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Sleep Disorders In Children From 4 To 18 Years Age Group Reporting To A Tertiary Care Hospital

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ABSTRACT

Background: Sleep disorders are a common occurrence in children, adolescents and can present in a myriad of ways. According to a various studies conducted on sleep disorders, sleep problems were present in 34% - 59% of the participants. The average sleep requirement of a child ranges from 16 to 18 hours during the first year of life and gradually decreases to 10 hours per night during childhood and adolescence. Sleep problems during infancy and early childhood are uncommonly recognized in pediatric practice, hence diagnosis and treatment of sleep disorders are challenging.Sleep disorders are indirectly represented and are associated with complaints related to the initiation and maintenance of sleep, bed wetting, sleep talking, sleepwalking, teeth grinding, and night terrors.

Polysomnography study is gold standard technique to diagnose sleep disorders, however it is not feasible to use polysomnography study at a community level. To diagnose sleep disorders at a community level sleep questionnaires can be used, these questionnaires have been validated by the use of polysomnography studies, with the help of such questionnaires, it is feasible to identify sleep disorders at a community level.

Method: Pediatrics Sleep Questionnaire (PSQ) was used in this study to diagnose sleep disorders. This Questionnaire, contains 31 questions, was translated and utilized in this study. Questions were put to the parents.

Questions answered by the parents which reflected the condition of the child vis a vis the presence of sleep disorders if any before the child's current illness for which he/she had reported to the OPD.

Questions 1–23 are composed of items related to snoring, sleep related breathing disorders (SRBD), daytime sleepiness, and daytime behaviour problems. These questions consist of items that were proven to be valid by conducting surveys on patients with sleep breathing disorders with an apnea-hypopnea index (AHI) of 5 or greater in polysomnography studies as defined in the study by Chervin et al where a sleep disorder was diagnosed in children older than 2 years of age.

The sensitivity was 0.81 and the specificity was 0.87 when diagnosing sleep disorder using this questionnaire. Among those in the validation study, 85% of patient's diagnosed using polysomnography were diagnosed with sleep disorder.

Patients who answered with 'Yes' to more than eight of questions 1–23, they were classified as suffering from generalised sleep disorder. Patients who answered with 'Yes' to questions 24, 25 or 26 or two of questions 26–31 was indicative of specific sleep disorders, namely, sleepwalking, bruxism, night terrors or insomnia respectively.

We followed the same questionnaire of utilising the 31 questions to diagnose a sleep disorder. Additional information was asked to assess and identify the risk factors associated with sleep disorders. To identify and assess the risk factors for sleep disorders questions pertaining to the environment mentioned in the pro forma were asked.

Result: The study was conducted in School of Medical Sciences and Research, Greater Noida. This study analyzed 345 participants, with a mean age of 8.12±2.73 years. The gender distribution showed a predominance of males (63.2%) over females (36.8%). In this study majority had subjects had 1-2 hours of screen time daily (63.5%), while a small proportion (8.2%) had 4+ hours of screen exposure. Most children engaged in the study had 1-2 hours of physical activity (80%), where as only 7.5% had less than 1 hour of activity. Generalized Sleep Disorder (26.7%) was the most common type of sleep disorder seen in this study where as Sleep Walking (4.9%) was the least common type of sleep disorder, Bruxism was seen in 12.2% of the subjects and Night Terror in 9.3% of the subjects. Obesity significantly increased the risk of generalized sleep disorder (OR = 11.3, $p < 0.001$). Higher screen time (≥3 hours) was strongly associated with sleep disorders (OR = 22.73, $p < 0.001$). Increased physical activity (>2 hours/day) was protective against sleep disorders ($p < 0.001$). The study highlights a strong correlation between high screen time, obesity, and sleep disturbances, while higher physical activity appears to be a protective factor against sleep disorders.

Conclusion: This study reveals that there is a high frequency of sleep disorders in children age 4 to 18 years. This requires further research as the presence of sleep disorders not only effects the body's physical growth but it also affects the psychological development of the body. Sleep disorders In children should not be ignored and must be kept as a top health priority of the growing age group.

Keywords: *Generalized Sleep Disorders; Children; Sleep Related Breathing Disorders; Sleep Walking; Insomnia; Bruxism; Obesity; Screen Time; Physical Activity; BMI; Lifestyle; Pediatric Sleep Questionnaire (PSQ); Polysomnography*

1. INTRODUCTION

Sleep disorders are a common occurrence in children, adolescents and can present in a myriad of ways [1].

