



SLEEP DISTURBANCES AND BEHAVIOURAL PROBLEMS IN CHILDREN WITH INTELLECTUAL DISABILITY: A CASE-CONTROL STUDY FROM A TERTIARY CARE CENTRE IN INDIA

Dr. Chandrashekar M¹ Dr Abhishek Nagakumar^{*2} Dr.Manovijay B Kalasagond³

¹Assistant ProfessorDepartment of Psychiatry,East point college of medical sciences& research center , Bidarahalli, Bengaluru,Karnataka,India

Email: 09m0606@gmail.com

^{*2}Assistant professorDepartment of PsychiatryMvj medical college and research institute Hoskote,bengaluruKarnataka, indiaEmail: docabhipsychiatry@gmail.com

Mobile : +919019700633

³Associate ProfessorDepartment of PsychiatryShri B M Patil Medical College, Hospital and Research centre. VijayapurKarnataka

Email: drbkmano@gmail.com

***Corresponding author: Dr Abhishek Nagakumar**

²Assistant professorDepartment of PsychiatryMvj medical college and research institute Hoskote,bengaluruKarnataka, indiaEmail: docabhipsychiatry@gmail.com

Mobile : +919019700633

Abstract :

Sleep disturbances are highly prevalent in children with intellectual disability (ID), with rates ranging from 34% to 86^{1,4}. These disturbances significantly impact cognitive functioning, behavioural regulation, and caregiver burden. This case-control study assessed sleep disturbances and behavioural problems in 60 children (30 ID, 30 controls) aged 5–12 years. Sleep was evaluated using the Sleep Disturbance Scale for Children (SDSC) and behaviour using the Behaviour Problems Inventory–Short Form (BPI-S). Sleep disturbances were significantly higher in the ID group (36.7% vs 6.7%, $p=0.009$). Disorders of initiating and maintaining sleep (DIMS) were most common. A significant negative correlation was observed between IQ and sleep disturbances ($r = -0.400$, $p = 0.029$). Behavioural problems were prevalent but not significantly associated with sleep disturbances. Sleep disturbances are common in children with ID and correlate with severity, warranting routine screening and early intervention.

Introduction

Sleep is a fundamental neurobiological process essential for optimal brain development, synaptic plasticity, emotional regulation, and behavioural functioning. In childhood, sleep plays a particularly critical role as it influences cognitive development, learning capacity, memory consolidation, and executive functioning. Disruption of sleep during developmental years has been associated with a wide range of adverse outcomes, including impaired attention, behavioural dysregulation, mood disturbances, and poor academic performance^{2,8}.

Children with intellectual disability (ID) represent a particularly vulnerable population with respect to sleep disturbances. Intellectual disability is characterized by significant limitations in intellectual functioning and adaptive behaviour with onset during the developmental period³. These limitations often coexist with neurobiological abnormalities, delayed brain maturation, and altered neurochemical pathways, all of which may contribute to dysregulation of sleep–wake cycles.

The prevalence of sleep disturbances in children with intellectual disability has been consistently reported to be significantly higher than in typically developing children. Studies have estimated prevalence rates ranging from 34% to 86% in children with ID compared to 11%–37% in the general pediatric population^{1,4,12}. This wide variation may be attributed to differences in diagnostic criteria, assessment tools, and heterogeneity of study populations.

Sleep disturbances in children with intellectual disability are multifactorial in origin. Neurobiological factors such as abnormalities in melatonin secretion, circadian rhythm dysregulation, and impaired central nervous system maturation play a crucial role. Additionally, behavioural factors such as poor sleep hygiene, inconsistent bedtime routines, and increased dependency on caregivers may further exacerbate sleep difficulties. Environmental factors, including parental practices and socioeconomic conditions, also contribute but may play a relatively lesser role compared to intrinsic neurodevelopmental abnormalities.

The spectrum of sleep disturbances observed in children with intellectual disability is broad. Commonly reported problems include difficulty initiating and maintaining sleep, frequent night awakenings, parasomnias, sleep-disordered breathing, and excessive daytime sleepiness^{5,13}. Among these, insomnia-related problems, particularly disorders of initiating and maintaining sleep (DIMS), are reported to be the most prevalent.

Sleep disturbances in this population are not merely nocturnal phenomena but have significant daytime consequences. Several studies have demonstrated strong associations between sleep disturbances and behavioural problems, including hyperactivity, aggression, irritability, stereotypies, and self-injurious behaviours^{6,14}. These behavioural disturbances may further impair social functioning and learning abilities, creating a vicious cycle.

Furthermore, sleep disturbances in children with intellectual disability have a substantial impact on caregivers. Caregivers often experience sleep deprivation, increased stress, and reduced quality of life. This highlights the broader psychosocial burden associated with sleep problems in this population.

Despite the high prevalence and significant impact, sleep disturbances in children with intellectual disability often remain under-recognized and under-treated. This is particularly relevant in low- and middle-income countries like India, where awareness about pediatric sleep disorders is limited and access to specialized services may be constrained.

In the Indian context, there is a paucity of systematic research examining sleep disturbances in children with intellectual disability and their relationship with behavioural problems. Most available studies are from Western populations, and their findings may not be directly generalizable due to cultural, environmental, and healthcare differences.

