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Key Words

Sleep, children, childhood, insomnia, snoring

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Received: 22 August 2023

Accepted: 14 September 2023

Published: 10 October 2023

Citation: Ashwini G. Kendre, Nilesh B. Belsare, Madhuri Kulkarni, Nikita D. Shah, Jyoti Chaudhary, Purnima Purohit, Bakjhtawar Khambatta. 2023. To Study Sleep Disorder in Children and Adolescents. Res. J. Med. Sci., 17: 5-11, doi: 10.59218/makrjms.2023.11.5.11

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To Study Sleep Disorder in Children and Adolescents

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ABSTRACT

Sleep problems are common and yet their recognition, diagnosis and treatment are not a regular part of healthcare evaluation and education. Childhood is characterized by considerable changes in the organization, timing and structure of sleep with high incidence of sleep problem. Chronic sleep problems are also common affecting 30% of children. Chronic sleep related problems are known to have negative effects on family, children's academic performance, neurocognitive as well as behavioral performance. Despite of relatively high prevalence of sleep disorder rate and potential for day time sequel, chronic sleep problems in children are reportedly under diagnosed. Methodology- The study was conducted at tertiary care center for a period of 18 months. The sample size taken for this study was 200 participants (parents of children between age group 1-18 years). Sleep disturbance scale for children [SDSC] questionnaire was prepared in the understandable language and were distributed to parents and instructed to read questionnaire and observe sleep pattern for one week before answering it. Results- There were 53% male children and 47% were female children. 145 (72.5%) out of 200 children had one or more sleep disorders. The 85 (42.5%) children had single sleep disorder, 13 (6.5%) children had two sleep disorders and 2 (1.5%) children had three sleep disorders. None of the children had T-score suggestive of clinically significant Total Sleep Disorder. The T-score was Borderline for Total Sleep Disorder in 32(16%) of children in this study. Sleep hyperhydrosis 1(0.5%) was found in 13-15 years age group only. Conclusion- No significant association between individual sleep disorder and gender was found. Significant association was found between DOA and age group 13-15 years. The present study showed that the proportion of sleep disorder was more in children who slept in the same room with parents.

INTRODUCTION

Sleep plays a key role in the development of children. It not only affects physical growth, behavior and emotion but is also closely related to cognitive functioning, school performance and attention. Sleep is intricately connected to health and general well-being^[1]. Over the past decade, research has recognized the importance of sleep and the adverse daytime consequences and health outcomes of untreated sleep disorders. Childhood is characterized by considerable changes in the organization, timing and structure of sleep with high prevalence of sleep problem. Chronic sleep problems are also common affecting 30% of children. Chronic sleep related problems are known to have negative effects on families, children's academics, neurocognitive and behavioral performance^[2,3]. In clinical practice, major errors are made in all main categories of sleep disturbances. They are commonly disregarded as laziness, some behavioral problems or some form of psychological shortcomings. They are treated symptomatically without considering the underlying cause^[1]. Despite of relatively high prevalence of sleep disorder rate and potential for day time sequel, chronic sleep problems in children are reportedly under diagnosed. A contributing factor may be the lack of community awareness of the negative effects of sleep problems on daytime functioning in children and hence the under-reporting by parents at medical consultation. Sleeping through the night is a milestone that is not always maintained once it has been reached.

At all ages sleep disturbance is the cause of much suffering. Studies show that persistent sleep disturbance causes personal distress, poor educational and occupational performance and social and recreational difficulties. Physical and mental health problems may also result^[4,5]. Cross-sectional studies show that night awakenings are common throughout early childhood. Approximately one in three children up to four years of age will continue to awake during the night and require intervention by a parent to return to sleep. The facts need to be brought in the notice of the parents and clinicians alike. Those suffering from sleep disturbances should be courage to recognize that such problems are not only troublesome but also potentially serious and that effective treatment for various disorders are available. The recognition and evaluation of sleep problems in children requires both an understanding of the association between sleep disturbances and daytime consequences, such as irritability, inattention and poor impulse control and familiarity with the developmentally appropriate differential diagnoses of common presenting sleep complaints (difficulty initiating and maintaining sleep, episodic nocturnal events).

