

Sleep problems among pupils in Benghazi, Libya

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ABSTRACT

Objective: To find the prevalence of sleep problems among pupils, its possible causes and associated behaviors.

Methods: This study was carried out during 3-24 February 1996. We randomly selected a sample of (277) 5th graders (181 boys and 96 girls), from 3 public primary schools in 3 different socio-economic areas in Benghazi, Libya. We interviewed the pupils and the teachers by a pretested questionnaire concerning sleep, school achievement and other behaviors. Those pupils who sleep after 10:00 pm, or those having bad sleep characters, or both, twice or more a week in the last month, were considered suffering from sleep problems. According to their performance in the first semester in both Arabic and Mathematics, pupils were classified in to 3 groups (>70% in both the good group, 50-70% in both subjects or in one provided that the other was above 70% the average group,

<50% in one or both subjects the poorly achieving group).

Results: This study shows high prevalence of sleep problems among pupils (28.9%), especially in a high-density area, with non-significant gender difference. Associated behaviors are bad school achievement, sleepiness and mood fluctuation.

Conclusion: Parental ignorance, unawareness and bad child rearing and follow-up are evident, and considered to be the main cause of these problems, that needs intensive education towards better sleep hygiene.

Keywords: Circadian rhythm, chronobiology, sleep problems, behavioral problems, sleep hygiene, school health.

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The term Circadian Rhythm (Biological Clock or Chronobiology) refers to the patterns of biological changes, which take place during 24 hours. Many physiological, psychological and metabolic functions in humans (as sleep-waking rhythm, body temperature, heart rate, endocrine secretion for example) show a well defined 24-hour periodicity, which appear to be consistent and intrinsic; since they persist even when environmental conditions are radically changed.¹ However, the external environmental stimuli (as exposure to bright light) can shift the phase of the human circadian rhythm.²⁻⁴ In experimental studies all body rhythms in most people change synchronously, but for some certain rhythms appear to get out of order.⁵ Sleep on the

other hand, is a very important component of the circadian rhythm, which appears to modulate various biological processes.⁶ Sleep is defined as "a reversible behavioral state of perceptual disengagement from and unresponsiveness to the environment".⁷ The sleep seems to be controlled by the reticular formation in the brain.⁸ The functions of sleep are restorative to the body, affecting its metabolic, physiological and psychological aspects.⁹⁻¹¹ Disturbances in sleep-wake cycles whether intrinsic (as sleep apnea), or extrinsic (as environmental sleep disorders like overcrowding, noisy, hot or cold bedrooms),¹² can cause disturbances in human behavior, ranging from sleepiness and fatigue which are often the earliest noted indicators of sleep loss,¹³

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to impaired cerebral functioning (poor attention, concentration, memory and irritability). Also anxiety, depression, perceptual distortions and even hallucination might be encountered, depending on the severity and duration of sleep problem.^{10,14} Consequently sleep problems will adversely affect the school performance of children.¹⁵⁻¹⁷ Unfortunately, with the advanced technical development (lights, television, satellites, internet) the main priority in obtaining adequate sleep seems to lessen, and sleep appears to be less evaluated.^{18,19} Failure to establish a regular sleeping pattern might be found in disorganized, chaotic homes, so that children do not have the opportunity to learn the normal pattern of sleep and waking behavior.²⁰ This study aimed to find the prevalence of sleep problems among pupils, their possible causes and effects.

Methods. Time of study. This cross-sectional study lasted from 3-24 February 1996. The reasons for choosing this particular time of the year are: 1. The teacher after spending 5-months with the pupils in the school is able to answer the questionnaire regarding their behavior in the class. 2. Assessment of the pupil's school performance will be more accurate after such a period of time. 3. Days being shorter in this season and midday naps are less usual traditionally in the Middle East countries.

Questionnaire. A questionnaire containing 26 questions inquiring with regards to the nature of sleep and related problems, as well as other behaviors of children was prepared on the basis of clinical experience and the scientific research.^{21,22} The first 23 questions were addressed to the pupils. While the last 3 were directed to the teacher. In addition, each pupil's first term averages in Arithmetic and Arabic language were obtained from the school files. The questions broadly fall in 3 categories: 1. Qualitative: sleep initiating, maintaining and late insomnia, sleep walking and talking, nightmares for example. 2. Quantitative: Sleep time onset during weekdays, weekends and midday naps. 3. Behavioral problems: Mood fluctuation, sleepiness and fatigue during class hours, weak attention and memory, aggressive attitude and hyperactivity for example.

