European Journal of Molecular & Clinical Medicine (EJMCM)
ISSN: 2515-8260 Volume 07, Issue 09, 2020

Original research article

Is maintaining sleep hygiene enough for good sleep? A socioeconomic correlation study in north India.

Pranjal Garg[1], Dr Rajesh Kathrotia[2], Dr Ashwini A Mahadule[3], Dr Annu Kumari[4], Dr Arun Goel[5]

[1]MBBS Student, AIIMS Rishikesh

[2]Additional Professor, Department of Physiology, AIIMS Rajkot

[3]Assistant Professor, Department of Physiology, AIIMS Rishikesh

[4]Postgraduate Student, Department of Physiology, AIIMS Rishikesh

[5]Additional Professor, Department of Physiology, AIIMS Rishikesh

Corresponding Author: Dr Ashwini A Mahadule

Abstract

Background: Sleep medicine is not considered an essential service, the lack of adequate sleep can reduce immunity, and the ability to handle stress, and organ dysfunctions. **Objectives:** A cross-sectional exploratory study was conducted to test whether socioeconomic status moderated links between sleep indicators. **Setting:** Three hundred and seventy-five Households (male head of family) were included in the study and chosen randomly representing their respective wards in equal proportion. **Measurements:** Assessments included Sleep Hygiene Index (SHI), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS) and Modified Kuppuswamy's Socioeconomic Scale (SES). **Results:** The study indicates SHI and ESS showed significant negative correlation with SES. This indicates poor sleep hygiene and more day time sleepiness with lower SES group. PQSI showed significant positive correlation indicating upper SES group showing poor sleep quality. **Conclusions:** We propose developing road map of sleep promotion program, which is a combination of sleep hygiene practice education, video-based visualization (imagery) training, and an educational session with some tips for time management in population of this part of India.

Keywords: Epworth Sleepiness Scale; Modified Kuppuswamy's Socioeconomic Scale; Pittsburgh Sleep Quality Index; Sleep Hygiene Index; Sleep quality.

Introduction

India is in the forefront of combating the COVID-19 pandemic, like other countries around the world. Although sleep medicine is not considered an essential service, the lack of adequate sleep can reduce immunity, and the ability to handle stress, and organ dysfunctions that occur during this pandemic. [1] Sleep disorders such as obstructive sleep apnoea (OSA) and insomnia continue to be prevalent in the Indian population. [2, 3] OSA contributes to cardiovascular, metabolic, neuro-cognitive, social, occupational, and traffic complications. In fact, OSA with cardiovascular complications may be a collateral risk factor for COVID-19. [4] Thus one cannot ignore the fact that sleep is important for people's health and wellbeing.

Many investigators find it difficult to ascertain which measures of socio-economic status (SES) are valid, which can be applied to multiple outcomes and which are most relevant for specific conditions. In addition, while most researchers understand they must control for the effects of SES when analyzing health outcomes, many regard different measures of SES as interchangeable. In reality, education and income capture different aspects of social position

and, thus, have distinctive characteristics. For example, income is sensitive to changes in life circumstances and time. Meanwhile, education is known to influence one's ability to make informed decisions.[5]

More Indian males between the age group of 20-30 years are found to be suffering from a sleep disorder, as per data compiled by DocsApp – a digital medical consultation platform. According to the data collected by DocsApp, at least 45 per cent of the cases received in the year 2019, pertained to males between the age group of 20-30 while female cases only made up 16 per cent for the same age group.[6]

Yet people in our very society have almost negligible in-formation about sleep and mental health and care least about proper sleep hygiene, sleep quality and prevalent excessive daytime sleepiness. They are part of India's informal and often invisible workforce, which runs into hundreds of millions by some estimates. Many informal workers end up in jobs that are crucial to city neighbourhoods, from domestic workers to security guards. [7] Possibly, this can be effectively solved by spreading awareness about the cause. Due to presence of very little literature about the comparative study of above mentioned indices with the socio-economic status of the people, this study was undertaken.

The main objective of the study is to compare the ubiquity of improper sleep hygiene, poor sleep quality and excessive daytime sleepiness with the socioeconomic status of the male populace of Rishikesh using predefined indices. Besides, the study also aims at discussing the demography of Rishikesh related to sleep architecture and help the policy formulating agencies to design appropriate schemes for the people with inappropriate sleep.