This study aimed at determining the prevalence of sleep disorders in children, types and its association in relation to age, sex and socioeconomic status in children and adolescent.

MATERIALS AND METHODS

Study place: The study was conducted at tertiary care centre for a period of 18 months.

Study design: Prospective Observational study.

Inclusion criteria: Parents of children between age group 7 to 15 years and willing to participate in the study were included.

Exclusion criteria: Children with any craniofacial abnormalities, neurological impairment and any chronic illness such as asthma, congenital heart diseases, epilepsy were excluded.

Sample size: 200 participants.

Data analysis: Data was analyzed by using SPSS-16 (Statistical Package for the Social Sciences) for Windows and entered into the Microsoft Excel sheet.

Ethical considerations: All the necessary ethical permissions were taken from the Institutional Ethical committee. Written informed consent was taken from the patients.

In this study, Sleep disturbance scale for children [SDSC] questionnaire (Appendix A) was used for diagnosis of various sleep disorders in children. SDSC questionnaire was prepared in the participant's local language and distributed to parents. They were instructed to read questionnaire and observe the sleep pattern for one week before answering it. The SDSC questionnaire used for studying various sleep disorders in children has been validated in the Italian population and is based on ASDC Classification of Sleep Disorders (1979). This questionnaire has also been used for a similar study in the Australian population by Blunden *et al.*^[4] In view of the unavailability of a validated questionnaire for studying sleep disorders in Indian children, this questionnaire was used for the above study.

The SDSC categorizes sleep disorders in six different factors:

- Disorders of initiating and maintaining sleep (DIMS): Sum of scores of items 1, 2, 3, 4, 5, 10, 11
- Sleep disordered breathing (SDB): Sum of scores of items 13, 14, 15
- Disorders of arousal (DOA): Sum of scores of items 17, 20, 21

- Sleep wake transition disorders (SWTD): Sum of scores of items 6, 7, 8, 12, 18, 19
- Disorders of excessive somnolence (DOES): Sum of scores of items 22, 23, 24, 26
- Sleep hyperhydrosis (SH): Sum of scores of items 9, 16

Each child's scores were analysed using the above categories and statistical analysis.

Statistical analysis: Statistical analysis was done by using SPSS for Windows Version 15 Software. For all the analysis $p < 0.05$ was considered as significant. The results were analyzed using the chi-square test.

We divided children into three clinical categories (1) normal (2) borderline and (3) clinically significant by using SDSC scoring sheet.

The individual disorder score for six disorder factors in three zones is given below:

- DIMS: Normal= <11, Borderline= 11 to 16, clinically significant= >16
- SBD: Normal= <4, Borderline= 4 to 6, clinically significant= >6
- DOA: Normal= < 4, Borderline= 4 to 5, clinically significant= >5
- SWTD: Normal= < 9, Borderline= 9 to 13, clinically significant= >13
- DOES: Normal= < 8, Borderline= 8 to 12, clinically significant= >12
- SH: Normal= <3, Borderline= 3 to 6, clinically significant= >6

RESULTS

Table 1 shows age and gender wise distribution of study group. The mean age of study subjects being 10.80 ± 2.48 years. There were 53% males and 47% were females. The maximum number of children (39.5%) belonged to 10-12 years of age group. The maximum number of female children belonged to age group of 7-9 years 36 (38.3%). The maximum number of male children belonged to age group of 10-12 years (52%).

Table 2 shows that maximum number of children (84%) belonged to Upper Middle Class.

Table 3 shows that in the present study out of 200 children there were 13 (6.5%) obese children, 50 (25%) were overweight, 135 (67.5%) were normal children and 2 (1.0%) children were underweight.

Table 4 shows that the maximum number of children 98 (49%) slept in the same room with parents while 16 (8%) children slept alone in a separate room.

As shown in Table 5, out of 200 study subjects, 145 (72.5%) were found to have sleep disorder. Disorder of

arousal was the most common disorder found in 111 (55.5%) study subjects, followed by Sleep wake transition disorder (24, 12%), Disorder of excessive somnolence (5, 2.5%), Disorders of initiating and maintaining sleep and Sleep hyperhydrosis in one subject each.

