Original Research Article

Study of sleep problems and its impact on scholastic performance in school going children

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Abstract

Background: Sleep is an integral part of any healthy individual. Although sleep disorders are common problems among families and they affect the learning, memory processes and academic performance of children, there is no evaluation of these disorders in India. Inadequate or poor sleep in children may have negative consequences on a host of functional domains, including mood, behavior, learning, and health. Therefore, it is important for pediatricians to both screen for and recognize sleep disorders in children during health encounters. A study that compared sleep in school-aged children using BEARS tool found that sleep problems and sleep patterns differed between these groups. The differences were attributed to school schedules, sleep practices and many other factors like time to go to bed, time to wake up, gap between last meal and sleep, watching TV and playing videogames before sleep also had significant contribution to sleep disorders and scholastic performance. **Objectives:** We studied the sleep problems among school going children in the age group of 7-12 years and the association of the sleep problems with scholastic performance in them. The aim of this study was to assess the prevalence of sleep disorders and its association with academic performance of school age children. **Materials and Methods:** A cross-sectional study was conducted on 1500 middle school students from two private schools of Kalaburagicity of Karnataka, India during 2016-17. The data gathered with a validated questionnaire to evaluate the academic performance and sleep disorders. Questionnaire based on the "BEARS" screening tool and Children's Sleep Habits Questionnaire (CSHQ) was used 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:** The study reveals a total of 1500 sample students out of which 971(64.7%) were boys and 529(35.3%) were girls found that 208(13.9%) students were having unsatisfied sleeping patternas shown. The mean duration of sleep was (8.04 ± 0.59) which was significantly higher in the group with poor academic performance (8.86±1.18 hours), than the other two groups (8.14±1.17) hours for average academic performance and (7.90±1.15 hours) for excellent academic performance. Of these 208 children, 116 scored A grade, 18 scored B grade, and 10 scored C grade. Other variables like time to go to bed (9.64 ± 0.63),time to wake up, gap between last meal and sleep(1.39 ±1.18), watching TV before going to bed 150 (72.1%)and playing videogames 52 (25%) before sleep also had significant contribution to sleep disorders and scholastic performance. **Conclusion:** This study revealed that sleep disorders negatively affect the academic performance and highlighted the importance of proper sleep among children and students. Sleep problems might be one of the contributors for poor scholastic achievements in children. 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.

Key Words: sleep disorder.

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For a variety of reasons, either by societal changes or due to lifestyle choice, chronic sleep loss is increasingly common in our hectic modern society [1–4]. Over the past century, sleep duration in children and adolescents showed a trend of 0.75 min less per year [2]. It has been estimated that 15%–75% of school-aged children are not getting sufficient sleep[5,6]. It is well established that insufficient sleep can result inexcessive daytime sleepiness and, therefore, links to problems with attention, concentration, impulsivity, mood regulation,

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behavioral problems, poor academic performance, social skills and cognitive functioning, to name a few.[7–10]. 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. In light of the increasing prevalence and negative consequences of sleep loss, promotion of healthy sleep habits and reform of public policies, such as school schedule modification, have been advocated to improve children's sleep. This need is further highlighted by the fact that, although the advances in sleep science are encouraging, awareness and appreciation of the importance of sleep among the general public and among health care professionals are still extremely limited[11]. 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. It is found that sleep problems exist in about 30-40% of the children before the school going age[12]. These may continue in the early childhood and adolescence and later become more grave and irreversible. 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[13]. 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 was conducted on 1500 school students from two private schools of Kalaburagi city of Karnataka, India during July 2016 to March 2017. Consent was obtained from the school authorities and parents of the children to carry out the study. All the children in the age group of 7-12 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. The data gathered with a validated questionnaire to evaluate the academic performance and sleep disorders. Sleep behaviors were assessed by a questionnaire, Children's Sleep Habits Quesstionare (CSHQ),which was designed and developed to evaluate sleep characteristics of school aged children usually 7 to 12 yrs old. Questionnaire was also based on the "BEARS" screening tool for sleep problems in children and to be filled by parents of school age children and adolescent children by themselves. The CSHQ included three items asking about bedtime, morning wake time and daily total sleep duration during weekdays and weekends. 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. 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 ≤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 2.0.

