

Sleep Quality Assessment of Adolescents Residing in an Urban Resettlement Colony, New Delhi, India

Mahasweta Dubey, Baridalyne Nongkynrih¹, Sanjeev Kumar Gupta¹, Mani Kalaivani², Anil Kumar Goswami¹, Harshal Ramesh Salve¹

Community Medicine, ¹Centre for Community Medicine, All India Institute of Medical Sciences, ²Department of Biostatistics, All India Institute of Medical Sciences, New Delhi, India

Abstract

Background: Sleep is essential for physical and psychological development of children as well as adolescents. Poor sleep has been noted to lead to poor diet, obesity, stunted growth, mental health issues, and substance abuse. Despite the knowledge regarding the importance of sufficient sleep, the prevalence of insufficient sleep has been noted to increase among children and adolescents. **Objective and Aim:** The aim of the study was to determine the prevalence of poor sleep quality among adolescents of an urban resettlement colony and to evaluate the association of poor sleep quality with the correlates. **Materials and Methods:** A community-based cross-sectional study was conducted including 620 adolescents aged 10–19 years, in an Urban Resettlement Colony, Dakshinpuri Extension, New Delhi. A self-reported interview was conducted with the pretested, semi-structured interview schedule. The interview focused on sociodemographic variable, sleep quality using Pittsburgh sleep quality index, Perceived stress scale, screen time, and anthropometric measurements. **Results:** The mean of Pittsburgh sleep quality index total score was 2.3 (standard deviation = 1.9). Among the adolescents, 7.3% of them were found to be poor sleepers. Poor sleep quality was observed to be higher during school days as compared to vacation (9.3%, 6.5%, respectively). Adolescents of age group equal to and > 15 years have higher odds of having poor sleep quality than those younger than 15 years of age (odds ratio = 4.9; 95% confidence interval: 2.2, 10.8). **Conclusion:** Significant difference in sleep duration was noted among adolescents of age ≥ 15 years as compared to the younger group in the present study.

Keywords: Adolescents, body mass index, Pittsburgh sleep quality index, screen-based media use, sleep quality, socioeconomic status

INTRODUCTION

Sleep is essential for physical and psychological development of children as well as adolescents. It has been noted that there is a gradual decline in sleep time as children grow into adolescents, even though the need for sleep among adolescents does not decrease.^[1] Adolescents need for sleep has been estimated up to 9.2 h per day.

Poor sleep has been noted to lead to poor diet, obesity, stunted growth, mental health issues, and substance abuse.^[2-4] Daytime sleepiness and depressive symptoms have been associated with shorter total sleep time in adolescents.^[5] Sufficient sleep and shorter sleep latency have been shown to lead to better academic performances as compared to insufficient sleep.^[6]

There have been various studies regarding the factors that could be associated with poor sleep quality. Electronic devices such as television, gaming consoles, and computer, being an important part in the lives of the present day adolescents,

have been seen to affect sleep quality.^[7,8] Factors such as socioeconomic, cultural, and racial factors have been seen to be related to sleep problems.^[9,10] Poor sleep quality has been reported to be associated with age and gender.^[11,12] Children from lower socioeconomic status are seen to be at greater risk of poor-quality sleep.^[13] Despite the knowledge regarding the importance of sufficient sleep, prevalence of insufficient sleep has been noted to increase among children and adolescents.^[14,15]

It is of utmost importance to understand the repercussions of unhealthy sleep pattern and the environmental factors which

Address for correspondence: Dr. Mahasweta Dubey,
House No. 674, Sector 16, Faridabad - 121 002, Haryana, India.
E-mail: msd1208@hotmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Dubey M, Nongkynrih B, Gupta SK, Kalaivani M, Goswami AK, Salve HR. Sleep quality assessment of adolescents residing in an urban resettlement colony, New Delhi, India. *Indian J Community Med* 2019;44:271-6.

Received: 28-02-19, **Accepted:** 21-08-19

Access this article online

Quick Response Code:



Website:
www.ijcm.org.in

DOI:
10.4103/ijcm.IJCM_87_19

affect the sleep quality among adolescents so that urgent actions could be taken to mitigate the effect.

There are not enough studies in India documenting the sleep quality of adolescents. The aim of the study was to determine the prevalence of poor sleep quality of adolescents of an urban resettlement colony, New Delhi and to evaluate the association of poor sleep quality with the correlates.