Sample. Three public primary schools were chosen randomly from the 3 different socio-economic areas in Benghazi, Libya,²³ school one selected from the high socio-economic area (Al-Fweehat Al-Sharqiya), school 2 from the middle class area (Al-Birka), and school 3 from the high density area (Al-Mheshi). The study sample consisted of 277 pupils from the 5th grade, 181 boys and 96 girls. The classes were selected by doing systematic sampling. The idea behind choosing the pupils of this level was that they were able to understand and answer the questions well with accuracy, and also as of their ability to understand time and recognize hours.

Procedure. The researcher assisted by 5 interns conducted the study. After explaining the purpose and the modality of the research to the school administration, a systematic sampling was carried out to select the required classes for study. Full information was given to the responsible teacher, and then the questionnaire was distributed to all the pupils in the class. The aim of the study and its importance was explained to them in simple terms. Thereafter each pupil was asked the first 23 questions in the questionnaire, and their responses were noted down. Occasionally it was necessary to use different words to make all questions clear to every child to elicit the correct response. After that, the responsible teacher for the class was asked about each pupil's behavior in the class on parameters such as sleepiness, attention, memory, activity, and aggressiveness. Teachers usually have a precise impression regarding the child and his/her performance, not merely from the daily observation, but also from the periodic meeting with parents. The last step involved taking the 1st term marks in both Arabic and Arithmetic for each pupil from the pupil's files. These 2 subjects were selected as of their basic nature and the expectation that performance in them should reflect performance in other subjects also.

Statistical analysis. Those children who slept after 10:00 pm, or exhibited (bad) sleep characters such as insomnia (difficulty in initiating or maintaining sleep, or both, short sleep time and non restorative sleep), 7 nightmares, sleep talking and walking, more than twice a week during the last month were considered as suffering from sleep problems. The study in the 3 schools starts at 7:45 am. The pupils were divided into 3 groups according to their school performance in both Arabic and arithmetic, as revealed by their marks for the first term of the academic year: The high achieving group (who scored $\geq 70\%$ in both subjects), the average group (50-70% in both subjects, or in one provided that the other was above 70%) and the poorly achieving group (<50% in one or both subjects).

Descriptive statistics (as percentages), as well as the inferential one (as Pearson chi-square or chi-square for linear trend according to the situation) among different groups were used. The result was considered statistically significant when the probability (P) was 0.05 or less.

Results. The sample consists from 277 pupils, including 181 boys (65.3%) and 96 girls (34.7%). Roughly similar proportions were taken from every school. Eighty pupils out of 277 (28.9%) suffered from sleep problems. **Table 1** shows the distribution of pupils according to the sleep onset time. One hundred pupils (36.1%) slept before 9:00 pm, the rest 177 (63.9%) after 9:00 pm. Among the later group, 125 (45.1%) slept between 9-10 pm, while 52

Table 1 - The distribution of pupils according to the sleep time onset.

Time of sleep (pm)	n (%)
<9	100 (36.1)
9-10	125 (45.1)
>10-11	28 (10.1)
>11-12	18 (6.5)
>12	6 (2.2)
Total	277 (100)

(18.8%) after 10:00 pm. However, the majority of the last group (who slept after 10:00 pm) had no day nap (41 out of 52-78.8%). Television appears to be the main factor for the delayed sleep in these children. **Table 2** demonstrates the distribution of sleep pattern in the 3 schools, according to sex, and the associated behaviors of sleep problems. School 3 (lower social area) had a higher number of pupils who suffered from these problems 37 out of 95 (38.9%), school 2 (middle level) however had the least number 17 out of 91 (18.7%), school one (higher level) was in between, having 26 out of 91 (28.6%). The X^2 for linear trend shows equivocal result but with possible upward trend in odds ratio especially between school

2 and 3 ($X^2=2.529$, $df=one$, $P>0.05$). Genderwise, 50 boys out of 181 (27.6%) had sleep problems compared to 30 girls out of 96 (31.3%), a statistically insignificant difference ($X^2=0.4$, $df=one$, $P>0.05$). The prevalence of school failure in this study was (23.5%), which was more or less similar to a previous study conducted in the same city, which gave 26%.²³ Twenty-seven out of 65 (41.5%) poor achievers suffered from poor sleep patterns, while only 28 out of 138 (20.3%) of the high achievers did so. The sleep problems of the average achievers came in between, 25 of 74 (33.8%). These differences are significant (X^2 for linear trend=10.647, $df=one$, $P<0.001$).

On the other hand, this study shows that 21.7% of the pupils (60 out of the 277) were suffering from day time sleepiness and fatigue during morning hours; among the good sleepers ($n=197$), only 32 (16.2%) suffered from sleepiness and fatigability during the school hours compared with the poor sleeper ($n=80$), among whom 28 (35%) had such complaints, which is a statistically significant difference ($X^2=12.8$, $df=one$, $P=0.001$). Finally this study shows that while only 5.1% of good sleepers (10 out of 197) suffered from mood fluctuations and disturbances, 21.3% of the poor sleepers (17 out of 80) exhibited this problem, with high statistical significance ($X^2=16.88$, $df=one$, $P=0.000$).

