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Original Research Article

Study of screen-time and sleep in children aged 3-15 years in Kanchipuram, Tamil Nadu, India

Prahlad Kadambi, L. Sushanth Prabhath Reddy, S. Mohammed Aashiq, Suresh P.*

Department of Paediatrics and Neonatology, Meenakshi Medical College Hospital and Research Institute, Kanchipuram, India

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***Correspondence:**
Dr. Suresh P.,
E-mail: sureshp39@ymail.com

ABSTRACT

Background: Sleep plays a vital role in good health, growth and well-being. Sleep disorders manifest with disturbance in both quantity and quality of sleep. The current generation of children is growing up surrounded by a world of electronic media through the smartphones and tablets of their parents. Previous studies have shown that sleep disorders are increasing in pediatric age group. This study aimed to assess screen-time, quality and quantity of sleep in children aged 3-15 years.
Methods: Total 104 children were recruited for our cross-sectional study from Meenakshi Medical College Hospital and Research Centre, Kanchipuram. After obtaining consent, Pediatric Sleep Questionnaire (PSQ) was administered after collecting clinical history. Anthropometry and clinical examination was performed.
Results: Total 8 out of 104 children (7.69%) in the study had poor quality sleep (PSQ Score≥5). 48 out of 104 children (46.1%) had deficient quantity of sleep as per American Academy for Sleep Medicine (AASM) recommendations. Children born with low birth weight had comparatively poorer quality of sleep (r=0.331 p=0.015). All 104 children had spent more screen time than permitted for their age.
Conclusions: Quality and quantity of sleep were affected in children aged 3-15 years. This may be attributed to increased screen time but needs to be confirmed in larger studies.

Keywords: Sleep quantity, Sleep quality, Children

INTRODUCTION

Sleep plays a vital role in good health, growth and well-being. Sleep disorders manifest with disturbance in quantity and quality of sleep. The American Academy for Sleep Medicine (AASM) recommends that adults get at least 7 hours of sleep every day, while recommending 8-10 hours for adolescents aged 13-18 years, 9-12 hours for children aged 6-12 years, 10-13 hours for preschoolers aged 3-5 years, 11-14 hours for toddlers aged 1-2 years.[1] Other standard recommendations for adequate quantity of sleep duration have been recommended by National sleep foundation of the United States and by the 24 hour Movement guidelines of Canada.[2,3] The World Health Organization (WHO) has given recommendations on adequate duration of sleep as 10-13 hours between 3-5 years of age.[4]

The common sleep disorders are insomnia, obstructive sleep apnea and narcolepsy.[5-7] While the spectrum of the disorder remains the same in adults and children, the presentation and line of clinical management vary greatly. While an adult patient with obstructive sleep apnea may present with a history of obesity, snoring, and prominent daytime somnolence, a child with the same condition is likely to present with normal body weight, tonsillar hypertrophy, and inattentiveness during school classes as noted by the child's teacher.

The current generation of children is growing up surrounded by a world of electronic media through the smartphones and tablets of their parents. This marks a noticeable shift from the immediate prior generation of children who grew up in the preceding decade with televisions and computers of their parents. With the advent of technology, numerous studies from across the world have shown that children are more exposed to screens at a younger age than before.[8]

Recently, the WHO has set out recommendations for physical activity, sedentary behavior and sleep patterns in children under 5 years of age. The salient features of the recommendations are as follows quoted from the WHO:[9]

Infants (less than 1 year) should 1) be physically active several times a day in a variety of ways, particularly through interactive floor-based play; more is better. For those not yet mobile, this includes at least 30 minutes in prone position (tummy time) spread throughout the day while awake 2) not be restrained for more than 1 hour at a time (e.g. prams/strollers, high chairs, or strapped on a caregiver's back). Screen time is not recommended. When sedentary, engaging in reading and storytelling with a caregiver is encouraged 3) have 14–17h (0–3 months of age) or 12–16h (4–11 months of age) of good quality sleep, including naps.

Children 1-2 years of age should 1) spend at least 180 minutes in a variety of types of physical activities at any intensity, including moderate-to-vigorous-intensity physical activity, spread throughout the day; more is better 2) not be restrained for more than 1 hour at a time (e.g., prams/strollers, high chairs, or strapped on a caregiver's back) or sit for extended periods of time. For 1-year-olds, sedentary screen time (such as watching TV or videos, playing computer games) is not recommended. For those aged 2 years, sedentary screen time should be no more than 1 hour; less is better. When sedentary, engaging in reading and storytelling with a caregiver is encouraged 2) have 11-14 hours of good quality sleep, including naps, with regular sleep and wake-up times.

Children 3-4 years of age should 1) spend at least 180 minutes in a variety of types of physical activities at any intensity, of which at least 60 minutes is moderate- to vigorous intensity physical activity, spread throughout the day; more is better 2) not be restrained for more than 1 hour at a time (e.g., prams/strollers) or sit for extended periods of time. Sedentary screen time should be no more than 1 hour; less is better. When sedentary, engaging in reading and storytelling with a caregiver is encouraged 3) have 10–13h of good quality sleep, which may include a nap, with regular sleep and wake-up times."

