

Characteristics of Sleep Habits among Adolescents Living in the City of Ribeirão Preto (SP)

Luiz Antonio Del Ciampo^{1*}, Adriana L Louro¹, Ieda R L Del Ciampo² and Ivan S Ferraz¹

¹Department of Child welfare and Pediatrics, Ribeirão Preto Medical School, University of São Paulo, Brazil

²Medical School, Federal University of São Carlos, Brazil

*Corresponding author: Luiz Antonio Del Ciampo, Department of Child welfare and Pediatrics, Ribeirão Preto Medical School, University of São Paulo, Avenida Bandeirantes, 3900, CEP. 14049-900, Ribeirão Preto – SP, Brazil, Tel: +55 11 3091-3116; E-mail: delciampo@fmrp.usp.br

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Abstract

Introduction: Sleep is an important physiological condition that plays a role in the physical and emotional development of adolescents. The aim of the study is to determine some sleep characteristics of adolescents living in the city of Ribeirão Preto (SP).

Methodology: This is a cross-sectional descriptive study conducted at 14 schools in the city of Ribeirão Preto (SP) including adolescents aged 10 to 19 years using a questionnaire about sleep habits. The chi-square test was used to determine differences between genders with the aid of the EPI-INFO 7 software, with the level of significance set at $p < 0.05$.

Results: A total of 535 adolescents (65% girls) were included in the study. Of these, 47.7% studied during the morning period and 10.3% had a job and studied in the evening period. Regarding sleep duration, 242 (45%) slept less than 9 hours per night during week days and 256 (48%) during the weekends (Saturday and Sunday). Of the total number of adolescents studied, 75.5% reported that they went to bed when they felt sleepy, 90% reported delay in falling asleep, 84.3% used some type of electronic equipment before going to sleep, and 44% reported that they woke up during the night. In the morning, 70.3% needed to be awakened, and 44.7% reported a delay in waking up. During daytime, 70% felt somnolent and 34% reported that slept during the day. Girls reported that they felt more daytime sleepiness (71.3%) and slept more during the day (62.1%) than boys (28.7% and 37.9%, respectively).

Conclusion: The study showed that almost half the adolescents investigated sleep less than the minimum time considered ideal. Furthermore, the most of adolescents went to the bed when they felt sleepy, used electronic devices before to sleep, had difficulties to fall asleep, need to be awake in the morning and felt sleepy during the day.

Keywords: Adolescent; Sleep; Sleep hygiene; Sleep stages

Introduction

Adolescence is the period of transition between childhood and adult life, characterized by changes in physical, emotional, sexual and social development [1]. Although during this phase most individuals are healthy, it is known that health status is related to behaviors and habits such as a healthy diet, the regular practice of physical activity and good sleep quality, which contribute to optimum physical and cognitive performance [2].

Sleep is an important physiological condition characterized by a reversible behavioral status with modifications of consciousness level and of responsiveness to internal and external stimuli [3]. The sleep-wake cycle is a circadian rhythm oscillating along 24 hour period which is subject to the influence of factors such as the alternate light and dark period, school hours, working hours, leisure, and family activities. This biological rhythm is important for the maintenance of a schedule involving sleep, study, leisure and meals, with sleep being an important synchronizing factor between internal variations and environmental cycles. Sleep also plays an important role in the physical

and emotional development of adolescents, who are going through a period of intense learning and differentiation. Adolescent is biologically programmed for sleep and later awakening, with his brain not experiencing a wakefulness state during most of the morning [4]. Even though there are individual variations due to genetic, environmental and sociocultural factors, there is a recognized need for 9 or more hours of sleep per day during adolescence [5,6].

In addition to the impact of these biological and environmental factors, the sleep patterns of adolescents can be significantly affected by social demands such as household tasks, extracurricular activities and work after school hours. Sleep-wake patterns vary widely during the week due to the habit of sleeping later on the weekends, as if to compensate for the accumulated sleep debt. This phenomenon, denoted "oversleeping", contributes to a break in the circadian rhythm and to reduced periods of daytime alertness [7].

