

Prevalence of sleep problems and habits in a sample of Saudi primary school children

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BACKGROUND: Sleep problems in children vary not only with age, but also with ethnic and sociocultural background. No research has been conducted to assess sleep problems in Saudi elementary school children. This study surveyed parents (or guardians) about their elementary school children's sleep to assess the prevalence of certain sleep problems.

METHODS: The study population comprised boys and girls attending regular public elementary schools in all grades and was conducted during springtime of the year 1999. A questionnaire inquiring about demographic data, specific sleep problems and habits and home environment was distributed and completed by the parents or guardians.

RESULTS: A total of 1012 complete questionnaires were included in the analysis. The sample comprised 511 boys (50.5%) and 501 girls (49.5%). The mean age was 9.5 ± 1.9 years, ranging from 5 to 13 years. Daytime fatigue was the most prevalent sleep problem (37.5%) followed by bedtime resistance (26.2%), difficulty rising in the morning during weekdays (20.7%), and sleep-onset delay (11.8%). Cosleeping with parents was reported in 12.4% of children. The study revealed some differences between boys and girls. Napping during the daytime was reported in 40.8% of children.

CONCLUSION: The study showed that sleep problems are prevalent among Saudi elementary school children. Moreover, the study shed some light on sleep habits and practices in this age group in Saudi Arabia, like the high prevalence of daytime napping.

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Sleep medicine is a new specialty in the medical community in general and in developing countries in particular. Knowledge of practitioners in the medical field about sleep disorders is limited. This limitation is more obvious in childhood-related sleep disorders. Relatively little is known, in particular, about sleep habits, sleep disturbances and the magnitude of this problem in school-aged children in developing countries. Based on the limited number of published studies, sleep disorders seem to be prevalent among school-aged children.¹⁻⁴ In Western countries, estimates of the prevalence of sleep problems range from 10% to 45%.¹⁻⁴ A study conducted in Libya reported a prevalence of 28.9%.⁵ Although elementary school children may suffer from a number of sleep problems, bedtime resistance seems to be the principal sleep-related complaint.^{6,7}

Environmental factors as well as the effects of the new civilization and changes in lifestyle have further complicated this matter. Moreover, sleep problems in children vary not only with age but also with ethnic and sociocultural background.⁸ A recently published study⁹ examined

differences in sleep complaints among adolescents from nine ethnocultural groups. European and American youths were at a significantly higher risk for insomnia compared to Chinese Americans, adjusting for the effects of age, sex, and socioeconomic status.

Saudi Arabia is culturally different from Western societies. No research has been conducted to assess sleep problems in Saudi elementary school children. This study surveyed parents (or guardians) about their elementary school children's sleep for the following reasons: first, to estimate the prevalence of specific types of parent-reported sleep problems and habits in this age group; second, to study the co-occurrence and association between sleep problems; and third, to assess associations between certain sleep problems and habits, and the age and sex of the children.

Methods

This cross-sectional study was conducted in Riyadh city, which has a population of more than 4 million.¹⁰ The study population comprised boys and girls attending regular public elementary schools in all grades. Elementary schools in Saudi Arabia include students from grade 1 to grade 6. We explained the aims of the project to the local educational authority and got their permission to carry out the survey. Every governmental public school was assigned a number, and then 10 public boys' schools and 10 public girls' schools were selected randomly to ensure that the sample was representative of schools in Riyadh. The same sampling process was done for the classes and students in each selected school. The study was conducted during Dhu Alqaada, 1419 H (March, 1999). All schools started at 07:00 and ended between 12:00 and 13:00 depending on the grade (usually, students are required to report to school before 06:45).

A questionnaire inquiring about demographic data, specific sleep problems and habits and home environment was based on previous studies.^{11,12} Children who were reported to have chronic medical, psychiatric or neurological illnesses were excluded from the final analysis. Sixty questionnaires were distributed to a pilot sample of parents (30 fathers and 30 mothers) drawn from the studied population to assess for the data-gathering process and legibility of the questionnaire. Data collected in the pilot study were not included in the final analysis. Questionnaires were distributed by trained medical students. Hence, questionnaires were completed by the child's parents or guardian. Letters addressed to