The present study was undertaken to address this gap by systematically evaluating sleep disturbances in children with intellectual disability, comparing them with typically developing children, and examining their association with behavioural problems in an Indian tertiary care setting.

Materials and Methods

Study Design and Setting

This study was designed as a hospital-based case-control study conducted in the Department of Psychiatry at a tertiary care teaching hospital in Bengaluru, India. A case-control design was chosen to allow comparison between children with intellectual disability and typically developing children with respect to sleep disturbances and behavioural problems.

Study Duration

The study was conducted over a period of two years (November 2017 to November 2019), allowing adequate recruitment and assessment of participants.

Sample Size and Sampling Method

A total sample of 60 children was included in the study:

- Cases: 30 children diagnosed with intellectual disability
- Controls: 30 age- and sex-matched typically developing children

Participants in the case group were recruited from outpatient and inpatient psychiatric services. Controls were recruited from the general pediatric population and accompanying siblings, ensuring matching for age and gender. A convenience sampling method was used due to the clinical setting; however, efforts were made to ensure representativeness by including consecutive eligible participants.

Inclusion Criteria

- Children aged 5–12 years
- Diagnosis of intellectual disability based on ICD-10 criteria³
- Availability of a primary caregiver capable of providing reliable history

Exclusion Criteria

- Presence of major neurological disorders (e.g., epilepsy) affecting sleep
- Comorbid psychiatric disorders known to influence sleep patterns
- Current use of medications affecting sleep architecture
- Acute medical illness at the time of assessment

Assessment Tools

1. Sleep Disturbance Scale for Children (SDSC)

The SDSC is a validated 26-item parent-reported questionnaire designed to assess sleep disturbances in children⁵. It evaluates six domains:

- Disorders of Initiating and Maintaining Sleep (DIMS)
- Sleep Breathing Disorders (SBD)
- Disorders of Arousal (DA)
- Sleep-Wake Transition Disorders (SWTD)
- Disorders of Excessive Somnolence (DOES)
- Sleep Hyperhidrosis (SHY)

Each item is scored on a Likert scale, and higher scores indicate greater severity of sleep disturbance.

2. Behaviour Problems Inventory – Short Form (BPI-S)

The BPI-S is a standardized instrument used to assess behavioural disturbances in individuals with developmental disabilities⁷. It evaluates:

- Self-injurious behaviour
- Aggression/destructive behaviour
- Stereotyped behaviour

Procedure

After obtaining informed consent from caregivers, participants were assessed using a semi-structured proforma for sociodemographic and clinical details. The SDSC and BPI-S were administered to caregivers in a structured interview format.

Statistical Analysis

Data were analysed using SPSS version 24.

Descriptive Statistics

- Continuous variables were expressed as mean $\pm$ standard deviation (SD)
- Categorical variables were expressed as frequencies and percentages

Inferential Statistics

1. Independent t-test

Used to compare mean scores (e.g., SDSC domains) between ID and control groups.

2. Chi-square test (χ^2)

Used to compare categorical variables such as prevalence of sleep disturbances and gender distribution.

3. Pearson correlation coefficient (r)

Used to assess:

- Relationship between IQ and sleep disturbances
- Relationship between duration and severity of sleep disturbance

Statistical Significance

A p-value < 0.05 was considered statistically significant.

Results

Sociodemographic Characteristics

A total of 60 children participated in the study. The mean age of children in the intellectual disability group was 9.26 ± 2.06 years, compared to 8.10 ± 2.23 years in the control group. This difference was not statistically significant ($p = 0.40$), indicating that the groups were comparable in terms of age.

There was a male predominance in the ID group (66.7%) compared to the control group (23.3%). This difference was found to be statistically significant ($\chi^2 = 11.38$, $p = 0.001$), suggesting a higher representation of males among children with intellectual disability in the sample.

Most children in the ID group were diagnosed with mild intellectual disability (70%), followed by moderate (23.3%) and severe (6.7%) categories.

(Table 1) DESCRIPTIVE DETAILS OF CAREGIVER OF CASES AND CONTROLS				
VARIABLES	caregiver of cases (n=30)	caregiver of controls(n=30)	Chi square/ t value	P value
Caregiver age (mean + SD) Range (years)	34.13+6.08 25-55	32.53+6.72 22-56	0.966	0.338
Caregiver gender Male Female	4(13.3%) 26(86.7%)	1(3.3%) 29(96.7%)	1.964	0.353
Marital status Single Married Separated Widowed	1(3.3%) 26(86.7%) 2(6.7%) 1(3.3%)	30(100%)		
Caregiver formal education (years) (mean + SD) Range (years)	9.97+3.46 3-18	9.30+4.489 0-20	0.644	0.522
Education status Illiterate Primary school	0 4(13.3%)	2(6.7%) 3(10%)	0.00	1.00

