

Study of sleep problems and their association with scholastic performance in school going children

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Abstract

Background: Sleep is an integral part of any healthy individual and sleep problems can affect the intellectual abilities including the performance at school. **Objectives:** We studied the sleep problems among school going children in the age group of 6-16 years and the association of the sleep problems with scholastic performance in them. **Materials and Methods:** The study was a cross-sectional study carried out in students attending a private school. The children were given a questionnaire based on the “BEARS” screening tool for sleep problems in children to be filled by children and parents. Accordingly, the age and academic grades of students were recorded. The prevalence of sleep problems and their relation to school grades were studied. **Results:** Out of 229 students, 25.33% (58) students were found to have sleep problems after applying the “BEARS” criteria. Of these 58 children, 31 scored A grade, 25 scored B grade, and 2 scored C grade. 23% (31 out of 135) of A graders were found to have sleeping problems, 28% (25 out of 89) of B graders, and 40% (2 out of 5) of C graders had sleeping problems. **Conclusion:** Sleep problems were common in school going children. It was observed that as scholastic grades decreased, the prevalence of sleeping problems increased. Sleep problems might be one of the contributors for poor scholastic achievements in children.

Key words: BEARS screening tool, Bed time problems and snoring, School performance, Sleep problems

Sleep is one of the most essential needs of a human being. Sleep patterns vary from infancy to preadolescence and to adolescence due to the hormonal influences, relative sleep needs, and life styles of children. Sleep needs vary with individual's sleep duration in the previous period. The sleep-wake pattern (circadian rhythm), though intrinsically regulated, is also influenced by external factors such as time of meals, alarm clocks, and light and dark environment. If there is a shortage of the adequate sleep according to the need on a long-term basis, then it can lead to “sleep debt.” If this debt is not cleared early then, the body may respond to this by decreased concentration, repeated napping, and dozing off. In addition to the reduced sleep duration, the quality of the sleep may be affected by problems such as snoring, frequent night time awakening, delay in going to bed and nightmares. They all add on to the problem by aggravating the symptoms of daytime sleepiness and reduced alertness.

Sleep influences the physical, mental, and social well-being. Sleep deprivation may present itself in many ways including inattention, poor concentration, moodiness, behavioral problems, and poor academic performance and social skills, to name a few. In children, the manifestations of sleep debt are not classical, and they may present with mood disturbances,

poor impulse control, irritable nature, and impaired vigilance. These may further develop into social, school, and learning problems.

It is found that sleep problems exist in about 30-40% of the children before the school going age [1]. These may continue in the early childhood and adolescence and later become more grave and irreversible. Since these problems may sometimes be associated with disorders such as attention deficit hyperactivity disorder, their early diagnosis and treatment are important. School going children with sleep problems may have poorer coping behavior; they may also get irritable, angry, depressed with frequent mood swings, and difficulty in adjusting at school. They may have adverse effects on the psychological and academic aspects of a child and can reduce their quality of life [2].

Currently, no routine screening of childhood sleep problems exists in our country. There is a paucity of data on the prevalence of sleep problems in school going children and their relationship to scholastic performance [3,4]. If sleep problems are diagnosed early and managed accordingly, it will immensely benefit not only the child and the family but the whole of society as well. Hence, there is dire need to detect sleep problems and their

effect on the school performance at the earliest so as to prevent consequences in future. We planned this study to assess the sleep problems among school going children between 6 and 16 years of age and to study their association with scholastic performance of these children.

MATERIALS AND METHODS

This was a cross-sectional study carried out for a period of 2-month from August 1, 2015, to September 30, 2015, in students attending a private school in Urban Bengaluru. Consent was obtained from the school authorities and parents of the children to carry out the study. Pediatric residents and interns examined the children and collected the data. All the children in the age group of 6-16 years were included in the study. Children with a chronic illness, such as asthma, seizures, mental retardation, developmental delays and hypothyroidism, and on chronic medications such as anti-epileptics and bronchodilators, were excluded from the study.

In a previous study conducted by Ravikiran et al. [5], 51.1% of the children were found to have sleep problems. In the present study, expecting to get a similar result with a relative precision of 15% and 95% confidence level the study required a minimum of 218 subjects. The children were given a questionnaire based on the "BEARS" criteria for screening of sleep problems in children to be filled by parents of school age children and in adolescent children by themselves with the help of their parents.

The questionnaire included a demographic profile of the students, past medical history, and the grades obtained in the last summative assessment. It also contained questions regarding the sleep problems. As the sleep problems and their assessment vary in the different age groups, different set of questions were given to children in the age group of 6-11 years (Group I) and 12-16 years (Group II). The questions included Yes or No option questions and direct answer type questions. The questionnaire also had a column for the Grades obtained by the child in their previous year's summative assessment which was to be filled by the parents.