Material and Methods:

Study design: A cross-sectional exploratory study was done among earning male head populace of Rishikesh India. The study was ethically approved from the institutional ethics committee.

Study Sampling: Rishikesh is divided into 20 wards and 14,975 house-holds.[8] General public in the municipality of Rishikesh were enrolled in the study. Stratified systemic random sampling was done. With Confidence level of 95% and Confidence Interval of 5 the sample size was 375 households.

Study participants: Three hundred and seventy-five Households (male head of family) were included in the study and chosen randomly representing their respective wards in equal proportion. Inclusion criteria were that the enrolling candidate must be between 18 years and 60 years of age, residing in Rishikesh India. Females and Households not willing to participate in the study were excluded.

Study procedure: A door to door data collection was done by the members of research team. The participants in the study were introduced to the survey procedure and were informed that the survey is anonymous, voluntary and performed for the purpose of a research project. Participants did not receive any incentives or financial compensation to participate in the study. They were free to withdraw from the study at any time. After expressing their informed consent to participate in the study, participants received sets of previously validated questionnaires, then filled them personally out. Medium of implementation was Hindi. Members of research team helped the participants manually to interpret the questionnaire correctly and consequently providing right information. The survey took on average about 30 min to complete. After collecting the data and properly completed questionnaires were qualified for further analysis. The collected material was encoded in the Excel software and the results were analysed collectively.

Study instruments:

Sleep Hygiene Index (SHI)[9]: It is a self-report questionnaire specifically designed to assess theoretically-based sleep hygiene domains thought to influence the sleep quality and quantity

of youth aged ≥ 12 years. A score of SHI <30 indicated good sleep hygiene and ≥ 30 indicated poor sleep hygiene.

Epworth Sleepiness Scale (ESS)[10]: The ESS is a self-administered questionnaire with 8 questions. Respondents are asked to rate, on a 4-point scale (0-3), their usual chances of dozing off or falling asleep while engaged in eight different activities. Most people engage in those activities at least occasionally, although not necessarily every day. The ESS score (the sum of 8 item scores, 0-3) can range from 0 to 24. The higher the ESS score, the higher that person's average sleep propensity in daily life (ASP), or their 'daytime sleepiness'. ESS >10 indicated greater tendency to fall asleep during daytime and ESS ≤ 10 indicated less tendency to fall asleep during daytime.

Pittsburgh Sleep Quality Index (PSQI)[11]: This is a self-report questionnaire that assesses sleep quality over a 1-month time interval. Developed by researchers at the University of Pittsburgh and takes 5–10 minutes to complete. Consisting of 19 items, the PSQI measures several different aspects of sleep, offering seven components scores and one composite score. The component scores consist of subjective sleep quality, sleep latency (i.e., how long it takes to fall asleep), sleep duration, habitual sleep efficiency (i.e., the percentage of time in bed that one is asleep), sleep disturbances, use of sleeping medication, and daytime dysfunction. Each item is weighted on a 0–3 interval scale. The global PSQI score is then calculated by totalling the seven component scores, providing an overall score ranging from 0 to 21, where lower scores denote a healthier sleep quality. PSQI >5 indicated poor sleep quality and PSQI ≤ 5 indicated good sleep quality.

Modified Kuppuswamy's Socioeconomic Scale (SES)[12]: The scale was initially developed by Kuppuswamy in the year 1976 including index parameters like education, occupation, and total income which was further modified in later years to include head of families' educational status, occupational status and overall aggregate income of the whole family, pooled from all sources. The Kuppuswamy SES has included 3 parameters and each parameter is further classified into subgroups and scores have been allotted to each subgroup. The total score of Kuppuswamy SES ranges from 3-29 and it classifies families into 5 groups, "upper class, upper middle class, lower middle class, upper lower and lower socio-economic class."

Statistical analysis:

Data was entered in Microsoft Excel sheet. Statistical analysis was done using statistical software IBM SPSS version 23. Normality of data was checked and found to be not normally distributed hence median and interquartile range were calculated.

Data was divided into 5 socioeconomic groups according to modified Kuppuswamy's scale (SES) as Lower (SES <5), Upper-lower (SES= 5-10), Lower-middle (SES= 11-15), Upper-middle (SES=16-25) and Upper (SES >25).