According to a various studies conducted on sleep disorders, sleep problems were present in 34% - 59% of the participants [2,3].

The average sleep requirement of a child ranges from 16 to 18 hours during the first year of life and gradually decreases to 10 hours per night during childhood and adolescence [3].

Sleep problems during infancy and early childhood are uncommonly recognized in pediatric practice, hence diagnosis and treatment of sleep disorders are challenging.Sleep disorders are indirectly represented and are associated with complaints related to the initiation and maintenance of sleep, bed wetting, sleep talking, sleepwalking, teeth grinding, and night terrors [3,4].

With an increase in people's screen viewing of digital devices such as television, mobile phones, other portable electronic devices, the internet has a wide range of positive impacts, such as updated information and improved academic performance, however one of the major negative impact is the sleep problems in children and adolescent [5].

Polysomnography study is gold standard technique to diagnose sleep disorders, however it is not feasible to use polysomnography study at a community level.

To diagnose sleep disorders at a community level sleep questionnaires can be used, these questionnaires have been validated by the use of polysomnography studies, with the help of such questionnaires, it is feasible to identify sleep disorders at a community level.

Children between the ages of 4 and 18 years undergo rapid cognitive and physiological development, making them particularly susceptible to sleep disturbances. Sleep disorders in this age group can present in various forms [6].

Despite high prevalence of sleep disorders and its ill effects on the health of children, Indian data is limited,and there is lack of knowledge in risk factors associated with sleep disorders.

2. METHOD

Pediatrics Sleep Questionnaire (PSQ) was used in this study to diagnose sleep disorders. This Questionnaire, contains 31 questions, was translated and utilized in this study.

Questions answered by the parents which reflected the condition of the child vis a vis the presence of sleep disorders if any before the child's current illness for which he/she had reported to the OPD.

Questions 1–23 are composed of items related to snoring, sleep related breathing disorders (SRBD), daytime sleepiness, and

daytime behaviour problems. These questions consist of items that were proven to be valid by conducting surveys on patients with sleep breathing disorders with an apnea-hypopnea index (AHI) of 5 or greater in polysomnography studies as defined in the study by Chervin et al where a sleep disorder was diagnosed in children older than 2 years of age [7].

The sensitivity was 0.81 and the specificity was 0.87 when diagnosing sleep disorder using this questionnaire.

Among those in the validation study, 85% of patient's diagnosed using polysomnography were diagnosed with sleep disorder. [7]

Patients who answered with 'Yes' to more than eight of questions 1–23, they were classified as suffering from generalised sleep disorder.

Patients who answered with 'Yes' to questions 24, 25 or 26 or two of questions 26–31 was indicative of specific sleep disorders, namely, sleepwalking, bruxism, night terrors or insomnia respectively.

Snoring for more than 3 days a week (2 questions) was classified as habitual snoring.

We followed the same questionnaire of utilising the 31 questions to diagnose a sleep disorder. Additional information was asked to assess and identify the risk factors associated with sleep disorders.

To identify and assess the risk factors for sleep disorders questions pertaining to the environment mentioned in the pro forma were asked.

3. RESULT

Table 1: Demographic Characteristic of Study Subjects (n=345)

