sleep without much disturbance. As compared to the 10th and 11th grade adolescents which experience higher nocturnal awakenings.

In the daytime leg pain study, the highest incidence was observed in the 12th graders followed by the 10th graders. The higher incidence of leg pain in 12th graders could be related to the average short sleep time of the population which eventually results in the lack of sleep and hence results in day time leg pain while, in the case of 10th higher incidence of leg pain should be associated with the higher nocturnal awakening which results in sleep disturbances and hence daytime leg pain. In the average day time napping study, highest percentage was observed of the 12th grade students which may be due to higher study load and shorter sleep time resulting in day time napping of students. Similarly, in the average daytime sleepiness study also highest sleepiness during the daytime was observed in the 12th grade students which is supposed to be due to lack of sleep during the night but higher daytime sleepiness in the 10th and the 11th grade students could be attributed towards sleep disturbances which can be ascertained by the above frequent nocturnal awakenings study.

Gupta et al. (2008) studied the sleeping patterns of urban school going adolescents in Delhi and reported that adolescents studying in higher grades faced sleep debt of approximately one hour per day daily which proceeded with the higher grades. Also, the higher graders showed lesser sleep time, and frequent nocturnal awakenings, daytime leg pain, and daytime napping and day time sleepiness. These results were in complete correlation with the present study. Devanani and Bhalerao (20111) reported daytime sleepiness in adolescents of Western India due to sleep debt and the differentiation of sleep during the weekdays and weekends. Also, the authors supposed that because of the current academic pressure on the adolescents they are facing chronic sleep debit due to the lower sleep time and the early wake up time. The results of the study were also in synchronization with the present study. While, the results of Kakkar et al. (2016) were in association with regards to average age of adolescents and sleep time but the results of the sleep habits of adolescents of urban and rural population of Rajasthan did not show any significant correlation with respect to the present study.

Cox *et al*. (2021) performed a study based on Pittsburgh sleep quality index on the faculty of Nursing college, Texas to study the sleep quality, sleeping pattern and difficulties in sleep. The authors observed that almost 70.5% of the selected candidates showed poor sleep quality also, sleep disturbances were observed to be high in the candidates. It was proposed that the disturbance in the circadian rhythm, long work shifts lead to jet lag type effect and sleep disturbances. The results of the study were in correlation with the present study where the 12th grade candidates due to higher academic stress received short sleep time which showed in symptoms like day time sleepiness and daytime

napping. However, the results of Mishra *et al*. (2023) were in contradiction with the present study as they reported good sleep quality and sleep hygiene in the adolescent population of Vellore, Tamil Nadu with only 12% reporting poor sleep quality. The authors suggested that enforcing bedtime routine and maintaining sleep hygiene can highly improve the sleep quality of the adolescents.

5. Conclusion

The present study evaluates the sleeping pattern of school going adolescents of Raipur district using the Pittsburgh sleep quality index and explains the impact of lack of sleep, disturbed sleeping habits on the academic performance of the adolescent population. The observations noted during the study highlights that adolescents studying in higher grades have to deal with short sleep duration due to the academic responsibilities and early morning wake up time during weekdays which in turn affects the physical and mental well-being of the adolescent population.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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