The "BEARS" sleep screening tool is a simple five-item pediatric sleep screening instrument for information and identifying sleep problems in primary care setting. It provides a comprehensive screen for the major sleep disorders affecting children in the 2-18-years. Each sleep domain has a set of age-appropriate "trigger questions" for use in the clinical interview [6]. The "BEARS" instrument is divided into five major domains: B - Bed time problems, E - Excessive daytime sleepiness, A - Awakening during the night, R - Regularity and duration of sleep, and S - Snoring. This screening tool is simple, user-friendly and has been found to be useful in identifying sleep-related problems and helps in recording the sleep information in children [7].

The children were further classified under different groups depending on the grades obtained during the last summative assessment. Children scoring more than or equal to 75% were kept in "A" grade, children scoring between 50% and 74% were graded as "B" and those scoring $\leq 49\%$ were classified as "C" graders.

Statistical Analysis

All the quantitative variables, such as age and duration of sleep, were analyzed and described in terms of mean and standard deviation. The qualitative variable like different sleep problems was expressed as a proportion. Chi-square test was used to find the association of sleep problems and their school performance. The data were collected and analyzed using SPSS software version 20.

RESULTS

A total of 275 questionnaires were distributed; out of which, 35 questionnaires were incomplete and another 6 questionnaires were not returned. So, a total of 234 children between 6 and 16 years were included in this study. Of these, 3 children had bronchial asthma on medications and 2 children were suffering from seizures and were on anti-epileptic medications. These 5 children were excluded from the study as they had illnesses affecting their sleep. Total number of studied students were 229, of which 80 (35%) were boys and 149 (65%) were girls.

They were divided into two groups, Group I consisted of children 6 and 11 years and Group II consisted of children between 12 and 16 years of age. Group I had 25 children while Group II consisted of 204 children. A total of 59% children (135) had scored "A" grade, the remaining 39% (89) had scored "B", and 2% (5) children scored "C" grade (Table 1). In the present study, sleep duration was between 8 h minimum to maximum of around 10 h.

Sleeping Problems in Group I

Out of 25 children, 72% (18) scored "A" grade, 24 % (6) scored "B", and 4% (1) child had scored "C" grade in last assessment as shown in Table 2. A total of 36% (9) children had slept problems in Group I, with some of the children having multiple sleep problems as well. Out of these 9 children, 33% (6) children were A graders, 33% (2) were B graders, and 100% (1 child) was C grader.

The problem in going to bed was seen in 5.55% (1 child) with A graders, compared to none among the B and C graders. Feeling tired a lot was seen in one child with A and C grades each. 11.11% (2 children) children among the A graders had a problem of "waking up a lot at night" or "trouble getting back to sleep," compared to none among the B and C graders. One child each with A and C grade had a problem at bedtime.

Table 1: Distribution of students depending on age group and grades

Age group	A Grades (%)	B Grades (%)	C Grades (%)	Total (%)
Group I	18	6	1	25
6-11 years (n=25)	(72)	(24)	(4)	(100)
Group II	117	83	4	204
12-16 years (n=204)	(57.3)	(40.68)	(1.96)	(100)
Total	n=135	n=89	n=5	n=229
	(59)	(39)	(2)	(100)

Table 2: After application of the “BEARS” screening tool to Group I

Sleeping problems	Children having the problem
Problem going to bed	1 (4)
Feeling tired	2 (8)
Wake up a lot at night	2 (8)
Problem at bedtime	2 (8)
Difficulty in waking up in the morning (or feels sleepy during the day)	4 (16)
Snoring in the night	2 (8)

BEARS: B - Bed time problems, E - Excessive daytime sleepiness, A - Awakening during the night, R - Regularity and duration of sleep, and S - Snoring

Table 3: When the “BEARS” criterion was applied to the Group II children

Sleeping problem	Children with problem n=204
Problem falling asleep	9 (4.4)
Sleepy during the day	25 (12.25)
Wake up a lot at night	20 (9.8)
Problem of snoring in the night	6 (2.9)

BEARS: B - Bed time problems, E - Excessive daytime sleepiness, A - Awakening during the night, R - Regularity and duration of sleep, and S - Snoring

16.66% children (3 children) among the A graders and one child among the B graders had difficulty in waking up in the morning or having excessive sleepiness in the daytime. One child among the B graders had a problem of snoring in the night, as compared to none from the A and C grades.