the parents explaining the survey, its procedures and its aims were sent home with each child. Parents were asked to score each item that described the child's behavior within the past 6 months following the instructions that were sent to them with the questionnaire. The questionnaire included two formats of questions: closed-ended questions with multiple choices, and open-ended questions. The following sleep problems were assessed: bedtime resistance (how often is it difficult getting your child to go to bed?), sleep-onset delay (does your child have difficulty falling asleep at night?), fear (does your child express any fears or worries before going to bed?), sleep interruption (does your child have difficulty sleeping through the night?), nightmares and sleep terrors based on the DSM-VI criteria,¹³ enuresis, sleep walking, sleep talking, difficulty rising in the morning during weekdays and weekends (does your child have difficulty getting out of bed in the morning, weekdays and weekends?), daytime fatigue (does your child complain of being tired in the daytime without being sleepy), enough sleep (do you think your child is getting enough sleep?), snoring and witnessed apnea (does your child stop breathing for appreciable periods during sleep?). Bedtime resistance, sleep-onset delay, fear, difficulty rising in the morning during weekdays and snoring were considered present if the problem occurred at least 3 times per week. For other problems an occurrence of at least once per week was enough to be coded as a problem. In comparing sleep problems and habits/practices by age group, we divided children into 5-6 years (post-toddlers), 7-10 years (middle childhood) and 11-13 years (pre-adolescents). The distribution of age and sex was similar to that in the school census.

The data was analyzed on a microcomputer using the SPSS program. A sample size of 972 was determined as necessary in a statistical power calculation of 80% and confidence level of 95% based on a prevalence of 3.5% to 5% for sleep problems and a 0.20 loss of response using Epi-Info 2000. Frequency distributions of all variables were examined for further statistical range and consistency checks on the data quality. Categorical variables were summarized by proportions while the continuous variables were summarized by means and standard deviations. The chi-square or Fisher's exact test was used to investigate the statistical significance of any association between categorical variables. For comparison of continuous data, the Student t-test was used. All tests were two sided and at the 5% level of probability.

Results

Of the 1500 distributed questionnaires, 1200 were returned for a response rate of 80%. One hundred and eighty-eight questionnaires were excluded due to incomplete data or the presence of exclusion criteria. Therefore, 1012 questionnaires were included in the final analysis. The sample comprised 511 boys (50.5%) and 501 girls (49.5%) from grade 1 to grade 6. Students were almost evenly distributed between the six grades of school, ranging from 15.4% to 19.2%. The mean age was 9.5 ± 1.9 years, ranging from 5 to 13 years. The illiteracy level was 11.9% for mothers and 5.6% for fathers. Nearly 65% of mothers and 57% of fathers had a primary, secondary or high school education. Twenty-three percent of mothers and 37.8% of fathers had graduate or post-graduate education. The mother's occupations were distributed as follows: housewives (74.9%) followed by teachers (18.4%), medical professionals (4.2%) and administrators (2.5%). Questionnaires were filled by mothers (47.2%), fathers (38.5%), and by others (14.3%).

Table 1 summarizes the prevalence of sleep problems in the whole group and in boys and girls. The three commonest sleep problems were statistically associated with one another. Bedtime resistance was associated with sleep-onset delay ($\chi^2=35.9$, $p<0.01$) and with difficulty rising on mornings during weekdays ($\chi^2=20.1$, $p<0.01$). Among children who displayed bedtime resistance, 70% of them had sleep-onset delay. On the other hand, among children who had sleep-onset delay, 27% had bedtime resistance and 10.6% had both problems. Among children with difficulty rising on mornings during weekdays, 38% were reported by parents to have bedtime resistance and 52% had sleep-onset delay. Among children who had bedtime resistance, 59% of them had difficulty rising in the morning during weekdays and 35% of the children who had difficulty rising in the morning had concomitant bedtime resistance. Both problems were present in 15.8% of children.

Tables 2-4 show the relationship between the three most prevalent sleep problems (bedtime resistance, sleep onset delay, and difficulty rising on morning during weekdays) and children's sleep history, habits and practices. Irregular bedtime was more prevalent in children with sleep problems. Children who displayed bedtime resistance and sleep-onset problems were more likely to keep a light on during sleep. Moreover, children who had a regular bedtime schedule displayed less daytime fatigue. Children who slept with parents were more likely to have

Table 1. Prevalence of sleep problems in school children (data are expressed as percentages).

Sleep Problems	Whole group (n=1012)	Boys (n=511)	Girls (n=501)
Bedtime resistance	26.2	28.3	23.8
Sleep-onset delay	11.7	9.8	14
Fear at bedtime	7.8	5.8	9.9
Sleep interruption	4.7	6.2	3.4
Nightmares	4.5	5.1	4.1
Sleep terrors	3.2	3.7	2.4
Enuresis	12.2	16.5	8.2
Sleep walking	6.0	7.6	4.8
Sleep talking	6.0	6.6	5.1
Difficulty rising in mornings (WD)	20.7	22.5	18.9
Difficulty rising in mornings (WE)	12.0	12.4	12.1
Snoring	17.9	20.8	14.9
Witnessed apnea	1.1	0.97	1.2
Napping during daytime	40.8	37.5	42.7
Sleep in class	8.6	13.5	6.9
My child is not getting enough sleep	65.6	67.6	64.1
Day time fatigue	37.5	36.4	40.1
Co-sleeping with parents	12.4	12.4	12.5

WD: Weekdays, WE: weekend

bedtime resistance and sleep-onset problems. On the other hand, children who watched TV or played computer games after 8 PM or at bedtime were likely to have bedtime resistance, sleep-onset delay or difficulty rising in the morning during weekdays. In general sleep problems were more common among children who have difficulty rising in the morning during weekdays. Children whose parents answered "yes" to the question "do you think your child is getting enough sleep?" had a significantly lower prevalence of sleep problems. No detectable differences could be elicited in the prevalence of sleep habits in the studied group in relation to parents' educational level or job status.