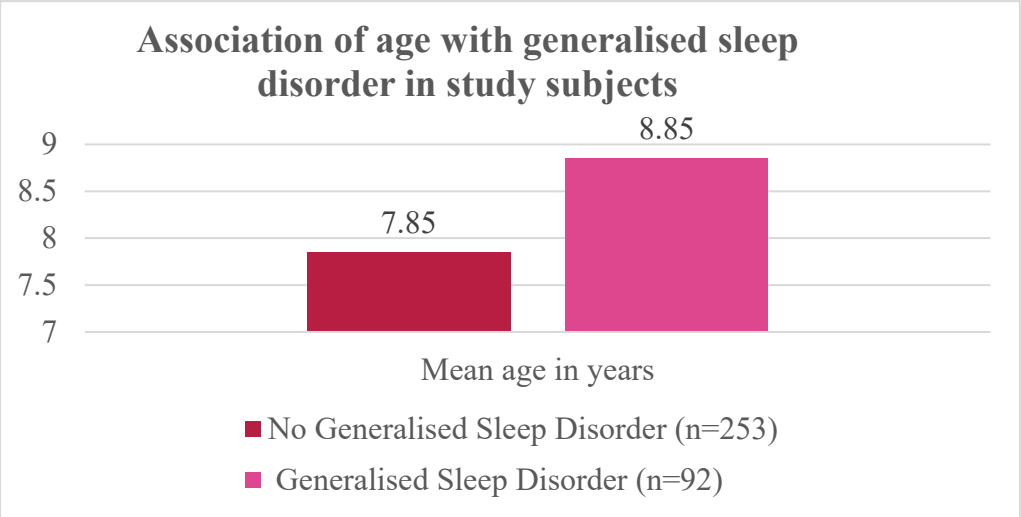
Characteristic	Number	Percentage (%)
Gender		
● Male	218	63.2
● Female	127	36.8
Age Group		
● 4-7 years	150	43.5%
● 8-11 years	147	42.6%
● 12 or more	48	13.9%
BMI		
● Underweight	51	14.8%
● Normal BMI	216	62.6%
● Overweight	50	14.5%
● Obese	28	8.1%
Screen Time		
● <1 hour	34	9.9%
● 1 hour	107	31.0%
● 2 hours	112	32.5%
● 3 hours	64	18.6%
● 4 or more	28	8.2%
Physical Activity		
● <1 hour	26	7.5%
● 1 hour	135	39.1%
● 2 hours	141	40.9%
● 3 or more	43	12.5%

The study was conducted in School of Medical Sciences and Research, Greater Noida. This study analyzed 345 participants, with a mean age of 8.12±2.73 years. The gender distribution showed a predominance of males (63.2%) over females (36.8%). In this study majority had subjects had 1-2 hours of screen time daily (63.5%), while a small proportion (8.2%) had 4+ hours of screen exposure. Most children engaged in the study had 1-2 hours of physical activity (80%), where as only 7.5% had less than 1 hour of activity. Generalized Sleep Disorder (26.7%) was the most common type of sleep disorder seen in this study where as Sleep Walking (4.9%) was the least common type of sleep disorder, Bruxism was seen in 12.2% of the subjects and Night Terror in 9.3% of the subjects. Obesity significantly increased the risk of generalized sleep disorder (OR = 11.3, $p < 0.001$). Higher screen time (≥3 hours) was strongly associated with sleep disorders (OR = 22.73, $p < 0.001$). Increased physical activity (>2 hours/day) was protective against sleep disorders ($p < 0.001$). The study highlights a strong correlation between high screen time, obesity, and sleep disturbances, while higher physical activity appears to be a protective factor against sleep disorders.

Table 2 : Association of different risk factors with generalised sleep disorder in study subjects

	Generalised Sleep Disorder		**Odds ratio (95% CI)**	**p value**
	No (n=253)	**Yes (n=92)**		
Mean age in years	7.85±2.73	8.85±2.64		
Gender				
female	96	31 (24.4%)	Ref	0.46
male	257	61 (28%)	1.20 (0.72-1.98)	
BMI				
normal BMI	182	34 (15.7%)	Ref	<0.001
obese	9	19 (67.9%)	11.30 (4.71-27.07)*	
overweight	25	25 (50%)	5.35 (2.75-10.40)*	
underweight	37	14 (27.5%)	2.02 (0.99-4.14)	
Screen time				
<1 hr	32	2 (5.9%)	Ref	**<0.001**
1 hrs	97	10 (9.3%)	1.64 (0.34-7.92)	
2 hrs	86	26 (23.2%)	4.83 (1.08-21.55)*	
3 hrs and above	38	54 (58.7%)	22.73 (5.13-100.64)*	
Physical Activity (hours)				
<1 hr	9	17 (65.4%)	Ref	**<0.001**
1 hrs	89	46 (34.1%)	0.27 (0.11-0.66)*	
2 hrs	117	24 (17%)	0.10 (0.04-0.27)*	
3 hrs and above	38	5 (11.6%)	0.06 (0.02-0.23)*	