Because of the intense relationship existing between sleep and wakefulness quality, one of the more immediate results of sleep of poor quality is the fall in performance on the following day, with sleepiness, mood fluctuations, anxiety, low self-esteem, slow reasoning, loss of memory, poor school performance, and predisposition to accidents [4,8,9].

In view of the importance of sleep for health during adolescence and considering the few studies available in Brazil about this topic, the objective of the present study was to determine some characteristics related to sleep among adolescents enrolled public schools located in the West region of the city of Ribeirão Preto (SP).

Methodology

This is a cross-sectional, observational and descriptive study carried out from September to November 2013 at 14 public elementary and high schools in the city of Ribeirão Preto (SP), including adolescents ranging in age from 10 to 19 completed years. The schools were similar in terms of administrative characteristics (public elementary and middle schools), geographic location in the West sector of the city and representative of the socioeconomic profile of their students. In a first stage of the study, the schools were visited in order to present the research project and to invite the students to participate.

On the occasion of a subsequent visit, the consent forms and the questionnaires regarding sleeping habits were distributed, and instructions about their filling out and date of collection were provided. In view of the possibility of absence of the students or forgetfulness, a limit of three visits was defined for the collection of the replies. The questionnaire used was a previously validated instrument that permitted to determine some characteristics related to sleep [10] and to obtain information about age, sex, schooling, period of the day during which the student attends classes, hours and type of work, time to go to sleep and to wake up on week days and weekends, what the student does before sleeping (reading, using the computer, games, telephone, music), whether he/she sleeps during the day, if he takes a long time to fall asleep, if he/she has daytime sleepiness, if his/her sleep is interrupted at night, if he/she wakes up by himself or needs to be awakened.

The following criteria were established to standardize the replies: a) taking a long time to fall asleep (more than 30 minutes); b) waking up too early (between 5:00 and 7:00 a.m.); c) sleeping during the day (more than 30 minutes), d) waking up at night (without considering trips to the bathroom). Inclusion criteria were: age of 10 to 19 years completed, agreeing to participate in the study, and giving written informed consent, also signed by a person responsible. Exclusion criteria were: pregnant girls, adolescents under treatment with drugs interfering with sleep (such as antidepressants and neuroleptics), presence of genetic syndromes and other diseases limiting habitual activities such as going to school, practicing sports, or working. The protocol and procedures of the study were approved by the Research Ethics Committee of the University Hospital, Faculty of Medicine of Ribeirão Preto, University of São Paulo. In addition to written informed consent signed by the students and the persons responsible for them, the authorization of the Regional Education Director's Office of Ribeirão Preto and of the Director's office of each teaching institution was also obtained. The absolute and relative frequency distribution of the Excel software (Windows 8) was used for the description of the variables stratified by sex, and the differences between proportions were analyzed by the chi-square test using the EPI-INFO7 software, with the level of significance set at $p < 0.05$.

Results

Of the 2264 eligible adolescents enrolled in the schools, 587 (25.9%) returned the signed consent forms and the filled out questionnaires. However, 52 were excluded due to an incompletely filled out

questionnaire, with 535 (23.6%) adolescents being finally included in the study. Of these, 348 (65%) were girls, 280 (52.3%) studied in the afternoon and 55 (10.3%) worked during one period of the day. Regarding sleep duration, 242 (45%) slept less than 9 hours per night during week days and 256 (48%) during the weekends (Saturday and Sunday), as shown in Table 1. Sleep duration on days with classes was less than 9 hours for 51.8% (97/187) of the boys and 46.8% (163/348) of the girls.