While a few previous studies have shown that sleep disorders are increasing in pediatric age group, there are very few studies that assess the quantity and quality of sleep in children in the Indian population.

Objectives

The objectives of the study were 1) to assess quality of sleep in children aged 3-15 years using pediatric sleep questionnaire (PSQ) 2) to assess the quantity of sleep in children aged 3-15 years 3) to assess the amount of screen time and outdoor playtime in children aged 3-15 years 4) to correlate the quality and quantity of sleep in children with the duration of screen time and outdoor playtime.

METHODS

The study was conducted as a prospective, cross-sectional study at Meenakshi Medical College Hospital, Kanchipuram between October 2019 and January 2020. 104 children were included in the study amongst the children who attended outpatient at Meenakshi Medical College Hospital, Kanchipuram as follow up patients. After obtaining consent, pediatric sleep questionnaire (PSQ) was administered after collecting clinical history. Anthropometry and basic clinical examination were performed.

History and anthropometry were recorded in a proforma which was devised for the purpose of the study (appendix-1). The proforma was internally validated by experts of Department of Paediatrics and Department of Community Medicine, Meenakshi Medical College Hospital, Kanchipuram. Data was tabulated using Microsoft Excel 2013 and statistical analysis was carried out using SPSS v17.0. The study followed the principles of the Helsinki declaration and ethical committee approval was obtained. The statistical tests employed include descriptive statistics and Pearson's correlation test.

Study tool - pediatric sleep questionnaire

The PSO is a reliable, validated structured questionnaire comprising of 5 questions regarding the child's sleep, 1 question regarding the child's breathing pattern, 16 questions regarding child's behavior pattern during daytime. The questionnaire is to be scored as per the scoring key and is labeled as PSQ score. A PSQ score of more than 5 is poor quality sleep and a PSQ score of more than 8 requires detailed sleep evaluation. The questionnaire is attached in appendix-2.[10]

RESULTS

The mean age of the study population was 93.8±24.2 months. The mean height of the study population was 117.6±21.9 cms. The mean weight of the study population was 20.91±9.12 kgs. The mean birth weight of the study population was 2.690±0.38 kgs. Table 1 shows the characteristics of the study population.

Table 1: Characteristics of study population.

	Mean	SD
Age (months)	93.8	24.2
Birth Wt. (kgs)	2.690	0.38
Height (cms)	117.6	21.9
Weight (kgs)	20.91	9.12
Total PSQ score	1.44	0.84
Screen time (mins)	183.3	148.1
Outdoor activity time (mins)	130.6	76.1
Duration of sleep (mins)	578.46	106.7
Number of URTI in past 6 months	2.23	1.16

Table 2: Age wise distribution of children in study population.

Age interval (years)	3-5	6-12	13-15
Frequency (n)	35	51	18

The mean duration of usage of smartphone in the study population is 58.94±74.29 minutes (SD is more than the mean due to wide variation in data). The mean duration of watching television in the study population is 116.4±106.6 minutes. The mean duration spent on miscellaneous gadgets in the study population is 7.8±21.3 minutes. (SD is more than the mean due to wide variation in data). The mean duration of total screen time in the study population is 183.2±143.3 minutes. The mean duration of time spent by the study population in outdoor play is 130.9±75.6 minutes.

The mean duration of afternoon sleep in the study population is 80.7±59 minutes and the mean duration of night sleep in the study population is 497.69±73.5 minutes. The mean duration of total sleep in the study population is 578.46±106.3 minutes.

Table 3 depicts the history of upper respiratory tract infections (URTI) in the study population for the preceding 1 year.

Table 3: Number of URTIs in the preceding one year in the study population.

Number of episodes	0-2	3-4	5-6	7-8	>8
Frequency (n)	83	12	3	4	2

Total 8 out of 104 children (7.69%) in the study had poor quality sleep (PSQ score≥5) and 3 out of these 8 children required for detailed sleep assessment as their PSQ score≥8. 48 out of `104 children (46.1%) had deficient quantity of sleep as per AASM recommendations. Table 4 shows the age wise distribution of the children who had sleep deficiency.

Table 4: Age wise distribution of children with sleep deficiency.

Age interval (years)	3-5	6-12	13-15
Frequency (n)	11	23	14

Total 31.4% of children aged between 3-5 years in the study population had sleep deficiency. 45% aged between 6-12 and 77.7% aged between 13-15 years in the study population had sleep deficiency.

There was no association between the PSQ Score and age of the child (r=0.099, p=0.48). An association was noticed between PSQ Score and birth weight of the child and was statistically significant (r=-0.31, p=0.04). An association was evident between PSQ Score and weight but was not statistically significant (r=0.19, p=0.17). A statistically significant association was noted between total duration of sleep and PSQ score (r=0.151, p=0.05). There was a statistically significant association between quantity of sleep and number of URTIs in the preceding one year (r =0.484, p=0.0003). A statistically significant association was noted between PSQ Score and quantity of sleep (r=0.15, p=0.05). No association was noticed between duration of screen time and quantity of sleep (r=0.07, p=0.61).