Correlation of Socioeconomic status with sleep hygiene index, Epworth sleepiness scale and Pittsburgh Sleep quality index were assessed by Spearman correlation coefficient.

Comparison of socioeconomic groups for different sleep parameters were done by Kruskal Wallis test. P value of <0.05 was considered as statistically significant.

Results:

Of total 375 participants enrolled in the study, 13 belonged to low socioeconomic status, 81 belonged to upper-lower socioeconomic status, 81 belonged to lower-middle socioeconomic status, 141 belonged to upper-middle socioeconomic status and 59 to upper socioeconomic status as per modified Kuppuswamy's scale.

The median age of all the participants enrolled was 37 years with interquartile range of 22 years. On comparison of different socio economic groups it was found that median age was comparable in all groups (Table1).

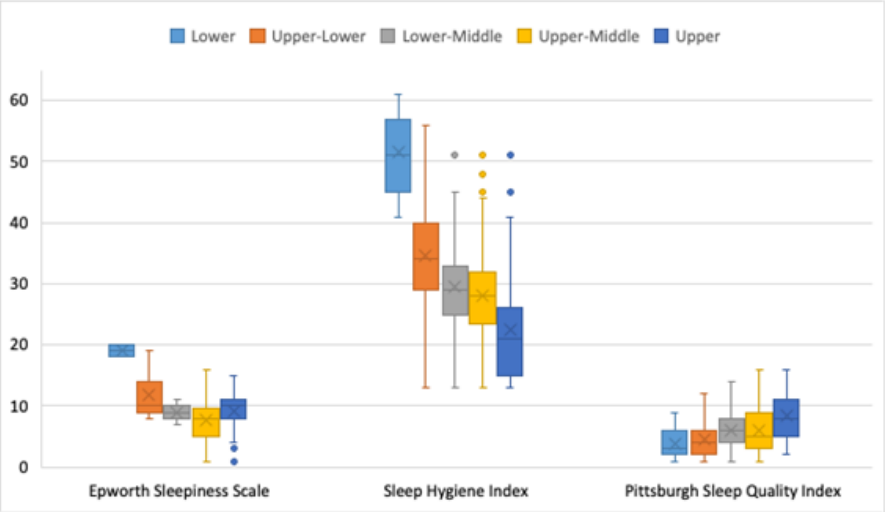
The prevalence of poor sleep architecture in the different SES groups of Rishikesh was significantly reported. Sleep hygiene was better in participants of upper, upper middle SES and lower middle SES group and participants in upper lower SES whereas lower SES reported poor of sleep hygiene. Daytime dozing was found to be significantly higher in participants of lower SES group and borderline increase in participants of upper lower SES and Upper SES group however participants in upper lower SES and lower middle SES reported good score in daytime sleepiness scale indicating their decrease tendency to doze off during daytime. Sleep quality was found to be significantly high in participants of lower SES and upper lower SES whereas participants in lower middle SES, upper middle SES and upper SES reported poor sleep quality. (Graph 1)

Our study also reported correlation between SES with sleep hygiene, ESS and PSQI. It was found that Sleep hygiene index(p=-0.34) and Epworth sleepiness scale (p=-0.54) showed significant negative correlation with socioeconomic status. This indicates poor sleep hygiene and more day time sleepiness with lower SES group. Pittsburgh sleep quality index showed significant positive correlation (p=0.36) indicating upper SES group showing poor sleep quality. (Graph 2, 3, 4).