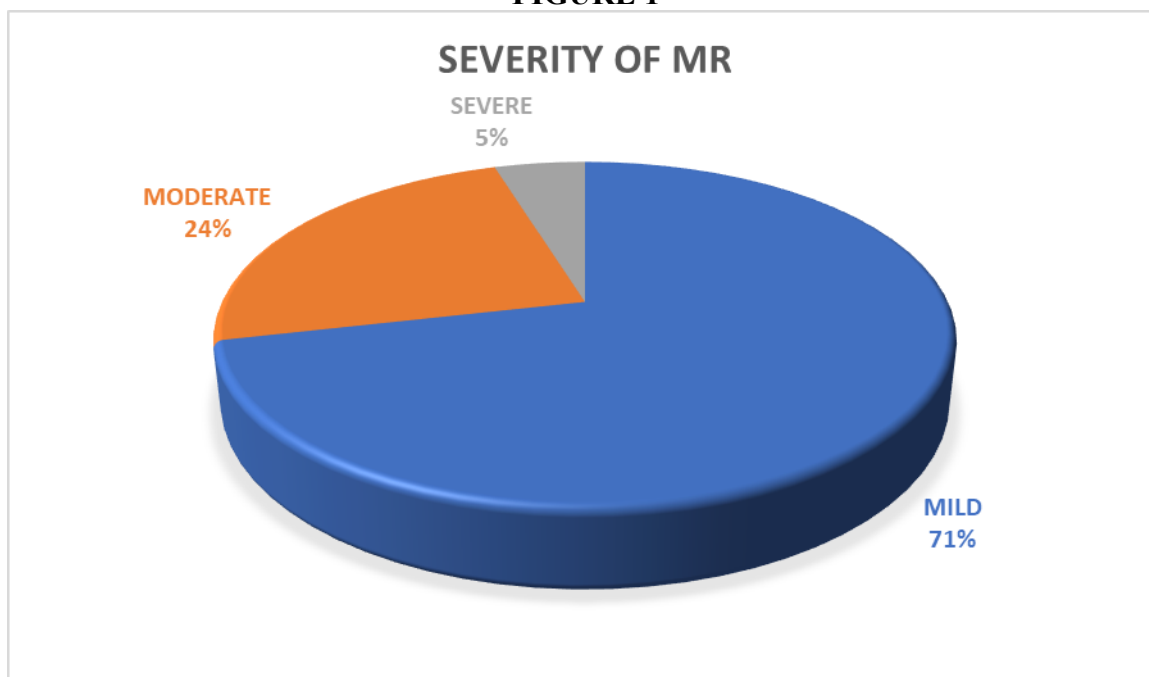
Secondary school	6(20%)	9(30%)		
High school	11(36.7%)	7(23.3%)		
Diploma	5(16.7%)	4(13.3%)		
Graduate	2(6.7%)	3(10%)		
Post-graduate	1(3.3%)	2(6.7%)		
Professional	1(3.3%)	0		
Occupation			0.480	0.488
Unemployed	15(50%)	16(53.3%)		
Unskilled	4(13.3%)	6(20%)		
Semi-skilled	3(10%)	0(0%)		
Skilled	4(13.3%)	2(6.7%)		
Student	0(0%)	2(6.7%)		
Clerical	2(6.7%)	1(3.3%)		
Professional	0(0%)	3(10%)		
Business	2(6.7%)	0(0%)		
Total monthly income(median)	10000	11000	1.039	0.303
Range (Rs)	3000-100000	5000-35000		
Socioeconomic status			4.022	0.045
Upper middle (II)	5(16.7%)	4(13.3%)		
Lower middle (III)	7(23.3%)	1(3.3%)		
Upper lower (IV)	18(60%)	25(83.3%)		
Locality				
Urban	30(100%)	30(100%)		
Religion				
Hindu	26(66.7%)	30(100%)		
Muslim	4(13.3%)			
No. of children at home (mean + SD)	2.07+0.640	2.23+0.728	-0.942	0.350
Range	1-4	1-3		
No. of people stay at home (mean + SD)	4.47+1.676	4.73+1.143	-0.720	0.474
Range	2-12	3-7		
Sleeping environment			1.071	0.612
With parent	27(90%)	29(96.7%)		
Without parent	3(10%)	1(3.3%)		

(Table 2) DESCRIPTION OF CLINICAL VARIABLES AMONG CASES

variables	Cases(n=30)
Severity of MR	
Mild	21(70%)
Moderate	7(23.3%)
Severe	2(6.7%)
IQ score (mean + SD)	53.3+12.76

Range	21-69
Psychiatric co-morbidities	
No	30(100%)
Medical co-morbidities	
No	30(100%)
Attending special school	
No	17(56.7%)
Yes	13(43.3%)
Duration of sleep disturbance (mean + SD)	2.63+2.65
Range(years)	1-8
Family history of sleep disturbance	
No	28(94.3%)
Yes	2(6.7%)

FIGURE 1



Sleep Characteristics

Children with intellectual disability demonstrated significantly altered sleep patterns compared to controls.

- Sleep latency:

A significantly higher proportion of children with ID required more than 30 minutes to fall asleep (16.6%) compared to controls (3.3%).

This difference was statistically significant ($\chi^2 = 8.864$, $p = 0.003$), indicating difficulty in sleep initiation.