Figure 1: Association of age with generalised sleep disorder in study subjects



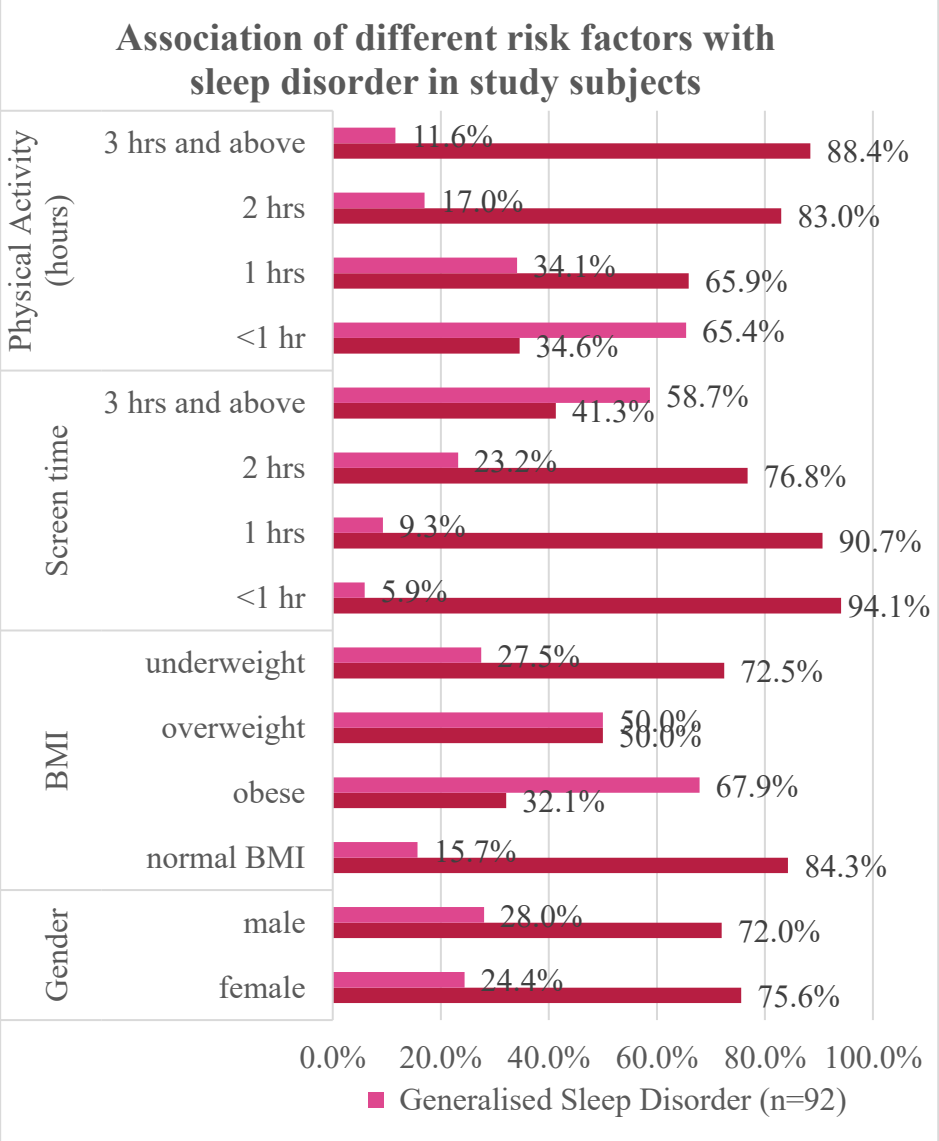


Figure 2: Association of different risk factors with sleep disorder in study subjects

4. DISCUSSION

This study was done to identify the frequency of sleep disorders in school going children between 4 to 18 years of age group.

The present study investigated the prevalence and associated risk factors of sleep disorders among children, revealing a 32.5% prevalence of sleep disturbances, including generalized sleep disorders (26.7%), sleepwalking (4.9%), bruxism (12.2%), and night terrors/insomnia (9.3%).

Several risk factors were identified, including higher BMI, increased screen time, and reduced physical activity, which significantly influenced the likelihood of sleep disorders in children.

In this study we conducted, the overall frequency of sleep disorder was 32.5%, the most common being sleep related breathing disorders seen in 26.7% of the study subject, in a study conducted by Udayakumar narasimhan et al , sleep problems were present in 34% of the participants which is near comparable to our study. However their study included only children above five years of age and sleep was assessed using children's sleep habit questionnaire, where as this study included children above 4 years of age and PSQ was used in this study [3].