Table 6 shows that proportion of DOA sleep disorders was more in 13-15 years of age group i.e., 72.4% compared to 10-12 years (53.2%) and 7-9 years of age group (42.9%) and difference was statistically significant. Sleep disorders of SWTD was comparable in all the ages and difference was not significant.

Table 7 shows that in male children, sleep disorders found in decreasing order are DOA 57 (53.7%), SWTD 11 (10.4%), DIMS 1 (0.9%) and DOES 1 (0.9%). In male SBD and SH were not found. In female children, sleep disorder found in decreasing order are DOA 54 (57.4%), SWTD 13 (13.8%), DOES 4 (4.3%), SBD 3 (1.5%) and SH 1 (1.1%). It shows that proportion of sleep disorders were more in females i.e., 79.8% as compared to male i.e., 66.0% and difference was statistically insignificant for DOA and SWTD sleep disorders.

Table 1: Age and Gender wise distribution

Age (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
7-9	27	25.5	36	38.3	63	31.5
10-12	52	49	27	28.7	79	39.5
12-15	27	25.5	31	33	58	29
Total	106	53	94	47	200	100

Table 2: Distribution of socioeconomic status

Socioeconomic status	No. of cases (N = 200)	Cases (%)
UMC	168	84
LMC	32	16

Table 3: Body mass index wise distribution

BMI	Total no of children	
	No	%
Underweight	02	1.0
Normal	135	67.5
Overweight	50	25
Obese	13	6.5
Total	200	100.0

Percentile ≤ 5 Underweight, 5-84 Normal, 85-94 Overweight, >95 Obese

Table 4: Distribution of sleep habitat

Sleep habitat	Total children	
	No	%
With parents	98	49
With siblings	86	43
Alone (separate room)	16	8

Table 5: Distribution of sleep disorder

Individual sleep disorder	N	%
DIMS (A) disorders of initiating and maintaining sleep	1	0.5
SBD (B) sleep breathing disorders	3	1.5
DOA (C) Disorders of arousal	111	55.5
SWTD (D) sleep wake transition disorders	24	12
DOES (E) disorders of excessive somnolence	5	2.5
SH (F) sleep hyperhydrosis	1	0.5
Total	145	

Table 6: Individual sleep disorder and age

Age (years)	Sleep disorder												
	#A (DIMS) N = 01		#B (SBD) N = 03		C (DOA) N = 111		D (SWTD) N = 24		#E (DOES) N = 05		#F (SH) N = 01		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
7-9 (N = 63)	00	0.0	01	1.6	27	42.9	07	11.1	00	0.0	00	0.0	35 (55.5)
10-12 (N = 79)	01	1.3	01	1.3	42	53.2	10	12.7	02	2.5	00	0.0	56 (70.9)
13-15 (N = 58)	00	0.0	01	1.7	42	*72.4	07	12.1	03	5.2	01	1.7	54 (93.1)
Total N = 200	01	0.5	03	1.5	111	55.5	24	12.0	05	2.5	01	0.5	145 (72.5)
p-value	NA	NA	0.004*	0.9608	NA	NA	-						

By Chi Square Test *Significant, #Test of significance not applied as no. of cases was inadequate

Table 7: Individual sleep disorder and gender

Gender	Sleep disorder												
	#A (DIMS) N = 01		#B (SBD) N = 03		C (DOA) N = 111		D (SWTD) N = 24		#E (DOES) N = 05		#F (SH) N = 01		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Male N = 106	01	0.9	00	0.0	57	53.7	11	10.4	01	0.9	00	0.0	70 (66.0)
Female N = 94	00	0.0	03	3.2	54	57.4	13	13.8	04	4.3	01	1.1	75 (79.8)
Total (N = 200)	01	0.5	03	1.5	111	55.5	24	12.0	05	2.5	01	0.5	145 (72.5)
P value	NA	NA	NA	NA	0.6018	0.4533	NA	NA	NA	NA	NA	NA	-