- Sleep duration:

A subset of children with ID slept for less than 7 hours, whereas none of the controls reported such reduced sleep duration, suggesting poor sleep quantity in the ID group.

(Table 3) OCCURRENCE OF SLEEP DISTURBANCES AMONG CASES AND CONTROLS

VARIABLES	Cases(n=30)	Controls(n=30)	Chi square/ T value	P value
No. of hours of sleep (hours)			0.317	0.573
9-11	8(26.7%)	10(33.3%)		
8-9	16(53.3%)	17(56.7%)		
7-8	3(10%)	3(10%)		
5-7	3(10%)	0(0%)		
How long after going to bed usually fall asleep (in min)			8.864	0.003
<15	14(46.7%)	25(83.3%)		
15-30	11(36.7%)	4(13.3%)		
30-45	1(3.3%)	0(0%)		
45-60	4(13.3%)	1(3.3%)		

FIGURE 2

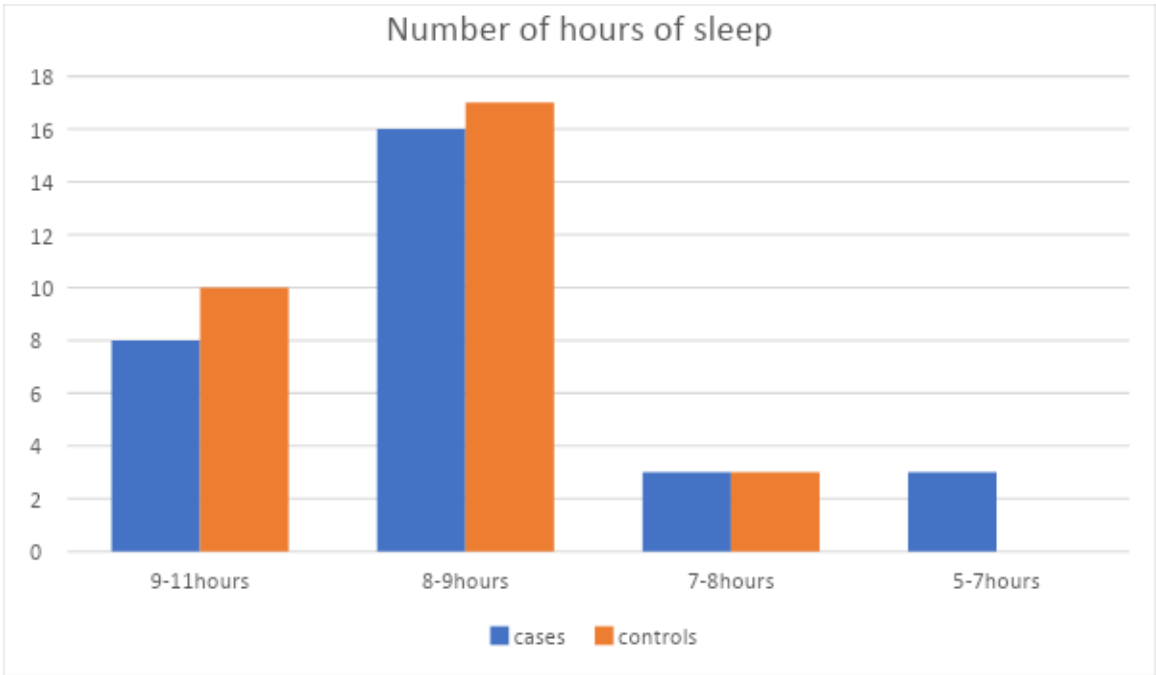
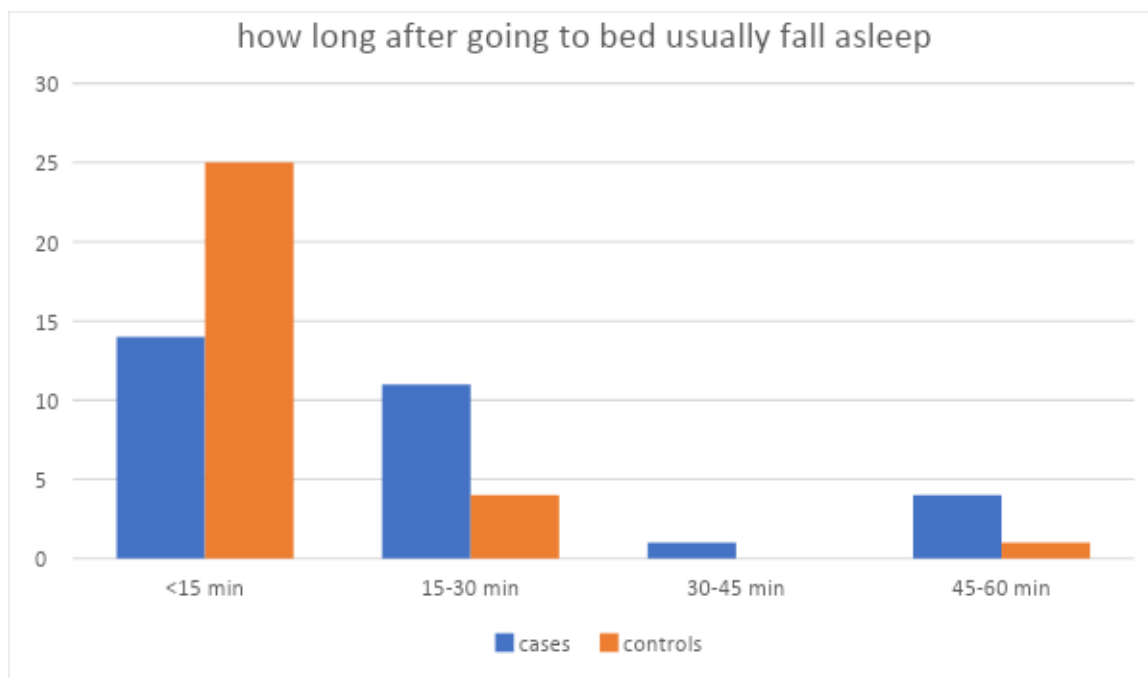