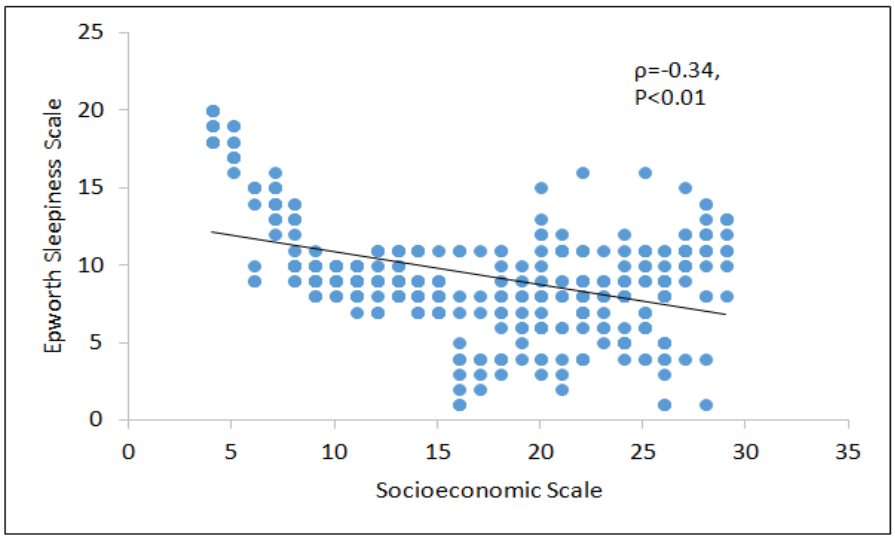
Table 1: Comparison of sleep hygiene, day time sleepiness and sleep quality among different socioeconomic groups. Values are expressed as Median (Inter Quartile Range).

	Socioeconomic status					
	Lower (N=13)	**Upper-Lower (N=81)**	**Lower-Middle (N=81)**	**Upper-Middle (N=141)**	**Upper (N=59)**	**P value**
Age (years)	38 (21)	37 (21.5)	35 (19)	41 (23)	37 (23)	0.31
ESS	19 (2)	10 (5)*	9 (2)*#	8 (4.5)*#	10 (3)*#	<0.01
SHI	51(12)	34 (11)*	29 (8)*#	28 (8.5)*#	21 (11)*#^$	<0.01
PSQI	3(4)	4 (4)	6 (4)	5 (6)*	8 (6)*#^$	<0.01

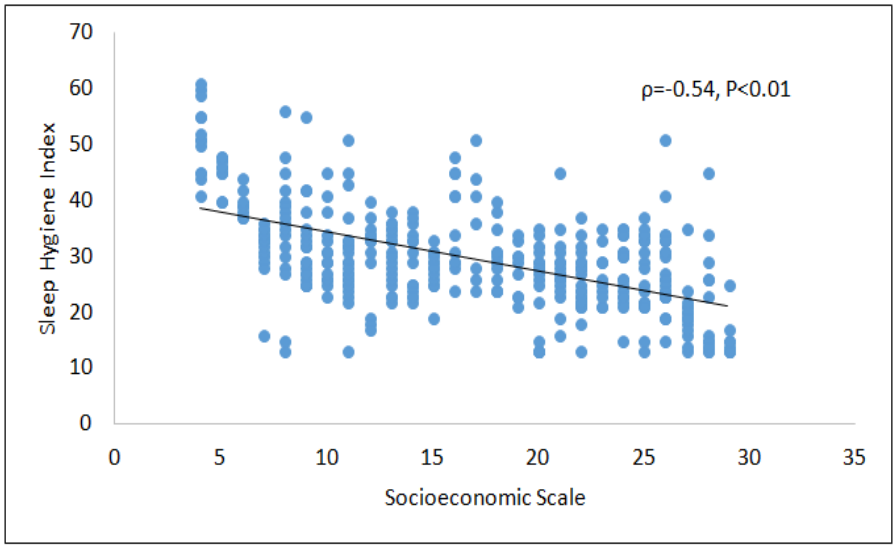
*P<0.05 on comparison with Lower, #P<0.05 on comparison with Upper-Lower, ^P<0.05 on comparison with Lower-Middle, $P<0.05 on comparison with Upper-Middle. Sleep Hygiene index (SHI), Epworth sleepiness scale (ESS), Pittsburgh Sleep Quality Index (PSQI)