MATERIALS AND METHODS

A community-based cross-sectional study was conducted among adolescents aged 10–19 years, in an Urban Resettlement Colony, Dakshinpuri Extension, New Delhi, which is the field practice area of the Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi.

The existing studies conducted on adolescents in India could not specify the prevalence of poor sleep quality. However, there are research works showing the prevalence of poor sleep quality among adolescents aged 12–17 years as 37.6%.^[16] A sample size was calculated based on the prevalence of poor sleep quality of 37.6% with 95% confidence interval (CI) and 4% as the absolute error. Nonresponse rate of 5% was included to calculate the sample required and rounded off to 620. A total of 620 adolescents were selected by simple random sampling from the population of 3526 adolescents in the area.

The area of study is the field practice area of Centre for Community Medicine Department of All India Institute of Medical Sciences. The data of the area are available through the Health Management and Information System maintained by the department. Adolescents residing in the area for the past 6 months were included in the study. Very sick adolescents and those unable to comprehend the questionnaire were excluded from the study. The study was started during the month of May when the schools were closed for summer vacation. Two-third of the adolescents were approached during the vacation, and the rest were interviewed after the school reopened.

House-to-house survey was conducted. If the adolescent was unavailable at the first visit, two more visits were made. If the adolescent could not be interviewed by the third visit, he/she was considered a nonrespondent. The adolescents and their parents were explained the outline of the study. The questions put forward by the parents and adolescents were duly answered and their doubts were cleared.

Measures

A self-reported interview was conducted with the pretested, semi-structured interview schedule. The interview focused on information regarding age, sex, and family environment including the number of siblings, number of family members, and number of rooms in the home. Education and occupation of both the parents were also included.

Pittsburgh sleep quality index

It is a self-rated questionnaire which assesses sleep quality and disturbances over a 1-month time interval. Nineteen individual items generate seven “component” scores: subjective sleep

quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. It gives a combined Pittsburgh sleep quality index (PSQI) score that ranges from 0 to 21, and a higher score is indicative of poorer sleep quality. Scores ≤ 5 were associated with good sleep quality and score > 5 were considered as poor sleep quality. It has high internal consistency Cronbach's $\alpha = 0.83$ and high test–retest reliability of 0.85 ($P < 0.001$).^[17]

Screen time – it included the time spent by adolescents in watching television and using other screen-based media (computer, smart phone, tablet devices, laptop, and game console) on a typical weekday and a typical weekend day during the last 7 days preceding the interview. Weighted average of the screen time was calculated. Recommended screen time was taken to < 2 h in a day.^[18]

Anthropometric variables included body weight and height. Measurements were performed according to written standardized procedures. Body weight was measured to the nearest 100 g and with minimal clothing and without shoes using calibrated portable scale. Height was measured to the nearest 1 cm while the individual is in full standing position without shoes using calibrated portable measuring tape. Body mass index (BMI) was calculated as a ratio of weight in kg by height squared in meter. The International Obesity Task Force^[19] age- and sex-specific BMI cutoff reference standards were used to identify overweight and obesity in adolescents between the age of 14 and 17 years. For participants who were 18 years and above, we used WHO adults' cutoff points of 25–29.9 kg/m² for overweight and 30 kg/m² and higher for obesity.

The Perceived stress scale (PSS) is a psychological instrument used to measure the perception of stress. It measures the degree to which one's life is appraised as stressful. The scale has been designed to find the respondents' perception about their life being unpredictable, uncontrollable, and overloaded. It also includes queries about the current level of stress experienced by the respondent. It was designed to be used in community samples with at least junior high school education. The items are easy to understand, and the response alternatives are simple to grasp. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way.^[20] Adolescents with perceived stress score ≥ 14 were considered to have moderate to high stress.

Statistical analysis

Data was entered using Epi Info version 7.1 (Epi Info™, Division of Health Informatics & Surveillance (DHIS), Center for Surveillance, Epidemiology & Laboratory Services (CSELS)), and statistical analysis was done using Stata 12.0 (College Station, Texas, USA) software for analyzing the general description of the questionnaires results and comparison of the score.