FIGURE 3



Prevalence of Sleep Disturbances

The overall prevalence of sleep disturbances was significantly higher in the ID group (36.7%) compared to controls (6.7%).

This difference was statistically significant:

$$\chi^2 = 6.857, p = 0.009$$

This finding indicates that children with intellectual disability are at a significantly higher risk of sleep disturbances compared to typically developing children.

Types of Sleep Disturbances

Among the various domains assessed using SDSC:

- Disorders of Initiating and Maintaining Sleep (DIMS):

Most common in ID group (43.3%)

Mean score significantly higher:

$$t = 2.982, p = 0.004$$

- Sleep-Wake Transition Disorders (SWTD):

Second most common (26.7%)

$$t = 2.219, p = 0.030$$

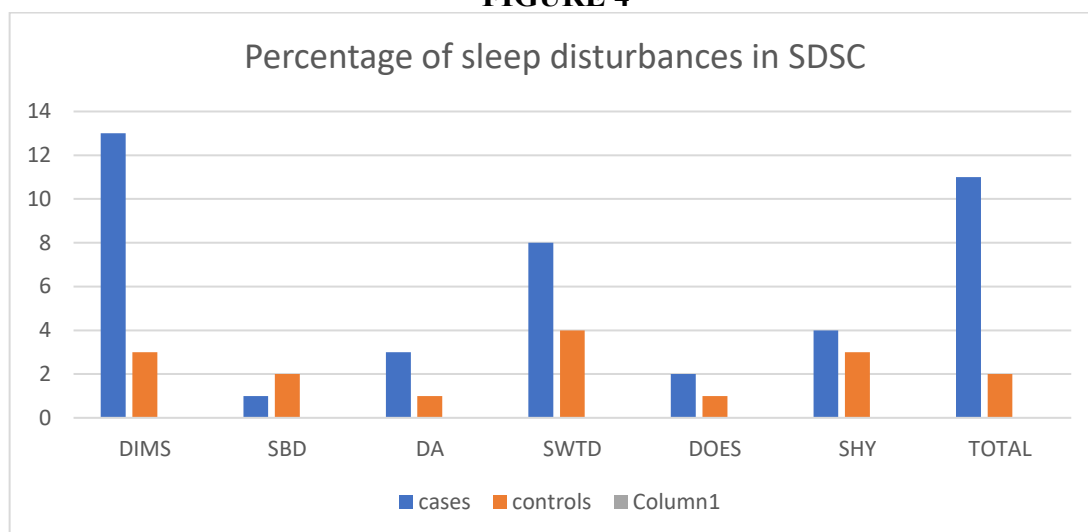
These findings indicate that insomnia-related disturbances are the predominant sleep problems in children with intellectual disability.

(Table 4) PERCENTAGE OF OCCURRENCE OF SLEEP DISTURBANCE AMONG CASES AND CONTROLS

SDSC	Cases(n=30)	Controls(n=30)
DIMS	13(43.3%)	3(10%)
SBD	1(3.3%)	2(6.7%)
DA	3(10%)	1(3.3%)
SWTD	8(26.7%)	4(13.3%)
DOES	2(6.7%)	1(3.3%)
SHY	4(13.3%)	3(10%)
TOTAL	11(36.7%)	2(6.7%)

VARIABLES	Cases(n=30)	Controls(n=30)	Chi square/ T value	P value
Sleep disturbance in SDSC (mean + SD)				
DIMS	12.53+5.917	8.8+3.343	2.982	0.004
SBD	3.13+0.730	3.27+1.015	-0.584	0.561
DA	3.27+0.868	3.20+0.761	0.316	0.753
SWTD	9.13+2.72	7.67+2.383	2.219	0.030
DOES	6.10+2.32	5.80+1.937	0.543	0.589
SHY	2.77+1.96	2.40+1.221	0.870	0.389
Total	36.80+9.83	31.23+5.594	2.694	0.009

FIGURE 4



Behavioural Problems

Behavioural problems were present in 83.3% of children with intellectual disability, compared to only 6.7% of controls, indicating a significantly higher burden of behavioural disturbances.