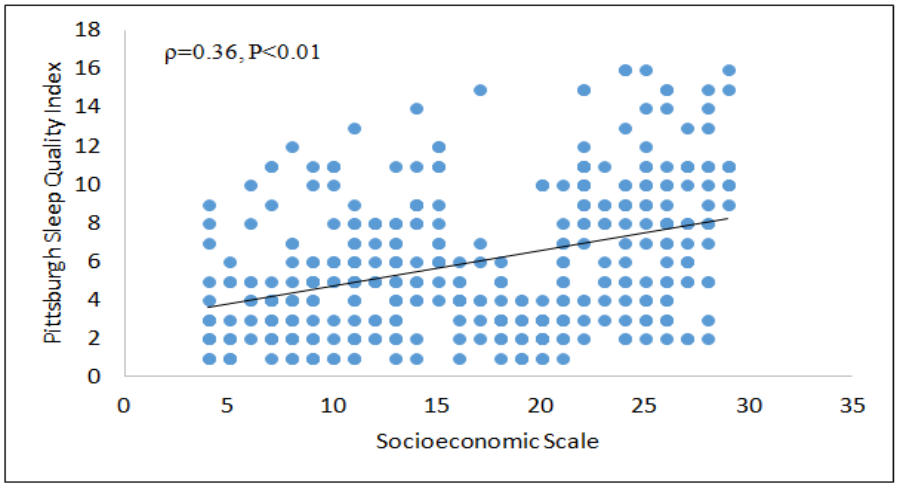
Graph 1: Comparison of sleep hygiene, day time sleepiness and sleep quality among different socioeconomic groups



Graph 2: Correlation of Socioeconomic Scale with Epworth Sleepiness Scale



Graph 3: Correlation of Socioeconomic Scale with Sleep Hygiene Index.



Graph 4: Correlation of Socioeconomic Scale with Pittsburgh Sleep Quality Index.

Discussion:

To our knowledge this is the first study of household-based sleep health epidemiology in different income groups of this geographical part of India and provides pooled prevalence estimates of subjective sleep quality in developing countries. Our study aimed to compare the ubiquity of improper sleep hygiene, poor sleep quality and excessive daytime sleepiness with the socioeconomic status of the male populace of Rishikesh. Women were not included in our study because our point of inclusion was subjects having company checks for employment or insurance reasons, or earning heads of the family; fewer women than men are sent for such checks in India, and they would have therefore been underrepresented. Another practical reason for excluding women was bearing in mind Indian social norms most Indian women would have been reluctant to allow a male technician to enter their house for study.

Importantly, we identified novel associations between objective sleep hygiene, daytime dozing and sleep quality for participants who experienced low, middle and high SES environments.

The impact of sleep behaviour on health outcomes is a rapidly growing literature as is our understanding of social inequalities in health. Strong sleep hygiene means having both a bedroom environment and daily routines that promote consistent, uninterrupted sleep. Keeping a stable sleep schedule, making bedroom comfortable and free of disruptions, following a relaxing pre-bed routine, and building healthy habits during the day can all contribute to ideal sleep hygiene. [13] Our study reported sleep hygiene was better practiced in participants of upper, upper middle SES and lower middle SES group and participants in upper lower SES and lower SES reported poor practice of sleep hygiene. This disparity could be significantly mediated by education, employment and health factors in poor individuals who showed poor practice of sleep hygiene, but not in individuals above the poverty line.

Daytime sleepiness is a bigger issue than it seems and that is why it needs to be addressed more solemnly now than ever before. In fact, it is a lot more than what can be excused for having a tiring day or restless sleep at night. Researches state a striking relationship between sleep disorders and excessive daytime sleepiness (EDS), of which obstructive sleep apnoea (OSA) is one. Patients suffering from OSA often show symptoms of EDS caused due to poor nocturnal oxygenation and dysregulation of autonomic function. It is believed that these factors are responsible for the destruction of neural networks responsible for wake promotion, also it causes autonomic arousals causing disrupted sleep. [14] Daytime dozing was found to be significantly higher in participants of lower SES group and borderline increase in participants of upper lower SES and upper SES group. Interestingly participants in upper lower SES and lower middle SES reported good score in daytime sleepiness scale indicating their decrease tendency to doze off during daytime. Daytime hyper somnolence (synonymous with EDS) was defined as sleepiness at least 3 or more days/week during the past 3 months in one or more of the following: after awakening, during free time, at work or driving, or during daytime in general. [15] From our study it could be suggested that participants from lower socioeconomic status were not obtaining the recommended hours of sleep during night hours, and compensated by sleeping extra hours in daytime. Shift work is not new. People have worked on shifts through the years in the medical field, transportation, emergency services, the defence, the police force and so on. Factories and mines have also worked on shifts to maximise available resources. What is new is a whole range of industries spawned by globalisation, providing services across time-zones in a 24/7 economy.