No differences in the prevalence of sleep problems could be elicited between different age groups, but some sleep habits and practices varied between age groups. The habit of watching TV after 8 PM increased from 50% in post-toddlers to 64.9% in the

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Table 2. Association between bedtime resistance and sleep habits and practices (data are expressed as percentages)

Associated Variables	Bedtime Resistance		χ^2 value	P value
	Yes (n=265)	No (n=747)		
Sleep regularly	81.6	93.9	15.7	< 0.0001
Sleep with parents	19.5	10.6	8.51	0.003
Playing computer games	31.2	21.0	4.7	0.03
Watch TV after 8 PM	52.4	39.9	6.9	0.008
Go to bed room directly at bedtime	85.8	92.4	5.7	0.017
Watch TV at bedtime	28.1	7.9	20.5	< 0.0001
Light on at bedtime	44.1	46.1	7.31	0.007
Snoring	6.4	2.6	4.05	0.04
My child is getting enough sleep	74.4	89.4	20.1	< 0.0001
Refuse to go to school	6.6	1.6	8.65	0.003

Table 3. Association between sleep-onset delay and sleep habits and practices (data are expressed as percentages)

Associated variables	Sleep-onset delay		χ^2 value	P value
	Yes (n=119)	No (n=893)		
Sleep Regularly	59.7	90.9	25.73	< 0.0001
Sleep with parents	20.6	12.6	3.99	0.046
Watch TV after 8 PM	74.7	51.8	15.79	< 0.0001
Play computer games after 8 PM	39.2	26.2	4.53	0.03
Watch TV at bedtime	59.1	46.1	4.76	0.029
Lights on at bedtime	58.4	34.4	21.98	< 0.0001
My child is getting enough sleep	50.4	88.4	51.7	< 0.0001
Refuse to go to school	10.5	2.6	-*	0.0001
Sleep in class	6.7	1.3	-*	0.006

*Fisher's exact test

Table 4. Association between difficulty rising in the morning during weekdays and sleep habits and practices (data are expressed as percentages).

Associated variables	Difficulty rising on morning (WD)		χ^2 value	P value
	Yes (n=209)	No (n=803)		
Sleep Regularly	60.6	95.3	91.26	< 0.0001
Sleep with parents	18.9	11.7	4.84	0.028
Watch TV after 8 PM	68.4	50.0	13.8	0.0002
Play computer games after 8 PM	37.1	23.8	7.08	0.008
Go to bedroom directly at bedtime	80.3	93.7	20.5	< 0.0001
Watch TV at bed-time	39.1	10.0	34.5	< 0.00001
Lights on at bedtime	50.3	38.9	6.5	0.01
Snoring	14.7	2.5	30.6	< 0.00001
My child is getting enough sleep	62.3	87.9	47.9	< 0.0001
History of daytime naps	77.3	61.6	9.39	0.022
Refuse to go to school	15.6	1.0	53.2	< 0.0001

pre-adolescent group, while 36.0% of post-toddlers continued to watch TV at bedtime. This percentage increased to 45.8% and 55.0% in the middle childhood and pre-adolescent groups, respectively. The percentage of daytime napping increased with age (32.4%, 39.5% and 45.4% for post-toddler, middle childhood and pre-adolescent groups, respectively), which may reflect nocturnal sleep deprivation in the older age groups. Cosleeping was similar in different age groups (15.0%, 13.6%, and 9.7% in post-toddler, middle childhood and pre-adolescent groups, respectively). While enuresis and nocturnal awakenings were more common among boys, fear during bedtime and sleep initiation problems were more common among girls (Table 1).