However, when the association between sleep disturbances and behavioural problems was analysed within the ID group:

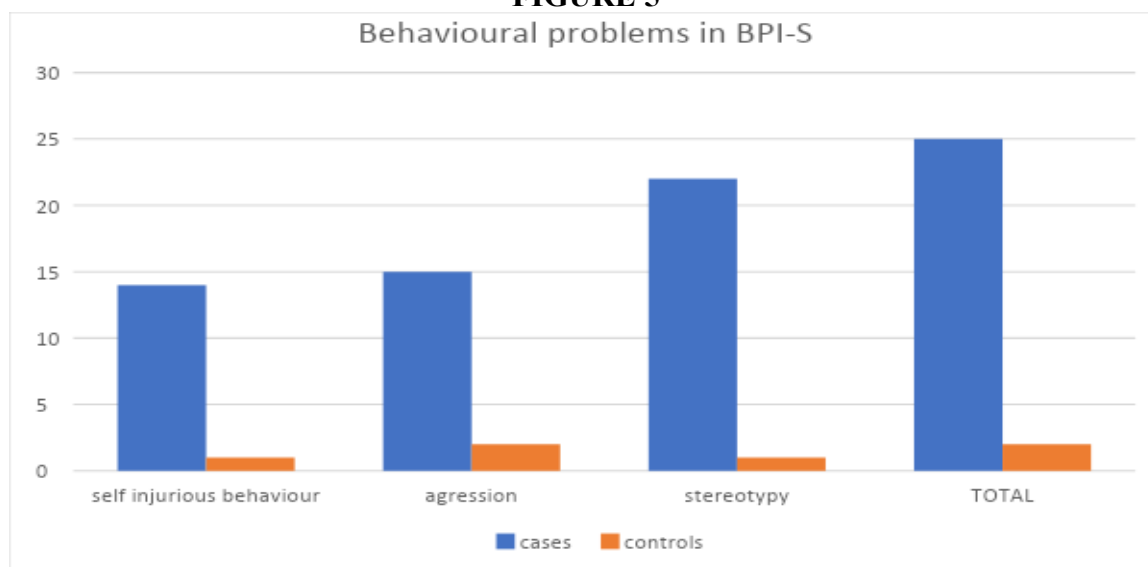
No statistically significant association was found ($\chi^2 = 3.474$, $p = 0.129$)

This suggests that behavioural problems may not be directly dependent on sleep disturbances in this sample.

(Table 5) BEHAVIOURAL PROBLEMS AMONG CASES AND CONTROLS				
BPI S	Cases (n=30)	Controls (n=30)	Chi square	P value

Self-injurious behaviour	14(46.7%)	1(3.3%)	32.411	0.000
Aggression	15(50%)	2(6.6%)		
Stereotype	22(73.3%)	1(3.3%)		
Total	25(83.3%)	2(6.7%)		

FIGURE 5



(Table 6) ASSOCIATION BETWEEN SLEEP DISTURBANCE AND BEHAVIOUR PROBLEMS IN CASES					
Variable	sleep disturbance		Chi square value	P value	Cramer's v
	absent	present			
Behavioural problems			3.474	0.129	0.340
Absent	5	0			
Present	14	11			

Correlation Analysis

- IQ vs Sleep Disturbance:

A significant negative correlation was observed:

$$r = -0.400, p = 0.029$$

This indicates that greater severity of intellectual disability is associated with more severe sleep disturbances.

- Duration vs Severity of Sleep Disturbance:

A significant positive correlation was found:

$$r = 0.485, p = 0.035$$

This suggests that longer duration of sleep problems is associated with increased severity

(Table 7) CORRELATION BETWEEN SLEEP DISTURBANCE AND SOCIODEMOGRAPHIC VARIABLES		
IQ score	Pearson correlation (r)	-0.400
	P value	0.029
	N	30
Duration of sleep disturbance	Pearson correlation (r)	0.485
	P value	0.035
	N	19
Caregiver age	Pearson correlation (r)	0.393

	P value	0.032
	N	30
Number of children	Pearson correlation (r)	0.364
	P value	0.048
	N	30
Correlation between DIMS and number of children		
Number of children	Pearson correlation (r)	0.464
	P value	0.010
	N	19

(Table 8) COMPARISON BETWEEN SLEEP DISTURBANCE AND SOCIODEMOGRAPHIC VARIABLES IN CASES

Variable	T value	P value
Parental SES	-0.276	0.785
Upper lower		
Middle		
Child age	-1.166	0.253
5-8years		
9-12years		
Gender of the child	0.584	0.564
Male		
Female		
IQ Score	-1.089	0.286
Mild		
Moderate and severe		
Attending special school	0.645	0.524
No		
Yes		
Duration of sleep disturbance	0.214	0.834
1-4years		
5-8years		

(Table 9) ASSOCIATION BETWEEN SLEEP DISTURBANCE AND SOCIODEMOGRAPHIC VARIABLES IN CASES

variables	Sleep disturbance		Chi square value	P value	Cramer's v
	absent	present			
Parental age			0.335	0.687	0.106
<35years	14	7			
>35years	5	4			
Years of formal education			4.983	0.042	0.408
1-10years	16	5			
11-20years	3	6			
Co sleeping			1.292	0.537	0.208
With caregiver	18	9			
Without caregiver	1	2			
Care giver SES			1.531	0.266	0.266