RESULTS

A total of 1500 children were included in the study. of which 971 (64.7%) were boys and 529 (35.3%) were girlsas shown in Table 1.1292 (86.1%) students were satisfied with their sleeping pattern and had no major

issues and 208(13.9%) were unsatisfied with their sleeping pattern as shown in Table 2. Duration of sleep during week days and weekends was higher in unsatisfied sleep pattern (P<0.001) which was statistically significant and also time to go to bed on school days and also on week ends was late and time to wake up on school days and also on weekends was also late in unsatisfied sleep pattern which was statistically significant (p <0.001) as shown in Table 3. In unsatisfied sleeping pattern children, they were interested in watching TV and listening to music while falling asleep which was highly significant. Though playing video games before going to bed, sleeping immediately after dinner, resisting to go bed, trouble falling asleep and awaking during night parameters were also compared between satisfied and unsatisfied sleeping pattern children they were of no significance(p>0.05) as shown in Table 4. Falling asleep during class period or during day time, sleepy /drowsy during home work was also observed more in unsatisfied sleep pattern children which was statistically significant. Out of 1292 of satisfied sleeping pattern children, 75.6% (980) scored "A" grade, 22.13 % (286) scored "B", and 2% (16) child had scored "C" grade in last assessment as shown in Table 2. Out of 208 of unsatisfied sleeping pattern children, 55.76% (116) scored "A" grade, 39.4 % (82) scored "B", and 3.84% (10) child had scored "C" grade in last assessment as shown in Table 5.

Table 1: Age and sex wise distribution of students

Age	Boys		Girls		Total	
	No.	%	No.	%	No.	%
7-10	435	44.8	252	47.6	687	45.8
11-12	536	55.2	277	52.4	813	54.2
Total	**971**	**100.0 (64.7%)**	**529**	**100.0 (35.3%)**	**1500**	**100.0**

Table 2: Distribution of students according to their sleeping pattern

Sleeping pattern	No. of students(children)	Percentage
Satisfied	1292	86.1
Unsatisfied	208	13.9
Total	**1500**	**100.0**

Table 3:

Variables	Satisfied sleeping pattern (n=1292) Mean ± SD	unsatisfied sleeping patter(n=208) Mean ± SD	Z Test values	P-value and Significant
Duration of sleep week day 9hrs/8hr/7hr/<7hr	7.86 ± 0.74	8.04 ± 0.59	3.46	P<0.001 VHS
Duration of sleep weekends / vaccination 9hr/8hr/7h/<7	8.63 ± 0.82	9.04 ± 0.74	6.80	P<0.001 VHS
Time to bed on school days 8pm/9pm / 19pm >11pm	9.15 ± 0.74	9.64 ± 0.63	8.93	P<0.001 VHS
Time to wake up on school days 5Am/6am/7am/>90am	6.24 ± 0.72	6.69 ± 0.85	7.65	P<0.001 VHS
Time to Bed on Non school days 8pm/9pm / 10pm / >11pm	9.75 ± 0.82	10.09 ± 0.56	5.81	P<0.001 VHS

Table 4:

Variables	Satisfied sleeping pattern(n=1292)		unsatisfied sleeping patter(n=208)		x^2 Test values	P-value and Significant
	Yes	No	Yes	No		
Child interested in watching TV/listening music while falling asleep Y/N	716 (55.4%)	576 (44.6%)	150 (72.1%)	58 (27.9%)	20.46	P<0.001 VHS
Is playing video/mobile games affecting child's sleep Y/N	190 (14.7%)	1102 (85.3%)	52 (25.0%)	156 (75.0%)	14.03	P<0.001 VHS

Table 5:

Child grade this yr A >75 B 50 C<49 D failing	**A**	**B**	**C**	**A**	**B**	**C**		**P>0.05**
	910	**328**	**24**	**130**	**70**	**8**	**2.48**	**NS**
Childs grade last year A >75 B 50 C<49 D failing	A	B	C	A	B	C		P<0.05
	980	266	16	116	82	10	5.68	S

NS= not significant; VHS=very highly significant; HS=highly significant; S=significant

DISCUSSION

Using a series sleep design, the present study offers valuable insight into school-aged children's sleep issues. After applying the "BEARS" screening tool and using Children's Sleep Habits Quesstionare (CSHQ), a total of 13.86% (208) students in our study were found to have sleep problems). 55.76% (116 out of 208) of A graders, 39.4%% (82 out of 208) of B graders, and 3.84%% (10 out of 208) 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. 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. In agreement with previous studies, our study indicated that unsatisfied sleep pattern and in some cases daytime sleepiness are positively associated with the impairment of attention, learning motivation, and, in particular, academic achievement. The potential mechanism connecting sleep with academic achievement lies in the crosstalk between sleep and neurocognitive functioning, where it was proposed that advanced neurocognitive functioning, selective attention, generally abstract reasoning, goal directed behaviors, and creative processing, was characterized by an involvement of prefrontal cortex, which is known to be intensively sensitive to sleep and vulnerable to disrupted sleep[14]. 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%)[15]. 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 [16]. It is knownthat 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[17]. Li *et al*. conducted a study on Chinese children [18] 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 Children's Sleep Habits Quesstionare (CSHQ), these are 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 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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