Discussion

This is the first study to report the prevalence of sleep problems and habits and their correlates in elementary school children in Saudi Arabia. In this study we explored most of the known sleep complaints and habits, and their interaction. Bedtime resistance was one of the most prevalent sleep problems among school children (26.2%). Our findings concur with the reported prevalence by Blader et al⁶ (27%) in a sample of American elementary school children. Other sleep problems like sleep-onset delay were prevalent among children with bedtime resistance, indicating the need for medical attention

by the child's pediatrician or family doctor if such a complaint was present. The prevalence of sleep-onset delay in this study was comparable to those in the Blader et al⁶ sample (11.3%), but less than those reported by Al-Sharbati in a sample of Libyan school children.⁵ Factors affecting sleep onset included watching TV or playing computer games at bedtime ($P < 0.01$). Our results concur with those of Owens et al¹⁴ who demonstrated that watching TV at bedtime was strongly associated with significantly increased sleep disturbances, particularly bedtime resistance, sleep-onset delay and anxiety around sleep. Therefore, health care professionals should be aware of the potential harmful effects of TV watching at bedtime and its impact on sleep in children. Moreover, parents should recognize the potential contribution of having a TV set in the child's bedroom.¹⁴

Difficulty rising in the morning during weekdays was high (20.7%) compared with weekends (12.0%), reflecting the possibility of inadequate sleep during weekdays. This point was supported by the fact that more than 65% of parents felt that their children were not getting enough sleep during weekdays. The prevalence of difficulty rising in the morning in our group was much higher than that reported by Blader⁶ (12.6% and 1.8% during weekdays and weekends, respectively).

Cosleeping was present in 12.4% of our sample. The habit of cosleeping differs between different

cultures. Some look to cosleeping as a normative practice in many societies.¹⁵ A prevalence rate of 5% was reported in a sample of school-aged children in Italy.¹⁶ Sleep problems were more common among cosleepers. However, this finding may reflect a parent's way of coping with sleep problems rather than a cause of sleep problems. The habit of co-sleeping in the Saudi culture deserves further study and analysis, as it appears to be of high prevalence compared with other cultures.

Another interesting finding of this study is the high rate of napping during daytime (40.8%). This percentage is very high compared with that reported in Western societies.¹⁷ It is known that as the child reaches middle childhood (after toddlers years, but before adolescence), he enters a phase of maximal daytime wakefulness and napping becomes rare.¹⁸ An increase in the percentage of those who nap may indirectly reflect an increased bodily need or wish for more sleep due to sleep deprivation,¹⁹ which is supported by the finding that 37.5% of surveyed students complain of daytime fatigue. This percentage is much higher than that reported by Blader⁶ of 17.8%. Another explanation is cultural differences. In Saudi Arabia, the habit of taking a nap is very popular among adults. Wali et al²⁰ have shown previously that up to 88% of Saudis nap in the afternoon. BaHamam et al²¹ reported similar findings of an increased rate of daytime napping (83.3%) among medical students.

Enuresis was reported in 12.2% of our study group with a significantly higher prevalence among boys. This prevalence is higher than the prevalence reported recently in a Turkish sample of elementary school children (5.8%).²² The reported prevalence of enuresis varied from 2% to 10%.^{6,23-30} A previously published study in the Eastern region of Saudi Arabia by Kalo and Bella reported a prevalence of 16.3% among boys and 13.8% among girls.³¹ A possible explanation for the difference in prevalence rates reported in different studies includes the use of different questions and methods of collecting data and different severity criteria. Moreover, the discrepancy may reflect cultural and/or biological differences among the studied groups.^{1,3} In the current study, sleepwalking was reported in 6.0% compared with 0.6% to 5% in the literature.²³⁻²⁸ On the other hand,

snoring was reported in 17.9% compared with 7.5% to 23% in previously published studies.^{21,23-25}

While some researchers have demonstrated gender differences between boys and girls in the prevalence of various sleep disorders,³² others failed to demonstrate such differences.²² In the present study, sleep-onset delay and fear during bedtime were more common among girls. On the other hand, sleep interruption was more common among boys. The last finding disagrees with the findings of Ipsiroglu et al³² who reported more nocturnal awakenings among girls. Sleep-onset delay was reported more frequently in girls than boys in many countries.³³

The current study has some limitations that need to be acknowledged. First, we used parental reports rather than objective measures. However, we believe that this approach is necessary as an initial step to identify and quantify the magnitude of problems. Second, the reported findings are subject to the parents' definition and understanding of the question. Yet, this problem is universal in most studies using questionnaires. Third, being a cross-sectional study, the possibility of recall bias cannot be ruled out. Finally, this study was conducted in a big, busy city; therefore results cannot be extrapolated to rural and peripheral areas in Saudi Arabia. Future studies should address sleep problems, habits and practices in elementary school children in rural areas and compare that to children in big cities.

In conclusion, the study showed that sleep problems are prevalent among Saudi elementary school children. Our findings concur with previous reports showing that bedtime resistance is among the principal sleep complaints in this age group. Daytime fatigue is much more prevalent than reported in the West. Moreover, the study has demonstrated some differences (high prevalence of daytime nap and cosleeping) between sleep habits and practices in this age group in Saudi Arabia compared with Western societies. Future studies should focus on sleep habits in Saudi children and the relationship of sleep habits to sleep problems and daytime function.

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