By chi square test not significant

Table 8: Individual sleep disorder and body mass index

BMI	Sleep disorder												
	#A (DIMS) N = 01		#B (SBD) N = 03		C (DOA) N = 111		D (SWTD) N = 24		#E (DOES) N = 05		#F (SH) N = 01		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Underweight (N = 2)	00	0.0	00	0.0	01	50.0	00	0.0	00	0.0	00	0.0	01 50.0
Normal (N = 135)	00	0.0	02	1.5	71	52.6	17	12.6	02	1.5	01	0.7	93 68.9
Overweight (N = 50)	01	2.0	01	2.0	32	64.0	06	12.0	03	6.0	00	0.0	43 86.0
Obese (N = 13)	00	0.0	00	0.0	07	53.8	01	7.7	00	0.0	00	0.0	08 61.5
Total (N = 200)	01	0.5	03	1.5	111	55.5	24	12.0	05	2.5	01	0.5	145 (72.5)
p-value	NA	NA	NA	NA	0.5799	0.9086	NA	NA	NA	NA	NA	NA	

By Chi Square Test Not Significant, *Test of significance not applied as no. of cases were inadequate

Table 9: Individual sleep disorder and sleep habitat

Sleep habit	Sleep disorder												
	#A (DIMS) N = 01		#B (SBD) N = 03		C (DOA) N = 111		D (SWTD) N = 24		#E (DOES) N = 05		#F (SH) N = 01		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Sleep with parents (N = 98)	00	0.0	02	2.04	55	56.1	09	9.2	02	2.04	00	0.0	01 50.0
Sleep with sibling (N = 86)	01	1.2	01	1.2	48	55.8	13	15.1	02	2.3	01	1.2	93 68.9
Sleep alone (N = 16)	00	0.0	00	0.0	08	50.0	02	12.5	01	6.3	00	0.0	43 86.0
Total (N = 200)	01	0.5	03	1.5	111	55.5	24	12.0	05	2.5	01	0.5	145 (72.5)
p-value	NA	NA	NA	NA	0.8981	0.4652	NA	NA	NA	NA	NA	NA	

By chi square test not significant

Table 10: Individual sleep disorder and socioeconomic status

S.E.S	Sleep disorder												
	#A (DIMS) N = 01		#B (SBD) N = 03		C (DOA) N = 111		D (SWTD) N = 24		#E (DOES) N = 05		#F (SH) N = 01		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
UMC (N = 168)	01	0.6	02	0.12	96	57.1	19	11.3	04	0.24	01	0.6	123 (73.2)
LMC (N = 32)	00	0.0	01	3.1	15	46.9	05	6.3	01	3.1	00	0.0	22 (68.8)
Total N = 200	01	0.5	03	1.5	111	55.5	24	12.0	05	2.5	01	0.5	145 (72.5)
p-value	NA	NA	NA	NA	0.2840	0.4911	NA	NA	NA	NA	NA	NA	

By chi square test not significant, *Test of significance not applied as no. of cases were inadequate

Table 8 shows that proportion of DOA sleep disorders was 64.0% for overweight followed by 53.8% for obese followed by 52.6% for normal and followed by 50.0% for underweight and the difference was not significant. Whereas a SWTD sleep disorder was 12.6% for normal followed by 12.0% for overweight followed by 7.7% for obese and the difference was not significant.

Table 9 shows that sleep habits for proportion of DOA sleep disorders was 56.1% for sleep with parents

which was comparable with Sleep with sibling i.e., 55.8% and sleep alone i.e., 50.0% and the difference was not significant. Whereas sleep habits for proportion of SWTD sleep disorders was 15.1% for sleep with sibling which was more compared with Sleep with parents i.e., 9.2% and sleep alone i.e., 12.5% and the difference was not significant.