Daily sleep time	Males		Females		p
	n	%	n	%	
< 9 h week	79	32.6	163	67.4	0.394
< 9 h weekend	75	29.3	181	70.7	0.113
≥ 9 h week	108	36.9	185	63.1	0.583
≥ 9 h weekend	112	39.8	167	60.2	0.144
h = hours					

Table 1: Distribution of the number of sleep hours according to week day and weekend and sex in adolescents attending public schools, Ribeirão Preto, 2013.

Although 75.5% (404/535) of the adolescents reported that they went to bed when they felt sleepy, even so 89.7% (480/535) of them took a long time to fall asleep. The use of some type of electronic equipment before going to sleep was reported by 84.3% (451/535) of the adolescents studied and 44% (235/535) reported that they woke up during the night. In the morning, 70.3% (376/535) needed to be awakened and 44.7% (239/535) reported that they took some time to wake up. Regarding the daytime period, 70% (373/535) reported that they felt somnolent, and 34% (181/535) reported that they slept during the day. These characteristics of sleep are presented in Table 2.

Sleep characteristics		Males		Females		p
		n	%	n	%	
Goes to bed when sleepy	yes	14	36.4	257	63.6	0.22
	no	40	30.5	91	64.5	
Takes time to fall asleep	yes	17	36.0	307	64.0	0.11
	no	14	25.5	41	74.5	
TV/PC/cellular phone/games/music player	yes	15	34.4	296	65.6	0.51
	no	32	38.1	52	61.9	
Wakes up during the night	yes	85	36.2	150	63.8	0.60
	no	10	34.0	198	66.0	
Takes time to wake up	yes	85	35.6	154	64.4	0.78
	no	10	34.5	194	65.5	

Wakes up by himself	yes	64	40.3	95	59.7	0.09
	no	123	32.7	253	67.3	
Daytime sleepiness	yes	107	28.7	266	71.3	0.04
	no	80	49.4	82	50.6	
Sleeps during the day	yes	53	29.3	128	70.7	0.04
	no	134	37.9	220	62.1	

TV: television PC: personal computer

Table 2: Distribution of sleep characteristics of adolescents enrolled public schools according to sex. Ribeirão Preto 2013.

The distribution of the number of hours of sleep according to study period and gender is presented in Table 3. Girls reported that they felt more daytime sleepiness (71.3%) and slept more during the day (62.1%) than boys (28.7% and 37.9%, respectively), with the difference being statistically significant ($p < 0.05$). No significant difference was observed between sexes regarding daytime sleepiness when attending classes in the morning (88.6%/78.1%) and in the afternoon (65%/35%). The distribution of the adolescents in terms of the report of daytime sleepiness according to sex and period of classes is presented in Table 4.

	< 9 hours				≥ 9 hours				p
	male		female		male		female		
Study period	n	%	n	%	n	%	n	%	
morning	67	77.0	141	84.0	20	23.0	27	16.0	0.176
evening	12	12.0	22	12.2	88	88.0	158	87.7	0.956

Table 3: Distribution of the number of sleep hours according to school period and sex in adolescents attending public schools. Ribeirão Preto, 2013.

	Morning				Evening				p
	male		female		male		female		
Daytime sleepiness	n	%	n	%	n	%	n	%	
Yes	68	78.1	149	88.6	39	39	117	65	0.182
No	19	21.8	19	11.3	61	61	63	35	0.928
Total	87	100	168	100	100	100	180	100	

Table 4: Distribution of the adolescents reporting daytime somnolence according to sex and study period in adolescents attending public schools, Ribeirão Preto, 2013.

Discussion

Sleep is considered to be an important indicator of health and quality of life and sleep deprivation is recognized as a factor that triggers various adverse consequences for individuals and for society [11]. The present study showed that, on week days, 42.2% of the boys and 46.8% of the girls sleep less than the 9 hours per night recommended for this age range, while on weekends these proportions increase to 59.8% and 47.9%, respectively, in agreement with literature studies showing that adolescents sleep fewer hours than recommended. A recent meta-analysis of 41 studies on sleep habits among adolescents showed that the total number of hours of sleep during week days was 7.4, 8.3 and 7.6 for North American, European and Asian subjects, respectively [12]. Among 308 Australian adolescents aged 13 to 17 years, 36% slept less than 8 hours per night [13]. In 2013, Maume [14] reported that 974 adolescents living in Cincinnati (OH, USA), slept on average 7.8 hours per night, as also observed by Kilani et al. in a study of 802 adolescents from Oman [15].