Discussion. The high prevalence of sleep problems in this study (28.9%) is in accordance with

Table 2 - The distribution of sleep pattern according to schools and sex, with the associated behavioral problems.

Descriptive variables	Sleep pattern	Poor n (%)	Good n (%)	Total n
School*	I	26 (28.6)	65 (71.4)	91
	II	17 (18.7)	74 (81.3)	91
	III	37 (38.9)	58 (61.1)	95
Sex†	Boys	50 (27.6)	131 (72.4)	181
	Girls	30 (31.3)	66 (68.8)	96
School performance‡	High	28 (20.3)	110 (79.7)	138
	Average	25 (33.8)	49 (66.2)	74
	Poor	27 (41.5)	38 (58.5)	65
Sleepiness and fatigue§	Present	28 (35)	32 (16.2)	60
	Absent	52 (65)	165 (83.8)	217
Mood fluctuations[I]	Present	17 (21.3)	10 (5.1)	27
	Absent	63 (78.8)	187 (94.9)	250

* - X^2 for linear trend = 2.529, $df=one$, $P>0.05$, data are equivocal but with a possible upward trend in odds ratio especially between 2 and 3
† - $X^2=0.04$, $df=one$, $P>0.05$
‡ - X^2 for linear trend = 10.647, $df=one$, $P<0.001$
§ - $X^2 = 12.8$, $df=one$, $P=0.001$
[I] - $X^2 = 16.88$, $df=one$, $P=0.000$
n - number, df - degrees of freedom

other studies conducted for the same age group both in the community and on patients, which gave figures ranging from 20-30%.²⁴ The sleep onset delay in this study is higher than that reported by Blader et al (11.3%).²⁵ During school days, particularly in winter season in which we conducted this research, it is ideal for the school children to sleep at 8-8:30 pm to have sufficient quantity of sleep, as the study in these schools starts early at 7:45 am. In our study, the late sleeping time at which many children went to sleep, particularly without midday nap indicate the parents' unawareness or carelessness, or both. Younger children who sleep late showed delayed sleep phase leading to more general breakdown of circadian synchronization resulting in tiredness and lack of energy during the day. The problem usually is caused by the parents' failure to set and enforce consistent routines for bedtime, naps and meal times. The home in such cases may be quite chaotic with minimal formal structure. The child simply falls asleep whenever he or she chooses, and bedtime may not even exist!²⁶ The difference in sleep problems among the different social classes is in accordance with similar studies.²⁷ More sleep problems were encountered among pupils of lower social area, followed by those of higher classes. The absence of structure deduced from this finding may reflect social instability, lack of parental education in child rearing, or ignorance (especially in lower class). Sleep problems in the high class could have been due to the excess usage of satellites, television, videos, and computers for example.²⁸ The role of television, as found in this study in causing disturbed sleep by delaying its onset is in accordance with other studies that show the negative effect of television on sleep.²⁹

In general, the younger the children, the more adaptable are their habits and routines, the more the environment is under the control of others, and the better their potential ability to sleep right. Therefore, most causes of daytime sleepiness in the younger children can respond rapidly to intervention. It has been found that the disturbed sleep is simply a mild behavioral problem in an otherwise healthy child.²⁴ When children grow older, then habits become more fixed and they gain independent control over the environment.³⁰ The insignificant sex difference in sleep pattern is also in accordance with the result of a study conducted on a younger age group.²⁸ On the other hand the study brings out the existence of a consistent link between sleep problems and poor school performance; similar result was obtained in other studies.²⁷ It has been found that the most noticeable effects of sleep deprivation are those affecting psychological performance (cognitive, memory and learning), and psychosocial skills.^{15,31-32} Consequently, performance may be hampered by sleep deprivation.¹¹ Vigilance and performance on reaction time tests have been shown to be significantly impaired by the loss of as little as one

night's sleep.³³⁻³⁴ Therefore the importance of adequate sleep for school children can not be overemphasized. The number of the children suffering from sleepiness and tiredness during morning hours is double of what is found for the same age in the United States of America (USA),³⁵ and higher also than the 17% found in the community based study of elementary school children in USA also.²⁶

The limitation of this study as many other studies of a similar type, was the pupils being the only source of information. Although it is time consuming and needing more efforts due to the lack of motivation and cooperation, the parents should be asked to provide additional information regarding their children's sleep for future researches.

In conclusion, this study demonstrates the high prevalence of sleep problems among children, associated with disturbed behavior, inadequate performance at school, sleepiness, and mood fluctuation. The main cause of that problem is likely the lack of knowledge, or the carelessness, or both from the parent's side in child rearing. Health education in primary health centers should stress the importance of sleep hygiene.

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