Table 10 shows that proportion of sleep disorders was more in UMC children i.e., 73.2% as compared to LMC i.e., 68.6% and the difference was not significant

Table 11: Total sleep disorder (t-score)

Sleep disorder Score (T-score)	No. of children	
	No.	%
Normal (<50)	168	84
Borderline (51-70)	32	16
Clinically significant disorder (>70)	0	0
Total	200	

Table 12: Score of Q1 and 2 of SDSC questionnaire

Q. No 1	Score					
	19-11 hrs N (%)	28-9 hrs N (%)	37-8 hrs N (%)	45-7 hrs N (%)	5<5 hrs N (%)	Total N (%)
1 (hrs of sleep)	42 (21)	111 (55.5)	42 (21)	4 (2)	1 (0.5)	200 (100)
Q. No 2	1	2	3	4	5	
	<15 min	15-30 min	30-45 min	45-60 min	>60 min	
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
2 (Time to fall asleep)	74 (37)	116 (58)	8 (4)	1 (0.5)	1 (0.5)	200 (100)

Table 13: Score for Q. No. 3-26

Q. No.	SCORE					Total N (%)
	1 N (%)	2 N (%)	3 N (%)	4 N (%)	5 N (%)	
Q. 3 Goes reluctantly to bed	142 (71)	50 (25)	5 (2.5)	2 (1.0)	1 (0.5)	200
Q. 4 Difficulty getting to sleep	140 (70)	59 (29.5)	Nil	Nil	1 (0.5)	200
Q. 5 Feels anxious or afraid when falling asleep"	163 (81.5)	35 (17.5)	1 (0.5)	Nil	1 (0.5)	200
Q. 6 Startle or jerk's parts of the body while falling asleep	157 (78.5)	37 (18.5)	4 (2)	1 (0.5)	1 (0.5)	200
Q. 7 The child shows repetitive actions like rocking or head banging while falling asleep	159 (79.5)	40 (20)	1 (0.5)	Nil	Nil	200
Q. 8 Experiences vivid dreams-like scenes while falling sleep	122 (61)	68 (34)	7 (3.5)	1 (0.5)	2 (1)	200
Q. 9 Sweats excessively while falling asleep	158 (79)	41 (20.5)	Nil	Nil	1 (0.5)	200
Q. 10 Wakes up more than twice per night	141 (70.5)	49 (24.5)	9 (4.5)	Nil	1 (0.5)	200
Q. 11 Difficulty to fall asleep again after waking up in the night	146 (73)	50 (25)	2 (1)	Nil	2 (1)	200
Q. 12 Frequent twitching or jerking of legs or kicks the covers off the beds	117 (58.5)	57 (28.5)	4 (2)	5 (2.5)	17 (8.5)	200
Q. 13 Difficulty in breathing during the night	152 (76)	43 (21.5)	5 (2.5)	Nil	Nil	200
Q. 14 Gasp for breath or is unable to breath during sleep.	166 (83)	33 (16.5)	1 (0.5)	Nil	Nil	200
Q. 15 Child snores	131 (65.5)	58 (29)	6 (3)	Nil	5 (2.5)	200
Q. 16 Child sweat excessively during night	129 (64.5)	58 (29)	4 (2)	6 (3)	3 (1.5)	200
Q. 17 You have observed the child sleepwalking	200 (100)	00 (00)	00 (00)	00 (00)	00 (00)	200
Q. 18 Observed the child in his/her sleep	60 (30)	34 (17)	9 (4.5)	22 (11)	75 (37.5)	200
Q. 19 Child grinds teeth during sleep	138 (69)	38 (19)	11 (5.5)	4 (2)	9 (4.5)	200
Q. 20 Wakes up from sleep screaming or confused but has no memory of these events	147 (73.5)	45 (22.5)	2 (1)	4 (2)	2 (1)	200
Q. 21-Night mares which he/she doesn't remember the next day	128 (64)	62 (31)	5 (2.5)	1 (0.5)	4 (2)	200
Q.22 Unusually difficult to wake up in the morning.	114 (57)	52 (26)	8 (4)	4 (2)	22 (11)	200
Q. 23 In the morning feeling tired'	151 (75.5)	41 (20.5)	1 (0.5)	4 (2)	3 (1.5)	200
Q. 24 Feels unable to move when waking up in the morning	165 (82.5)	34 (17)	1 (0.5)	Nil	Nil	200
Q. 25 Experiences Day time somnolence	142 (71)	49 (24.5)	5 (2.5)	2 (1)	2 (1)	200
Q. 26 Falls asleep suddenly in inappropriate situations	152 (76)	45 (22.5)	3 (1.5)	Nil	Nil	200

1: Never, 2: Occasionally (once or twice per month or less), 3: Sometimes (once or twice per week), 4: Often (3 or 5 times per week), 5: Always (daily)

for DOA and SWTD sleep disorders. The commonest sleep disorder in UMC and LMC was DOA 96 (57.1%) and 15 (46.9%) respectively.