A study on 250 adolescents attending Pittsburgh schools (PA, USA) revealed that their sleep period ranged from 6 to 7 hours on weekdays and from 7 to 8 hours on weekends [16]. In a study of 15,364 US adolescents aged 15 to 18 years, Meldrum & Restivo [17] observed that 68.5% of them slept less than 8 hours per night, a result similar to that reported by Pabayo et al. in a study of North American adolescents aged 14 to 19 years who slept, on average, 398 minutes per night [18].

A multicenter study of 117,888 European adolescents detected a mean sleep time per night of 7.7 hours [19]. Maslowsky et al. also detected a reduction of sleep hours per night among 15,701 US adolescents, who slept on average 8.5 hours per night at 13 years of age and who reduced this time to 7.3 hours at 18 years of age [20]. Between 1991 and 2007, Barnes and Meldrum studied 287 pairs of monozygotic twins aged on average 15.7 years who belong to the National Longitudinal Study of Adolescent Health, USA, and observed that the mean time of hours of sleep was 7.7 hours [21].

Adolescents who sleep little have a greater chance to adopt other unhealthy habits [22,23] such as physical inactivity, inadequate eating habits, and sedentary behaviors [24]. Sleepiness can interfere with school performance and with the willingness to go to school, in addition to generating less personal satisfaction, an increased number of diseases and feelings of irritation and anger [25]. A shorter nighttime sleep is also associated with greater alcohol, tobacco and drug consumption, with high risk sexual behaviors, overweight [2], inappropriate eating habits [26], and suicidal ideation [27].

It has been reported that changes in sleeping behavior during adolescence are due to increased school requirements, social activities and holding a job, as well as other activities such as watching television and navigating on the internet, which may contribute to a delayed bedtime and to daytime sleepiness [28,29]. The most direct consequence of inadequate sleep for adolescents is sleepiness, which manifests in a more significant manner as difficulty in waking up at the proper time to go to school and in participating in situations of low stimulation such as reading activities during classes [30].

A study conducted in Sweden and Estonia on 2,241 adolescents aged 15 to 16 years indicated that 25% of them slept less than 9 hours per night and that this reduced sleep time was negatively associated with poor school performance and with an increased number of absences [30]. A study on Norwegian adolescents reported that 32.3% of them slept less than 8 hours per night and also practiced few physical activities, with excessive use of television and computer and

no defined times for meals [31]. The mean number of hours of sleep per night was eight among 3,311 adolescents from different European countries. Those who slept less were the more sedentary ones, had a higher body mass index and greater body fat and ate less healthy foods [32,33].

Some authors have demonstrated that sleep duration is reduced among adolescents with advancing age [4,28,34,35]. Knutson et al compared sleep duration in a sample of Australian young people between 1985 and 2004 and observed a reduction of hours of sleep in the second evaluation compared to the first. In addition, boys went to sleep later than girls in 2004, a difference that was not observed in the first evaluation [36]. Some studies of sleep duration during the second decade of life have also been conducted in Brazil. Among 1,126 adolescents aged 13 to 20 years enrolled in high school in the city of Santa Maria/RS, 54.8% slept 8 hours or less before the days with classes [37]. A study of 863 schoolchildren in the second decade of life living in the city of São Paulo revealed that their mean sleep duration during weekdays was 8.8 hours and that the prevalence of adolescents who slept 8 hours or less during days of classes was 39%. The main variable associated with less than 8 hours of sleep was age, with a reduction of sleep hours occurring with the advance of adolescence [28]. Among 92 adolescents enrolled in public schools in the city of São Paulo, the mean number of hours of sleep was 8.8 and sleep time was found to be related to age range more than to sex [38].