Chi-square test was used to observe association between global PSQI score and various correlates. A CI of 95% was achieved with 0.05 level of significance. Selected correlates

Table 1: Characteristics according to sleep quality

Characteristics	Total (n)	Poor sleep quality, n (%)	Good sleep quality, n (%)	P*
Gender				
Male	233	12 (5.2)	221 (94.8)	0.1
Female	317	28 (8.8)	289 (91.2)	
Age (years)				
<15	342	11 (3.2)	331 (96.8)	0.0
≥15	208	29 (13.9)	179 (86.1)	
Type of family				
Nuclear	362	26 (7.2)	336 (92.8)	0.9
Extended	188	14 (7.4)	174 (92.6)	
Number of family members				
Three	13	0	13 (100)	0.4
Four	132	8 (6.1)	124 (93.9)	
Five or more	405	32 (7.9)	373 (92.1)	
Number of rooms				
One	248	19 (7.7)	229 (92.3)	0.7
Two or room	302	21 (7.0)	281 (93.0)	
Number of siblings				
One	16	0	16 (100.0)	0.1
Two	180	9 (5.0)	171 (95.0)	
Three or more	354	31 (8.8)	323 (91.2)	
Father's education				
Profession/honors/graduate/postgraduate	55	7 (12.7)	48 (87.3)	0.4
Intermediate/high school diploma	87	5 (5.7)	82 (94.3)	
High school certificate	240	15 (6.3)	225 (93.7)	
Middle school certificate	105	7 (6.7)	98 (93.3)	
Primary school certificate	12	1 (8.33)	11 (91.7)	
Illiterate	21	0	21 (100)	
Father's occupation				
Profession/semi-profession/clerical/shop owner/farmer/skilled worker	248	7 (2.8)	255 (97.2)	0.6
Semiskilled worker/unskilled worker/unemployed	272	18 (6.6)	230 (93.4)	
Mother's education				
Profession/honors/graduate/postgraduate	130	11 (8.5)	119 (91.5)	0.4
Intermediate/high school diploma	13	0	13 (100.0)	
High school certificate	144	12 (8.3)	124 (91.7)	
Middle school certificate	184	11 (6.0)	173 (94.0)	
Primary school certificate	57	2 (3.5)	55 (96.5)	
Illiterate	23	3 (13.0)	20 (87.0)	
Mother's occupation				
Profession/semi-profession/clerical/shop owner/farmer/skilled worker	9	1 (11.1)	8 (88.9)	0.6
Semiskilled worker/unskilled worker/homemaker	534	38 (7.1)	496 (96.9)	
Vacation				
Yes	400	26 (6.5)	374 (93.5)	0.2
No	150	14 (9.3)	136 (90.7)	
Screen time (h)				
<2	177	11 (6.2)	166 (93.8)	0.5
≥2	373	29 (7.8)	344 (92.2)	
BMI				
Normal	497	37 (7.4)	460 (96.2)	0.6
Overweight/obesity	53	3 (5.7)	50 (94.3)	
PSS				
Low stress	22	4 (18.2)	18 (81.8)	0.5
Moderate/high stress	186	25 (13.4)	161 (86.6)	

*P value is calculated using χ^2 . BMI: Body mass index, PSS: Perceived stress scale

with $P < 0.2$ in bivariate analysis were included in multivariate logistic regression analysis. The results were reported as odds ratio (95% CI).

Ethical issues

Approval for the study was taken from the Ethics Committee of

Ethical issues

Approval for the study was taken from the Ethics Committee of AIIMS. Informed written consent was taken from adolescents 18 years of age and above. Informed written assent was taken for adolescents <18 years of age and informed written consent was taken from the caretaker of the adolescents.

RESULTS

A total of 550 adolescents were interviewed, among whom 42.4% were females and 57.6% were males. Seventy adolescents could not be interviewed as their houses were locked on 3 occasions. Among the 70 adolescents who could not be interviewed, 39 were females and 31 were males. Response rate for the interview was 88.7% [Table 1]. Of 550 adolescents, 400 of them were interviewed during vacation and the rest 150 were interviewed when the school reopened and they were attending the same. The mean age of the adolescents included in the study was 13.8 (standard

deviation [SD] = 2.8). The mean of PSQI total score was 2.3 (SD = 1.9); 1.7 (SD = 1.7) for adolescents younger than 15 years of age and 3.1 (SD = 2.1) for those 15 years and above. Of all the adolescents who were interviewed, 7.3% of them were found to be poor sleepers. The demographic profile, parents' education and occupation, BMI, and perceived stress score in relation to sleep quality have been shown in Table 1. Differences in sleep quality with respect to gender, family type, siblings, parental education and occupation, screen time, BMI, and PSS were not found significant; but, there were significant difference in sleep quality as far as age groups were concerned ($P = 0.00$).