Sleeping Problems in Group II

There were 57% (117) children who scored “A” grade, 41% (83) children scored “B” grade, and 2% (4) children scored “C” grade. Total 49 children (24%) had sleep problems, with some of the children having multiple sleep problems as shown in the Table 3. 3.42% of the A graders (4 children) and 6.02% of the B graders (5 children) had problem of falling asleep, compared to none among the C graders. 9.40% (11 children) of A graders and 16.86% (14 children) of B graders had a problem daytime sleepiness. 9.40% (11) children among A graders and 9.63% (8

children) from the B graders had a problem of “waking up a lot at night,” compared to none among the C graders. 4 children (3.41%) among “A” graders and one child each from “B” graders (1.20%) and “C” graders (25%) had problem of snoring in the night.

DISCUSSION

After applying the “BEARS” screening tool, a total of 25.33% (58) students in our study were found to have sleep problems, and 36% (9/25) of Group I and 24 % (49/204) of the Group II children had sleeping problems (Table 4). 23% (31 out of 135) of A graders, 28% (25 out of 89) of B graders, and 40% (2 out of 5) of C graders had sleeping problems. It has been observed that as the scholastic grades decreased the prevalence of sleeping problems increased. Prevalence of sleep problems was more in children with lower grades; although, it was statistically insignificant ($p=0.14$) (Table 4). Some of the subjective items such as feeling sleepy in the day and difficulty in waking up were also seen. The average sleep duration of the children in our study was found to range from 8 to 10 h in both the groups.

A study on rural Indian children using the “BEARS” screening tool showed that sleep patterns vary between school and preschool children, and sleep problems were found in about 51.1% of the study population [5]. In comparison, we had school going children in urban set up with 25.33% (58) of sleep problems. The lower prevalence of sleep problems in our study may be due to the source of data collection itself, as we had taken students from a school, without any symptoms. In the same study, they [5] had taken school going students from a hospital outpatient department and also their children and parents might be more health conscious than the in our study group. The questionnaire was filled by health professionals in them, whereas parents and or children filled the questionnaire in our study.

Bharti et al. found sleeping problem in 42.7% of the children that included nocturnal enuresis (18.4%), sleep talking (14.6%), bruxism (11.6%), nightmares (6.8%), night terrors (2.9%), snoring (5.8%), and sleepwalking (1.9%) [8]. Mohammadi et al. in their study found bedtime problems in 21-56% children, including excessive daytime sleepiness in 26.73-42.98%, awakening during the night in 13.8-32.5%, sleep disordered breathing in 10.53-17.82% children [9]. It is known

Table 4: Grade wise distribution of sleep problems after applying the “BEARS” criteria

Grades	Group I		P value	Groups II		Total	
	Number of students	Students with sleep problems (%)		Number of students	Students with sleep problems (%)	Number of students	Students with sleep problems (%)
A	18	6 (33)	0.14*	117	25 (36)	135	31 (23)
B	6	2 (33)		83	23 (27.7)	89	25 (28)
C	1	1 (100)		4	1 (25)	5	2 (40)
Total	25	9 (36)		204	49 (24)	229	58 (25.33)

BEARS: B - Bed time problems, E - Excessive daytime sleepiness, A - Awakening during the night, R - Regularity and duration of sleep, and S - Snoring

that children have insomnias in the form of frequent nocturnal awakenings and difficulty in falling asleep. Almost 75% of children with major depression have insomnia. Insomnia may be a risk factor for the development of psychiatric disorders later in life [10].

Li et al. conducted a study on Chinese children [11] and found that insufficient sleep and daytime sleepiness were commonly present, and they were positively associated with impairment of school performance. They also documented that by delaying school start time by 30 min and 60 min, the corresponding sleep duration increased by 15.6 min and 22.8 min, respectively. Moreover, this intervention significantly improved the sleep duration and daytime sleepiness.

Our study has few limitations such as we used BEARS screening tool and this tool is only for screening in a primary care setting; it does not delineate the specific sleep problems. Studies with polysomnographic tests involving child psychologists and sleep experts could put more light on the exact relationship between sleep problems and school performance. The prevalence of sleep problems in our study may not reflect the true problem in general population. Further studies including large sample sizes, different socio-economic groups, and the effect of TV, computers, mobiles, and internet on sleeping habits and their influence on sleep problems and scholastic achievement needs to be studied.

CONCLUSION

We conclude that sleep problems are common in school going children, and these might be one of the reasons for poor scholastic achievements. Despite being so prevalent, many of them remain underreported and undiagnosed, possibly due to neglect and ignorance of parents as well as health care providers. The health professionals should make it as a point to screen each child for sleep problems to treat them at the earliest, so as to prevent their adverse effects in future.

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