Factors such as school hours at the beginning of the day [39] and holding a job [37] can also interfere with sleep patterns and contribute to reduced sleep duration during adolescence, being associated with problematic behaviors such as worse school performance and limited time spent with the family or devoted to the practice of physical exercises. A study of Brazilian adolescents reported that, regardless of economic class, the period of school classes was strongly associated with sleep duration, indicating that those who studied or worked during the morning had greater sleep deprivation [28]. A recent Brazilian study conducted on more than eleven thousand adolescents aged 15 to 19 years living in the state of Santa Catarina pointed out that the prevalence of individuals who sleep less than 8 hours per night has increased from 31.2% in 2001 to 45.9% in 2011, reflecting the modifications in life habits imposed on adolescents during the last decade [40].

The activities carried out by adolescents between lying down in bed and starting to sleep have been a subject of interest on the part of many investigators. In the present study, we observed that 84.3% of the adolescents used some type of electronic equipment before sleeping. Noland et al. reported that adolescents state that they use some strategies in order to fall asleep or remain awake, the most used strategy being watching television (46.2%) [41]. Data of a WHO survey of the health conditions of adolescents from 41 countries demonstrated that 61% to 70% of them watch television for more than two hours per day [42].

A study conducted in England on adolescents aged 11 to 13 years observed that the use of technology (television, videogames, telephone, and social networks) was inversely associated with sleep duration, which was reduced on average by 1 hour when compared to adolescents who did not use these types of technology [43]. Zhou et al. [44] have reported the detection in their results of some mechanisms whereby the use of electronic equipment may impair sleep quality, such as their use as a form of leisure at any time during the day or night, extending over long periods with no definition of beginning or ending time; the use of this type of sedentary entertainment alters the

architecture of sleep, resulting in poor sleep quality; exposure to the screen luminosity near the time for rest may affect the sleep cycle by nighttime salivary suppression of melatonin; the use of electronic equipment may increase the level of activity of the nervous system and result in elevated alertness, psychological excitement and difficulty in falling asleep. Also, television programs and videogames were pointed out as factors interfering with sleep due to their excessively violent and/or stimulating content, possibly inhibiting relaxation and resulting in anxiety and difficulty in falling asleep [40].

These factors were similar to those reported by Mesquita & Reimão who showed that increased time of computer use by adolescents was associated with shorter sleep duration and a poorer perception of sleep quality [45]. In another study conducted on 136,589 Korean adolescents, it was observed that the smaller number of sleep hours due to excessive use of the computer and of the internet was associated with emotional disorders such as depressive symptoms and suicidal ideation [27].

The limitations of the present study are the facts that the investigation was conducted on a relatively small number of adolescents who study in schools of only one region in the city, that were not separated into groups according to the stage of pubertal development, and that the data were obtained by self-evaluation, possibly leading to an overestimate of sleep time. In addition, by being a cross-sectional study, it may have reflected seasonal habits that are not maintained during other periods of the year. On the other hand, the relevant information obtained here about the sleep characteristics of adolescents can be added to that obtained in other studies, providing a base for the implantation of actions directed at the improvement of sleep quality and consequently of general health conditions.

Learning about these conditions, allied to the peculiarities of adolescence, should be the basis for the counseling of the adolescents themselves and their relatives about health care, with priority given to actions involving sleep hygiene, which should be fully included in Hebiatry programs.

Conclusions

The present study showed that almost half the adolescents investigated sleep less than the minimum time considered ideal for individuals going through physical and emotional changes in an important phase of life, a fact that may involve situations of physical, emotional and social risk. The greater daytime sleepiness and the longer period of daytime sleep among female adolescents should be better studied for a definition of their causes.

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