When comparing these results with other Indian studies, it is evident that the prevalence of sleep disorders in this study (32.5%) is slightly lower than that reported in school-based (47.5%) and hospital-based (42.7%) studies in India [8].

The variations in prevalence may be attributed to differences in study populations, methodologies, and definitions of sleep disorders. However, the presence of common risk factors, such as obesity, screen time, and inadequate physical activity, suggests a consistent trend across populations.

In this study , there was no significant difference between the frequency of sleep disorders in male and female study population. In males, the frequency of sleep disorders was (28%), where as in case of females it was (24.4%).

One of the key findings of this study was the association of obesity with sleep disorders. Obese children had an 11.3 times higher risk of developing generalized sleep disorders, while overweight children had a 5.35 times higher risk compared to children with normal BMI. This is in agreement with Indian studies, which have shown that increased BMI is a major risk factor for sleep disorders, particularly sleep-disordered breathing and insomnia [9].

The Chennai study further identified Vitamin D deficiency as a possible contributor to sleep disturbances, with 78% of children with sleep disorders having low Vitamin D levels. While this study did not assess Vitamin D levels, future research in this area could help in understanding its role in childhood sleep issues [10].

Screen time was another significant factor affecting sleep health. Children who had more than 3 hours of screen time per day had a 22.73 times higher risk of developing generalized sleep disorders, highlighting the strong link between excessive screen exposure and sleep disturbances. Indian research similarly suggests that excessive use of electronic devices before bedtime contributes to insomnia, nightmares, and bruxism [11,12].

The impact of screen time on sleep has been well-documented globally, with mechanisms including delayed melatonin secretion, disrupted circadian rhythms, and increased psychological stimulation. Given the widespread accessibility of digital devices among children, this remains a crucial area for intervention.

On the contrary, physical activity played a protective role in preventing sleep disorders. Children who engaged in 2 or more hours of physical activity had significantly lower odds of developing sleep problems, reinforcing the benefits of exercise in maintaining sleep hygiene. Similar observations have been reported in Indian literature, where regular physical activity has been associated with better sleep quality and reduced risk of sleep-related breathing disorders [13].

This underscores the importance of promoting healthy lifestyle habits, including reducing screen time and encouraging physical activity, to mitigate the risk of sleep disorders in children.

Indian studies have further explored the impact of socioeconomic and environmental factors on sleep disorders. A study by found that children from urban areas had higher rates of sleep disturbances compared to those in rural settings, possibly due to differences in lifestyle, pollution levels, and access to electronic devices. Another study suggested that exposure to artificial lighting at night is a growing concern, with blue light exposure disrupting melatonin secretion and leading to insomnia [14].

The COVID-19 pandemic has also played a role in worsening sleep health among Indian children. A study by found that lockdown-related screen time increases contributed to a rise in sleep disorders due to altered sleep schedules and reduced physical activity [15].

Similarly, a study on online learning and digital strain highlighted that excessive screen exposure led to increased insomnia and daytime fatigue among Indian children. These findings indicate that external factors, such as lockdowns and technological advancements, have exacerbated sleep-related issues in India [16].

Despite the high prevalence of sleep disorders in India, there remains limited awareness and access to pediatric sleep health services. Studies indicate that only a small percentage of children with sleep disturbances visit sleep specialists or

pediatricians for diagnosis and management [15].

The use of polysomnography, the gold standard for sleep disorder diagnosis, remains largely limited to specialized centers, making validated sleep questionnaires an essential tool for large-scale screening in community settings. This study further emphasizes the need for school-based and community-level screening programs to identify children at risk and provide timely interventions [17].

Moreover, studies in India have identified specific sleep disorders such as obstructive sleep apnea (OSA), restless leg syndrome (RLS), and parasomnias as significant concerns.

A study reported a higher prevalence of sleep disturbances in children with autism spectrum disorder (ASD), suggesting that children with neurodevelopmental disorders are at greater risk of sleep problems [18].

Another study found that children with type 2 diabetes had higher rates of sleep disturbances, likely due to metabolic disruptions and obesity [19].

5. CONCLUSION

This study reveals that there is a high frequency of sleep disorders in children age 4 to 18 years. This requires further research as the presence of sleep disorders not only effects the body's physical growth but it also affects the psychological development of the body.

Sleep disorders In children should not be ignored and must be kept as a top health priority of the growing age group.

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