Table 2 shows the distribution of PSQI component scores along with the global PSQI score during the vacation and school days. It was noted that around 18% of adolescents reported sleep duration of <6 h per day; 20% of the adolescents reported having sleep latency of >30 min. No adolescents complained daytime dysfunction, nor did anyone report the use of medication for last 1 month. Differences in subjective sleep quality and sleep duration were not significant; however, there were significant differences in sleep latency, habitual sleep efficiency, and some sleep disturbances. Prevalence of poor sleep quality in our study was found to be 7.3% (9.3% and 6.5% during the school days and vacation days respectively). Sleep

Table 2: Results of Pittsburgh sleep quality index and its components among adolescents

Variables	Total (n=550)	Vacation (n=400)	School days (n=150)	P
Average time to go off to sleep (min)	16.1±19.3	16.3±19.1	15.7±19.7	
Average duration of actual sleep (h)	8.3±1.7	8.5±1.8	7.7±1.4	
Subjective sleep quality, n (%)				
Very good	227 (41.3)	163 (40.8)	64 (42.7)	0.6
Fairly good	318 (57.8)	234 (58.5)	84 (56.0)	
Fairly bad	4 (0.7)	2 (0.5)	2 (1.3)	
Very bad	1 (0.2)	1 (0.3)		
Sleep latency (min), n (%)				
<15	298 (54.2)	233 (58.3)	65 (43.3)	0.02
15-30	139 (25.3)	92 (23.0)	47 (31.3)	
31-60	83 (15.1)	54 (13.5)	29 (19.3)	
>60	30 (5.5)	21 (5.3)	9 (6.0)	
Sleep duration (h), n (%)				
>7	399 (72.6)	296 (74.0)	103 (65.7)	0.06
6-7	52 (9.5)	41 (10.3)	11 (7.3)	
5-6	92 (16.7)	57 (14.3)	35 (23.3)	
<5	7 (1.3)	6 (1.5)	1 (0.7)	
Habitual sleep efficiency, n (%)				
>85	476 (86.6)	356 (89.0)	120 (80.0)	0.04
75-84	59 (10.7)	34 (8.5)	25 (16.6)	
65-74	9 (1.6)	6 (1.5)	3 (2.0)	
<65	6 (1.1)	4 (1.0)	2 (1.3)	
Some sleep disturbance, n (%)	174 (31.6)	101 (25.3)	73 (48.7)	0.00
Medication used for sleep, n (%)	0	0	0	
Daytime dysfunction, n (%)	0	0	0	
Global PSQI, n (%)				
≤5	510 (92.7)	374 (93.5)	136 (90.6)	0.2
>5	40 (7.3)	26 (6.5)	14 (9.3)	

PSQI: Pittsburgh sleep quality index

efficiency was also noted to be higher during vacation (89%) in comparison to 80% during the school days. Subjective sleep quality was however similar during both vacation and school days. Finally, adolescents reported higher sleep disturbances during the school days than those during the vacation (48.7%, 25.3% respectively).

As per Table 3, odds ratio for poor sleep quality across various characteristics was achieved by using logistic regression after adjusting for age, gender, number of siblings, and vacation. It was found that adolescents of age group ≥ 15 years have higher odds of having poor sleep quality than those younger than 15 years of age (odds ratio = 4.9; 95% CI: 2.2, 10.8).

DISCUSSION

Adolescence is a transition from childhood to adulthood and is affected by the immediate environment surrounding the adolescents. The present study aims to determine the sleep quality and sleep disturbances among the adolescents. It also aimed to determine the factors associated with poor sleep quality.