Sleep quality was found to be significantly high in participants of lower SES and upper lower SES whereas participants in lower middle SES, upper middle SES and upper SES reported poor sleep quality. It also represents males that are better educated and employed, have higher incomes, and are of better socioeconomic class and status than an impoverished Indian villager. These more affluent males are therefore more likely to be westernized and perhaps

have a higher prevalence of diabetes, hypertension and ischemic heart disease than rural Indians. The findings of similar study in men residing in urban India have shown higher prevalence of obstructive sleep apnoea–hypopnea syndrome (OSAHS). OSAHS in urban Indian men is striking and may have major public health implications in a developing country. The presence of snoring, nocturnal choking, unrefreshing sleep, recurrent awakening from sleep, daytime hyper somnolence, and daytime fatigue was each statistically significant for identifying patients with OSAHS. [16] Previous studies have shown an association between impaired sleep quality and watching TV, night-time TV viewing and viewing TV in the bedroom. [17, 18, 19, 20]

Mobile phones have become ubiquitous in India. Almost every adolescent has a smart phone with easy access to internet and social media. Some major contributors to poor sleep include excessive use of mobile phones, TV, internet and social media. [21]

Another study was conducted in same geographical region of India. SAHARA study in past found that subjective quality of sleep was poor, compared to lowlanders, in a significant proportion of the population native to moderately high altitude even after removing potential confounders such as chronic obstructive pulmonary disease and restless legs syndrome, perhaps because of deficient acclimatization. The acclimatization process may involve genetic as well as epigenetic factors. [22]

But unfortunately, most of the sleep promotion programs which were conducted so far focused on enhancing knowledge on sleep [23, 24] and only a few of the studies were found to have resulted in improving the sleep behaviours [25, 26] or sleep problems [27] in sub-urban Indian population. Some studies have investigated the effect of other interventions on improving sleep such as use of cognitive-behaviour therapy [28] and sleep hygiene intervention programme. [29] However, to the best of our knowledge, none of the studies have focused on interventions for improving sleep in remote areas of India. Therefore, we propose development of sleep promotion program (SPP), which is a combination of sleep hygiene practice education, video-based visualization (imagery) training, and an educational session with some tips for time management in sub urban population of India. [30]

Limitations & Future Directions:

Subjective perception of subjects in reply to questionnaire cannot be ruled out. Our findings may be confirmed in future with addition of quantitative assessment of sleep in different socioeconomic strata. Future studies should test longitudinal and bidirectional associations between sleep and its indicators to determine which associations may be most important across developmental transitions, as most current analyses are cross-sectional and cannot determine direction of effects between sleep and socioeconomic status. Elucidating genetic and environmental influences on associations between sleep and its indicators may clarify whether there is an underlying (genetic) dysregulation accounting for poor sleep, or if links between sleep and socioeconomic status are primarily accounted for by environmental or lifestyle factors.

Conclusion:

This study finding identify socioeconomic status as a potent moderator of associations between sleep and its indicators in households. Therefore, socioeconomic inequalities should be taken into account when designing interventions focusing on psychosocial factors. Our study provides additional evidence that gaps between socioeconomic status and perceived position in the social hierarchy may have important health implications with regard to the difference in sleep hygiene practices, daytime sleepiness and sleep quality. We propose developing road map of sleep promotion program, which is a combination of sleep hygiene

practice education, video-based visualization (imagery) training, and an educational session with some tips for time management in population of this part of India.

References:

1. Besedovsky L, Lange T, Haack M. The sleep-immune crosstalk in health and disease. Physiol Rev. 2019; 99:1325–1380.
2. Khan IW, Juyal R, Shikha D, Gupta R. Generalized anxiety disorder but not depression is associated with insomnia: a population based study. Sleep Sci. 2018; 11:166.
3. Choudhury A, Routray D, Swain S, Das AK. Prevalence and risk factors of people at-risk of obstructive sleep apnea in a rural community of Odisha, India: a community based cross-sectional study. Sleep Med. 2019; 58:42–47.
4. Pazarlı AC, Ekiz T, İlik F. Coronavirus disease 2019 and obstructive sleep apnea syndrome. Sleep Breathing. 2020
5. Liberatos P, Bruce LG, Kelsey JI. The measurement of social class in epidemiology, epidemiologic reviews, 1988. volume 10 (1): 87–121.
6. https://economictimes.indiatimes.com/magazines/panache/do-you-snooze-right-most-indian-men-between-20-30-years-of-age-suffer-from-sleep-disorders/articleshow/74609419.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
7. https://www.bbc.com/news/world-asia-india-46779469.
8. Censusindia.gov.in. (2011). District census handbook Dehradun. [online] Available at: http:// censusindia.gov.in/2011census/ dchb /0505_PART_B_DCHB_DEHRADUN.pdf [Accessed 29 Mar. 2019].
9. Mastin DF, Bryson J, Corwyn R. Assessment of sleep hygiene using the Sleep Hygiene Index. J Behav Med. 2006; 29: 223-227.
10. Johns MW. Reliability and factor analysis of the Ep-worth Sleepiness Scale. Sleep.1992; 15: 376-381.
11. Buysse DJ, ReynoldsIII CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: A New Instrument for psychiatric practice and research. Psychiatry research.1988; 28: 193-213.
12. Sheikh Mohd Saleem. Modified Kupppuswamy Scale updated for year 2018. Paripex. 2018; 7(3): 435 -436.
13. https://www.sleepfoundation.org/articles/sleep-hygiene.
14. Slater G, Steier J. Excessive daytime sleepiness in sleep disorders. J Thorac Dis. 2012;4(6):608-616.
15. Udwadia ZF, Doshi AV, Lonkar SG, Singh CI. Prevalence of sleep-disordered breathing and sleep apnea in middle-aged urban Indian men. Am J Respir Crit Care Med. 2004 Jan 15;169(2):168-73.
16. Kuriyan R, Bhat S, Thomas T, Vaz M, Kurpad AV. Television viewing and sleep are associated with overweight among urban and semi-urban South Indian children. Nutr J 2007; 6:25.
17. Johnson JG, Cohen P, Kasen S, First MB, Brook JS. Association between television viewing and sleep problems during adolescence and early adulthood. Arch Pediatr Adolesc Med 2004; 158:562–8.
18. Custers K, Van den Bulck J. Television viewing, internet use, and self-reported bedtime and rise time in adults: Implications for sleep hygiene recommendations from an exploratory cross-sectional study. Behav Sleep Med 2012; 10:96–105.
19. Dworak M, Schierl T, Bruns T, Strüder HK. Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of schoolaged children. Pediatrics 2007; 120:978–85.

20. Singh SK. The diffusion of mobile phones in India. Telecomm Policy (Elsevier) 2008; 32:642–51.
21. 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.
22. Gupta R, Ulfberg J, Allen RP, Goel D. Comparison of Subjective Sleep Quality of Long-Term Residents at Low and High Altitudes: SARAHA Study. J Clin Sleep Med. 2018;14(1):15-21.
23. Cain N., Gradisar M., Moseley L. A motivational school-based intervention for adolescent sleep problems. Sleep Medicine. 2011;12(3):246–25.
24. Bakotić M., Radosevic-Vidacek B., Košćec A. Educating adolescents about healthy sleep: experimental study of effectiveness of educational leafet. Croatian Medical Journal. 2009;50(2):174–181.
25. Brown F. C., Buboltz W. C., Jr., Soper B. Development and evaluation of the Sleep Treatment and Education Program for Students (STEPS) Journal of American College Health. 2006;54(4):231–237.
26. Kira G., Maddison R., Hull M., Blunden S., Olds T. Sleep education improves the sleep duration of adolescents: a randomized controlled pilot study. Journal of Clinical Sleep Medicine. 2014;10(7):787–792.
27. Schlarb A. A., Liddle C. C., Hautzinger M. JuSt—a multimodal program for treatment of insomnia in adolescents: a pilot study. Nature and Science of Sleep. 2011;3, article 13.
28. Moseley L., Gradisar M. Evaluation of a school-based intervention for adolescent sleep problems. Sleep. 2009;32(3):334–341.
29. Tan E., Healey D., Gray A. R., Galland B. C. Sleep hygiene intervention for youth aged 10 to 18 years with problematic sleep: a before-after pilot study. BMC Pediatrics. 2012;12, article 189.
30. John B, Bellipady SS, Bhat SU. Sleep Promotion Program for Improving Sleep Behaviors in Adolescents: A Randomized Controlled Pilot Study. Scientifica (Cairo). 2016; 2016:8013431.