Table 11 shows that none of the children had T-score more than 70. The total score suggestive of Borderline Sleep Disorder was present in 32(16%) of children in this study.

As shown in Table 12, the maximum number 111 (55.5%) of parents replied that their children got 8-9 hrs of sleep at night. The maximum number of children 116 (58%) fell asleep within 15-30 min after bed going to.

Table 13 shows responses to questions related to sleep in study subjects.

DISCUSSION

In present study 145 (72.5%) subjects were found to have sleep disorder. In the present study the Disorder of Arousal (41.5%) was the most common isolated sleep disorder, followed by in decreasing order were Sleep Wake Transition Disorder (12%), Disorder of Excessive Somnolence (2.5%), sleep breathing

disorder (1.5%), Disorders of Initiating and Maintaining Sleep (0.5%) and Sleep Hyperhydrosis (0.5%).

In a study done by Blunden *et al.*^[6] found Disorders of Initiating and Maintaining Sleep (DIMS) 24.1%, Sleep Wake Transition Disorder (SWTD) 19.7%, Disorder of Arousal (DOA) 14.5% sleep breathing disorder (SBD) 14.10%, Disorder of Excessive Somnolence, (DOES)13.3%, Sleep Hyperhydrosis (SH) 8%.

A study was done by Stores *et al.*^[7] USA using specially designed questionnaire. Total 452 children between age group of 3 to 14 years were studied. In this study the prevalence of Individual sleep disorder was DOES (4%), DIMS (16.8%) and Snoring (22.9 %).

Association of individual sleep disorder and age group:

In the present study Disorder of Arousals increased as the age advanced. The proportion of DOA sleep disorders was more in 13-15 yrs of age group i.e., 62% compared to 10-12 years and 7-9 years of age group having sleep disorder 35.4 and 30.1% respectively and difference was statistically significant. Sleep disorders of SWTD was comparable in all the

ages and difference was not significant. Sleep hyperhydrosis was found in 13-15 years age group only.

A study was done by Blunden *et al.*^[6], in Australia in 361 children between age group of 4.5-16.5 years using the SDSC scale. They found that age related decrease in sleep Hyperhydrosis from 8.4-0.0%, Sleep wake transition from 27.3-7.6% (SWTD), Sleep Breathing Disorders (SBD) from 24.4-10.2% and Disorder of arousal from (DOA) 19.1-2.5%.

In a study done by Clarisse Potasz *et al.*^[8], in São Paulo, Brazil, three hundred and thirty children participated in the study, 166 boys and 164 girls. Sleep Disordered Breathing (SDB) was more prevalent in age group between 7-11 years. The prevalence of Sleep Hyperhydrosis (SH) was significantly higher in age group between 4-7 years than in 11-14 years. The other sleep disorder did not show significant differences in relation to age.

Association of Individual sleep disorder and gender:

In the present study proportion of sleep disorders were more in females i.e., 53 (56.3%) as compared to male i.e., 54 (50.9%) and difference was statistically not significant for DOA and SWTD sleep disorders.

A study done by Clarisse Potasz *et al.*^[8], in São Paulo, Brazil. Three hundred and thirty children participated in the study, 166 boys and 164 girls. They found that sleep disorders in relation to gender, showed a higher prevalence of SH in boys (n = 40, 12%) than in girls (n = 22, 6%); There were no differences in the distribution of the other sleep disorders in relation to gender.

A study done by Blunden *et al.*^[6], in Australia in 361 children between age group of 4.5-16.5 years using the SDSC scale, 198 male and 163 female. Apart from a non-significant trend for higher hyperhydrosis scores in male gender was not predictive of sleep problems.

The above studies showed no significant association between individual sleep disorder and gender which is consistent with the present study.