Upper lower Middle	13 6	5 6			
Child age			0.096	1.00	0.056
5-8years 9-12years	8 11	4 7			
gender of child			0.072	1	0.049
Male Female	13 6	7 4			
IQ score			1.975	0.225	0.257
Mild Moderate and severe	15 4	6 5			
Attending special school			0.032	1.00	0.033
No yes	11 8	6 5			

Table 10- PATHOLOGICAL SLEEP DISTURBANCES AMONG CASES AND CONTROLS

	Pathological in cases	Pathological in controls
DIMS	8(26.7%)	1(3.3%)
SBD	1(3.3%)	2(6.7%)
DA	1(3.3%)	1(3.3%)
SWTD	2(6.7%)	1(3.3%)
DOES	2(6.7%)	1(3.3%)
SHY	2(6.7%)	0
TOTAL SLEEP DISTURBANCE	1(3.3%)	0

(Table 11) ASSOCIATION OF PATHOLOGICAL DIMS IN CASES & CONTROLS

	controls	Cases	Chi square	P value	Cramer's v
DIMS			7.723	0.021	0.359
normal	5	11			
pathological	11	18			

Discussion

The present study demonstrates that sleep disturbances are significantly more prevalent in children with intellectual disability compared to typically developing children. This finding is consistent with a substantial body of literature reporting increased rates of sleep problems in children with neurodevelopmental disorders.^{1, 4, 12} The prevalence of sleep disturbances observed in the present study (36.7%) falls within the lower range of previously reported estimates, which vary widely from 34% to 86%. This variation may be attributed to differences in study design, diagnostic criteria, assessment tools, and population characteristics. One of the key findings of the study is the predominance of disorders of initiating and maintaining sleep (DIMS) among children with intellectual disability. This aligns with earlier studies that have consistently identified insomnia-related difficulties as the most common sleep disturbances in this population.^{5, 13} Difficulties in sleep initiation and maintenance may reflect underlying neurobiological dysfunction, including abnormalities in circadian rhythm regulation and melatonin secretion. Neurobiological mechanisms play a crucial role in sleep regulation, and disruptions in these systems may contribute significantly to sleep disturbances in children with intellectual disability. Studies have suggested that altered melatonin production and dysregulation of the suprachiasmatic nucleus may impair the normal sleep-wake cycle. Additionally,

delayed brain maturation and structural abnormalities in neural circuits involved in sleep regulation may further exacerbate sleep problems.

Behavioural and environmental factors also contribute to sleep disturbances in this population. Children with intellectual disability often exhibit irregular sleep routines, dependence on caregivers for sleep initiation, and poor sleep hygiene practices. These factors can reinforce maladaptive sleep behaviours and contribute to chronic sleep disturbances. Furthermore, communication difficulties may prevent children from expressing discomfort or sleep-related concerns, leading to under-recognition of symptoms.

The study also found a significant negative correlation between IQ and sleep disturbances, indicating that greater severity of intellectual disability is associated with more severe sleep problems. This finding is consistent with previous research demonstrating that children with more severe neurodevelopmental impairment are more likely to experience significant sleep disturbances.^{6,15} The association between severity of intellectual disability and sleep disturbance may be explained by greater neurological dysfunction, impaired self-regulation, and increased dependence on caregivers. Interestingly, although behavioural problems were highly prevalent in children with intellectual disability, no significant association was found between sleep disturbances and behavioural problems in the present study. This finding contrasts with several previous studies that have reported strong associations between sleep disturbances and behavioural dysregulation, including aggression, hyperactivity, and stereotyped behaviours.^{6,14,16}

Several factors may account for this discrepancy. First, the predominance of mild intellectual disability in the study sample may have influenced the findings. Behavioural disturbances are often more severe in children with moderate to severe intellectual disability, and their association with sleep disturbances may be more pronounced in such populations.

Second, the relatively small sample size may have limited the statistical power to detect significant associations. Behavioural problems in children with intellectual disability are multifactorial and may be influenced by a range of biological, psychological, and environmental factors. Therefore, sleep disturbances may represent only one of several contributing factors.

Third, the tools used for assessment may capture different dimensions of behaviour and sleep, which may not directly correlate in all cases. It is also possible that behavioural problems may mediate rather than directly correlate with sleep disturbances, suggesting a more complex relationship.

Another important finding of the study is the absence of significant association between sleep disturbances and sociodemographic variables such as caregiver age, socioeconomic status, and schooling. This suggests that intrinsic neurodevelopmental factors may play a more dominant role than environmental factors in determining sleep disturbances in children with intellectual disability.^{4,17}

From a clinical perspective, the findings of this study highlight the importance of routine screening for sleep disturbances in children with intellectual disability. Given the high prevalence and significant impact on functioning, early identification and intervention are essential. Clinicians should actively inquire about sleep patterns during routine assessments and provide guidance on sleep hygiene and behavioural interventions.

Interventions for sleep disturbances in children with intellectual disability may include behavioural strategies such as establishing consistent bedtime routines, improving sleep hygiene, and reducing environmental disruptions. In selected cases, pharmacological interventions such as melatonin may be considered, particularly when circadian rhythm disturbances are suspected.