Table 3: Odds ratio and 95% confidence interval for poor sleep quality

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age		
<15	Reference	Reference
≥ 15	4.87 (2.3-9.9)	4.9 (2.2-10.8)
Gender		
Female	Reference	Reference
Male	0.56 (0.3-1.1)	0.5 (0.2-1.2)
Type of family		
Nuclear	Reference	
Extended	1.03 (0.5-2.04)	
Number of rooms		
One	Reference	
Two or more	0.9 (0.5-1.7)	
Father's occupation		
Semi-skilled worker/unskilled worker/unemployed	Reference	
Profession/semi-profession/clerical/shop owner/farmer/skilled worker	1.17 (0.6-2.3)	
Vacation		
No	Reference	Reference
Yes	1.5 (0.8-2.9)	1.3 (0.6-2.8)
Screen time (h)		
<2	Reference	
≥ 2	1.3 (0.6-2.6)	
BMI		
Normal	Reference	
Overweight/obesity	0.74 (0.2-2.5)	
PSS		
Low stress	Reference	
Moderate/high stress	0.69 (0.2-2.2)	

OR: Odds ratio, CI: Confidence interval, BMI: Body mass index, PSS: Perceived stress scale

The prevalence of poor sleep quality among the adolescents, based on this study, is 7.3%. However, evidence from previous studies in India among adolescents aged 12–17 years has shown the prevalence of poor sleep quality to be around 37.6%.^[16] Study in United States on adolescents showed that 16.3% of adolescents suffer from one or the other sleep problems.^[21] Around 16.9% of Chinese adolescents have shown to present with sleep disturbances.^[22] Significant difference in sleep duration was noted among adolescents of age ≥ 15 years as compared to the younger group in the present study. Adolescents of older age group were sleeping less than the younger adolescents (7.7 h vs. 8.6 h, respectively). Similar results were seen in a study done on urban schoolgoing adolescents^[23] in which adolescents studying in higher grades were seen to have a poorer sleep quality. The probable reason is assumed to be the increase in the academic demands from adolescents of higher grades. However, in order to find association between sleep quality and other factors, various correlates were also included apart from age.

In the study, adolescents were actually sleeping for an average of 8.3 h as compared to the set requirement of minimum sleep duration of 9.2 h per night.^[24] In a separate study on adolescents in India, total sleep time was found to be 7.8 h per day.^[23] The difference in the sleep duration can be attributed to the fact that a major proportion of the interview in the present study was conducted during the summer vacation. This is evident, as the average duration of actual sleep during school days has been shown to be 7.7 h per night in our study, which is comparable to the study by Gupta *et al.*^[23]

Considering fathers' occupation as an indication of socioeconomic condition, it was observed to have no association with the sleep quality in the present study. However, study by Saxena *et al.*^[16] and Marco *et al.*^[13] showed that adolescents from lower socioeconomic conditions showed poorer sleep outcomes. Lower socio economic condition maybe a cause of ignorance toward sleep hygiene practices, and therefore, they are unable to utilize it at home.

The study did not show association between the screen time and sleep quality. Van den Bulck showed that the presence of media delayed the bed time and wake up time leading to daytime sleepiness.^[25] Although the present study did not inquire regarding the same, further studies including the above variable are required for an in-depth study.

The study did not show any significant association between BMI, perceived stress, and sleep quality. A meta-analysis including longitudinal studies showed that children and adolescents who sleep for shorter duration have twice the odds of overweight or obesity as compared to those who sleep for longer duration.^[26] However, there is dearth of studies from India which assesses perceived stress association with the sleep quality among adolescents. A study by Lemma *et al.* including the university students of Ethiopia showed strong association of perceived stress with sleep quality.^[11] A more in-depth study can therefore give us a clear picture regarding the stress and sleep quality.

Global PSQI score showed good quality of sleep in 93% of the adolescents. The study was conducted in an urban resettlement colony with around 400 interviews being conducted during the vacation. This could be a reason for the high percentage of good-quality sleep.

The strength of the study was that it was a community-based study compared to most other studies conducted in India which were either school-based or hospital-based study. High response rate (91.7%) was observed in the study. Validated questionnaire was used to evaluate sleep quality and stress score.

However, the study had some limitations. As a cross-sectional study, the results of the study cannot be an indication of causal relationship. It was self-reported sleep quality estimation and other covariates by the adolescents; thereby, it is vulnerable to recall bias. This may give an overestimated or underestimated picture rather than the actual. Major part of the study was conducted during the vacation, thereby giving a picture of good sleep quality among higher proportion of the adolescents interviewed.