Association of individual sleep disorder and socioeconomic status:

In the present study the prevalence of DOA and SWTD was higher in upper middle social class (59.5%) than the lower middle social class (53.1%) and the difference was not statistically significant. The prevalence of other sleep disorder was comparable in both the groups.

A study done by Potasz *et al.*^[8], in São Paulo, Brazil. Three hundred and thirty children participated in the study. They studied all six sleep disorders. In this study they found that prevalence of SDB, SH and DOES was higher in upper socioeconomic class than lower socioeconomic class. There were no differences in the distribution of other sleep disorder in relation to socioeconomic level.

A study was conducted by Arman *et al.*^[9], in Turkish children. It was population based cross-sectional study. The mean age of 2669 children was 8.2±2.4 years and 51% of the students were girls. A structured questionnaire evaluating the sleep schedule variables was filled out by their parents. Socioeconomic status (SES) was determined according to the Turkish SES scale. They revealed that waking time and total sleep duration decreased significantly with higher SES among both girls and boys.

The African American children and children from low-income families have been found to have higher rates of sleep disordered breathing, shorter sleep times, poorer sleep quality and more frequent weekend napping in comparison to their European American and middle- to high-income counterparts^[10-13].

A study was conducted by Bøe *et al.*^[14], in Bergen, Norway in 2012. The participants were 5781 children in age group of 11-13 years. The aim of this study was to investigate the association between familial socioeconomic status (SES) and children's sleep problems. In this study they found that the difficulties initiating and/or maintaining sleep (DIMS) and time in bed (TIB) was significantly higher in lower socioeconomic group than the higher socioeconomic group.

Association of individual sleep disorder and sleep habit:

In present study the number of children slept with parents were 98 (49%), with sibling 86 (43%) and alone were 16 (8%). The prevalence of DOA was higher in children who slept with parents (42.8%) and who slept with siblings (40.6%) compared to (37.5%) who slept alone. An interview based comparative study done in parents of healthy 6- to 48-month-old children (56 Japanese parents and 61 white US parents). More Japanese than US children co-slept (59% vs. 15%). A greater proportion of US children had regular bedtime struggles and night waking. The experience of the Japanese families indicates that co-sleeping per se was not associated with increased sleep problems in early childhood^[15].

A study was conducted by Cortesi *et al.*^[16], in Rome, Italy in 148 school-aged children with bedtime problems (44 co-sleepers, 104 solitary sleepers) and 228 healthy peers. In this study they found that co-sleepers have a significantly later bedtime, shorter night time sleep duration.

The above studies shows that there is association of co-sleeping and sleep disorders and this finding is consistent with the present study.

Total score of all 26 questions was summed up and is converted into T score. This T score is used to determine the Total Sleep Disorder. The T score of more than 70 was considered Clinically significant disorder, between 51-70 was considered as Borderline

disease and less than 50 was considered as normal. In the present study none of the children had T- score more than 70. The Borderline Sleep Disorder was present in 32 (16%).

To conclude, in the present study out of 200 children 145 (72.5%) had one or more individual sleep disorders. Eighty-five (42.5%) children had single sleep disorder, 13 (6.5%) children had two sleep disorders and 2 (1.5%) children had three sleep disorders. Also, significant association was found between DOA and age group 13-15 years.

CONCLUSION

The Disorders of Arousal (DOA) was the most common individual sleep disorder (ISD) in this study while Disorders of Initiating and Maintaining sleep (DIMS) and Sleep Hyperhydrosis (SH) Disorders were seen only in 1 child each. None of the children had T-score suggestive of clinically significant Total Sleep Disorder. The T-score was Borderline for Total Sleep Disorder in 32(16%) of children in this study. Proportion of children with Disorder of Arousal increased as the age advanced. The prevalence of DOA and SWTD was higher in upper middle social class than the lower middle social class and the difference was not statistically significant. The prevalence of other sleep disorder was comparable in both the groups. No significant association between individual sleep disorder and gender was found. Significant association was found between DOA and age group 13-15 years. The present study showed that the proportion of sleep disorder was more in children who slept in the same room with parents. This may be because of the fact that these sleep disorders were noticed and reported by the parents more frequently as compared to the parents who did not sleep along with their children.

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