The findings also underscore the need for a multidisciplinary approach in managing children with intellectual disability, involving psychiatrists, pediatricians, psychologists, and caregivers. Addressing sleep disturbances may lead to improvements in overall functioning and quality of life.

Strengths of the Study

- Use of validated assessment tools (SDSC, BPI-S)
- Inclusion of a control group for comparison
- Assessment of both sleep and behavioural domains

- Evaluation of correlation with severity (IQ)

Limitations

- Small sample size, limiting generalizability
- Predominance of mild intellectual disability
- Cross-sectional design (cannot infer causality)
- Reliance on caregiver-reported measures

Clinical Implications

- Routine screening for sleep disturbances should be incorporated into clinical practice
- Early intervention may improve behavioural and cognitive outcomes
- Caregiver education is essential in management
- Sleep assessment should be part of comprehensive evaluation in ID

Future Directions

- Larger multicentric studies
- Longitudinal designs to assess causality
- Use of objective measures such as polysomnography
- Exploration of intervention strategies

Conclusion

Sleep disturbances are significantly more prevalent in children with intellectual disability compared to typically developing children. Disorders of initiating and maintaining sleep are the most common type. The severity of intellectual disability is associated with greater sleep disturbances. Although behavioural problems are highly prevalent, their association with sleep disturbances was not statistically significant in this study. Routine screening and early intervention are essential to improve outcomes in this population.

REFERENCES

1. Wiggs L, Stores G. Sleep problems in children with severe intellectual disabilities. *J Intellect Disabil Res.* 1996;40(6):491–499.
2. Owens JA. Sleep disorders and attention-deficit/hyperactivity disorder. *Curr Psychiatry Rep.* 2008;10(5):439–444.
3. World Health Organization. The ICD-10 classification of mental and behavioural disorders. Geneva: WHO; 1992.
4. Quine L. Sleep problems in children with mental handicap. *J Ment Defic Res.* 1991;35(3):269–290.
5. Bruni O, Ottaviano S, Guidetti V, Romoli M, Innocenzi M, Cortesi F, et al. The Sleep Disturbance Scale for Children (SDSC): Construction and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. *J Sleep Res.* 1996;5(4):251–261.
6. Didden R, Korzilius H, van Aperlo B, van Overloop C, de Vries M. Sleep problems and daytime problem behaviours in children with intellectual disability. *J Intellect Disabil Res.* 2002;46(7):537–547.
7. Rojahn J, Matson JL, Lott D, Esbensen AJ, Smalls Y. The Behavior Problems Inventory: An instrument for the assessment of self-injury, stereotyped behaviour, and aggression/destruction in individuals with developmental disabilities. *J Autism Dev Disord.* 2001;31(6):577–588.
8. Owens JA, Mindell JA. Pediatric insomnia. *Pediatr Clin North Am.* 2011;58(3):555–569.
9. Krakowiak P, Goodlin-Jones B, Hertz-Picciotto I, Croen LA, Hansen RL. Sleep problems in children with autism spectrum disorders, developmental delays, and typical development: A population-based study. *J Sleep Res.* 2008;17(2):197–206.

10. Stores G. Clinical diagnosis and misdiagnosis of sleep disorders. *J Neurol Neurosurg Psychiatry*. 2007;78(12):1293–1297.
11. Richdale AL, Schreck KA. Sleep problems in autism spectrum disorders: Prevalence, nature, and possible biopsychosocial aetiologies. *J Dev Behav Pediatr*. 2009;30(5):382–390.
12. Owens JA. Classification and epidemiology of childhood sleep disorders. *Prim Care*. 2008;35(3):533–546.
13. Mindell JA, Owens JA. A clinical guide to pediatric sleep: Diagnosis and management of sleep problems. 2nd ed. Philadelphia: Lippincott Williams & Wilkins; 2010.
14. Goldman SE, Richdale AL, Clemons T, Malow BA. Parental sleep concerns in autism spectrum disorders: Variations from childhood to adolescence. *J Dev Behav Pediatr*. 2012;33(2):179–187.
15. Stores G, Wiggs L. Sleep disturbance in children and adolescents with disorders of development: Its significance and management. Cambridge: Cambridge University Press; 2001.
16. Mayes SD, Calhoun SL. Variables related to sleep problems in children with autism. *Res Autism Spectr Disord*. 2009;3(4):931–941.
17. Matsuoka S, Nakai Y, Yoshida S, et al. Sleep problems and associated factors in children with developmental disorders. *Sleep Med*. 2014;15(6):634–639.
18. Mindell JA. Pediatric sleep disorders. *Sleep Med Rev*. 2011;15(2):123–131.
19. Owens JA, Spirito A, McGuinn M. The Children's Sleep Habits Questionnaire (CSHQ): Psychometric properties of a survey instrument for school-aged children. *Sleep*. 2000;23(8):1043–1051.
20. Sadeh A. A brief screening questionnaire for infant sleep problems: Validation and findings for an Internet sample. *Pediatrics*. 2004;113(6):e570–e577.