DISCUSSION

48 out of `104 children (46.1%) had deficient quantity of sleep as per AASM recommendations. The findings of our study are similar to that of a study conducted by Riya Thakaran et al carried out in Mangalore, Karnataka in 2018.[11] In their study, 48% of children had sleep disturbances which was attributed to gadget usage. However, their study used the sleep disturbance scale for children (SDSC) tool while our study used the PSQ Tool.

A study conducted by Bhavneet Bharti et al in 2006 at Chandigarh showed that 31% of children had sleep related complaints such as sleep talking, nocturnal enuresis, bruxism and 34% children were sleep deficient as opposed to 46.1% in our study. However, their study did not evaluate the quality of sleep.[12] Another study conducted by Shabnam Jalilolghadr et al showed a high prevalence of sleep disorders (85%) among a population in Qazvin, Iran.[13]

The incidence of deficiency of sleep quantity has increased. This can be attributed to changing lifestyle, increased use of gadgets, increased time spent on social media to name a few contributory factors. The mean duration of usage of smartphone in the study population is 58.94±74.29 minutes (SD is more than the mean due to wide variation in data). The mean duration of watching television in the study population is 116.4±106.6 minutes. The mean duration spent on miscellaneous gadgets in the study population is 7.8±21.3 minutes. (SD is more than the mean due to wide variation in data). The mean

duration of total screen time in the study population is 183.2±143.3 minutes. Due to an increased time spent on these gadgets, we can attribute poor quality of sleep and deficient quantity of sleep to this.

The American Academy of Pediatrics (AAP) recommends no screen time until 18 months of age, little to no screen time from 18 to 24 months of age, upto 1 hour per day for pre-school children aged 3-5 years, 90 minutes for elementary school children and upto 2 hours per day for middle school children.[14]

The age period of18 to 24 months is a critical developmental period for children and thus maximum physical and creative interaction with people is to be encouraged. If they do get screen time during this period, co-watching high-quality educational content with them isessential to help them understand what they are seeing, and limit total exposure to minimum. However, there are no recommendations specific for Southeast Asian or Indian population.

As per the AAP Guidelines, all 104 children had an increased duration of screen time as compared to what was considered appropriate for their age. This can be attributed to changing lifestyle and easy availability of TV, smartphone and internet in all households. In recent times, with an increased push for digitalization, there is a need to revisit the guidelines and to formulate an approach which is practically feasible. Also, with increased push for digital learning and online classes, further studies are required to correlate the screen times spent with sleep pattern and behavior.

Limitations

Sleep quantity and quality were assessed by the reporting of the mother and was not assessed in a laboratory setting. The use of polysomnography would strengthen the study design in future studies. Also, while the duration of screen time was noted, the details regarding the purpose of screen time (whether educational or recreational) were not collected. Moreover, our sample population from Kanchipuram is not representative of the entire Indian Population.

CONCLUSION

Both sleep quantity and quality were affected in children aged 3-15 years. This could possibly be attributed to increased screen time. The observations and derived inferences are likely to assume significant relevance with the emerging unavoidable push towards digital learning. The results presented in the paper possibly lead to a valid and strong argument for need of broad based further studies to generalize the presented preliminary indicative observations.

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APPENDIX I

Study proforma

Name –

Age-

DOB –

Address –

Birth weight –

Present height –

Present weight -

Natal history – NVD / LSCS

Pre-term/ term / post-dated

Maternal complications: - PIH / GDM / Hypothyroid/Others _____

History of Hospitalistion: Perinatal / Neonatal/ Infancy / early childhood

Duration of usage of smartphone - _____

Duration of usage of TV – _____

Duration of usage of miscellaneous gadgets - _____

Duration of outdoor activity – _____

Number of URTI in past year – _____

Past history –

APPENDIX II

Study tool - Pediatric sleep questionnaire (PSQ)

	Yes	No	Don't know
While sleeping does your child…			
Snore more than half the time?			
Always snore?			
Snore loudly?			
Have "heavy" or loud breathing?			
Have trouble breathing or struggle to breathe?			
Have you ever…			
Seen your child stop breathing during the night?			
Does your child….			
Tend to breathe through the mouth during the day?			
Have a dry mouth on waking up in the morning?			
Occasionally wet the bed?			
Wake up feeling un-refreshed in the morning?			
Have a problem with sleepiness during the day?			
Has a teacher or other supervisor commented that your child appears sleepy during the day?			
Is it hard to wake your child up in the morning?			
Does your child wake up with headaches in the morning?			
Did your child stop growing at a normal rate at any time since birth?			
Is your child overweight?			
This child often…			
Does not seem to listen when spoken to directly			
Has difficulty organizing tasks			
Is easily distracted by extraneous stimuli			
Fidgets with hands or feet or squirms in seat			
Is "on the go" or often acts as if "driven by a motor"			
Interrupts or intrudes on others (e.g. butts into conversations or games)			