CONCLUSION

Significant difference in sleep duration was noted among adolescents of age ≥ 15 years as compared to the younger group in the present study. Adolescents of older age group were sleeping less than the younger adolescents (7.7 h vs. 8.6 h, respectively). Global PSQI score showed good quality of sleep in 93% of the adolescents.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Fredriksen K, Rhodes J, Reddy R, Way N. Sleepless in Chicago: Tracking the effects of adolescent sleep loss during the middle school years. *Child Dev* 2004;75:84-95.
2. Calamaro CJ, Mason TB, Ratcliffe SJ. Adolescents living the 24/7 lifestyle: Effects of caffeine and technology on sleep duration and daytime functioning. *Pediatrics* 2009;123:e1005-10.
3. Gangwisch JE, Babiss LA, Malaspina D, Turner JB, Zammit GK, Posner K. Earlier parental set bedtimes as a protective factor against depression and suicidal ideation. *Sleep* 2010;33:97-106.
4. Gradisar M, Wolfson AR, Harvey AG, Hale L, Rosenberg R, Czeisler CA. The sleep and technology use of Americans: Findings from the national sleep foundation's 2011 sleep in America poll. *J Clin Sleep Med* 2013;9:1291-9.
5. O'Brien EM, Mindell JA. Sleep and risk-taking behavior in adolescents. *Behav Sleep Med* 2005;3:113-33.
6. Wolfson AR, Carskadon MA. Sleep schedules and daytime functioning in adolescents. *Child Dev* 1998;69:875-87.
7. Cain N, Gradisar M. Electronic media use and sleep in school-aged children and adolescents: A review. *Sleep Med* 2010;11:735-42.
8. Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: A systematic literature review. *Sleep Med Rev* 2015;21:50-8.
9. Ohayon MM, Smirne S. Prevalence and consequences of insomnia disorders in the general population of Italy. *Sleep Med* 2002;3:115-20.
10. Grandner MA, Kripke DF. Self-reported sleep complaints with long and short sleep: A nationally representative sample. *Psychosom Med* 2004;66:239-41.
11. Lemma S, Gelaye B, Berhane Y, Worku A, Williams MA. Sleep quality and its psychological correlates among university students in Ethiopia: A cross sectional study. *BMC Psychiatry*. 2012;12:237. doi: 10.1186/1471-244X-12-237.
12. Thomée S, Härenstam A, Hagberg M. Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults – A prospective cohort study. *BMC Public Health* 2011;11:66.
13. Marco CA, Wolfson AR, Sparling M, Azuaje A. Family socioeconomic status and sleep patterns of young adolescents. *Behav Sleep Med* 2011;10:70-80.
14. Gruber R, Carrey N, Weiss SK, *et al.* Position statement on pediatric sleep for psychiatrists. *J Can Acad Child Adolesc Psychiatry* 2014;23:174-95.
15. Owens J, Adolescent Sleep Working Group, Committee on Adolescence. Insufficient sleep in adolescents and young adults: An update on causes and consequences. *Pediatrics* 2014;134:e921-32.
16. Saxena S, Koreti S, Gaur A. Prevalence and predictors of sleep wake disturbances among adolescents. *International Journal of Contemporary Medical Research* 2016;3:2944-7.
17. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Res* 1989;28:193-213.
18. American Academy of Pediatrics. Committee on Public Education. American Academy of Pediatrics: Children, adolescents, and television. *Pediatrics* 2001;107:423-6.
19. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatr Obes* 2012;7:284-94.
20. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *Journal of Health and Social Behavior* 1983;24:386-96.
21. Strine TW, Chapman DP. Associations of frequent sleep insufficiency with health-related quality of life and health behaviors. *Sleep Med* 2005;6:23-7.
22. Strauch I, Meier B. Sleep need in adolescents: A longitudinal approach. *Sleep* 1988;11:378-86.
23. Gupta R, Bhatia MS, Chhabra V, Sharma S, Dahiya D, Semalti K, *et al.* Sleep patterns of urban school-going adolescents. *Indian Pediatr* 2008;45:183-9.
24. Carskadon MA, Harvey K, Duke P, Anders TF, Litt IF, Dement WC. Pubertal changes in daytime sleepiness. *Sleep* 1980;2:453-60.
25. Van den Bulck J. Television viewing, computer game playing, and internet use and self-reported time to bed and time out of bed in secondary-school children. *Sleep* 2004;27:101-4.
26. Fatima Y, Doi SA, Mamun AA. Longitudinal impact of sleep on overweight and obesity in children and adolescents: A systematic review and bias-adjusted meta-analysis. *Obes Rev* 2015;16:137-49.