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Sleep Disorders and Quality of Life in Children with Cerebral Palsy

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ABSTRACT

Sleep disorders are common in children with Cerebral Palsy (CP) and can adversely affect their health and quality of life. **Objective:** To investigate the factors associated with sleep disorders in children diagnosed CP with age ranged from 5 to 10 years. **Methods:** A cross-sectional study was conducted for six months from March 2024 to August 2024, with 150 children aged 5 to 10 years diagnosed with CP at Department of Pediatrics, Khairpur medical college Khairpur Mir's. Data on demographics, type of CP, motor function levels (GMFCS), epilepsy presence, physiotherapy intensity, co-sleeping practices, and sleep disorder prevalence were collected. Odds Ratios (OR) and Adjusted Odds Ratios (Adjusted OR) were calculated using chi-square tests and multivariate analysis. **Results:** Participants were predominantly aged 8 to 10 years (53.3%), with spastic CP being the most common type (56.7%). Significant associations were found between sleep disorders and several factors: type of CP (OR = 2.57, P = 0.004), GMFCS levels III and IV (OR = 2.94, P = 0.001), epilepsy (OR = 2.67, P = 0.01), and low physiotherapy intensity (OR = 3.11, P < 0.001). Multivariate analysis confirmed that the type of CP (Adjusted OR = 2.45, P = 0.007) and motor impairment severity (Adjusted OR = 3.10, P = 0.001) were significant risk factors for sleep disorders. **Conclusion:** The study highlighted a high prevalence of sleep disorders among children with CP, emphasizing the need for targeted interventions addressing specific risk factors to improve sleep quality and overall well-being.

INTRODUCTION

Worldwide, Cerebral Palsy (CP) affects about 1 in 300 live births and is a set of permanent mobility disorders that first manifest in early childhood and are characterized by the impairment of muscle coordination and control. One of the many secondary health issues that children with cerebral palsy frequently face is sleeping difficulties. Sleep disorders are prevalent in this demographic and have a substantial influence on the general well-being, development, and quality of life of afflicted children as well as their families [1]. Sleep difficulties affect a significant number of children with Cerebral Palsy (CP); estimates range from 30% to 80% of this population developing sleep problems. These conditions can show up as resistance to going to bed, delayed initiation of sleep, frequent night awakenings, and trouble staying asleep. These disruptions have serious ramifications; they can cause behavioural issues, daily drowsiness, and difficulties with cognitive and emotional development [2]. A non-progressive, chronic movement impairment that manifests before the age of two years old and is brought on by brain damage is known as cerebral palsy. Brain palsy can impact musculoskeletal function, sight, language, learning, perception, and so on [3, 4]. There are several different causes that might lead to sleep disturbances in children with cerebral palsy. A higher frequency of sleep problems has been linked to specific varieties of cerebral palsy (CP), including the spastic and

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dyskinetic variants. This association is probably caused by underlying neurological abnormalities that impact the brain regions in charge of regulating sleep [5]. Furthermore, there is evidence linking sleep disorders to the severity of motor impairments as categorized by the Gross Motor Function Classification System (GMFCS). Children with higher GMFCS scores, which are associated with more mobility limitations, frequently experience more severe challenges when it comes to getting a good night's sleep [6, 7]. Additional variables that can worsen sleep difficulties include the existence of epilepsy, which affects of children with cerebral palsy. Difficulties sleeping may also be caused by the drugs used to treat epilepsy [8, 9]. Additionally, children's sleep habits may be impacted by the type and intensity of their physical therapy. Lower intensity therapy has been associated with less favorable sleep effects, for example. While it is believed that sleeping together fosters a sense of security and closeness among family members, the benefits of this practice for children with impairments in terms of better sleep quality have been disputed. According to certain research, co-sleeping may not be able to significantly reduce sleep disruptions; therefore, tailored approaches to sleep management should be examined more closely [10]. By assisting healthcare professionals and caregivers in putting into practice practical methods to enhance sleep quality, the study's findings are meant to add to the expanding corpus of research on sleep in children with cerebral palsy. In the end, children with cerebral palsy may benefit from increased sleep in terms of their quality of life, functionality, and health.

This study was investigating the factors associated with sleep disorders in children diagnosed CP with age ranged from 5 to 10 years.

METHODS

This was a cross-sectional study, conducted for six months from March 2024 to August 2024 at Department of Pediatrics, Khairpur Medical College, Khairpur Mir's. Utilizing the Children's Sleep Habit Questionnaire (CSHQ), a primary data was gathered from patients at the Children's Health Department Outpatient Clinic. Stratified sampling was employed to select participants meeting specific inclusion criteria related to ensuring relevant data for genetic analysis. Children with cerebral palsy aged 5–10 years and having a primary caregiver capable of providing information about their daily activities and sleep patterns were included, while those with chronic diseases such as cardiovascular diseases, diabetes, chronic obstructive pulmonary disease, or malignancy were excluded; parents completed the 33-item Children's Sleep Habits Questionnaire (CSHQ) to assess eight types of sleep problems. A three-point rating system was used for each question; 1 represented infrequently, 2 represented occasionally, and 3 represented always. A sleep problem was indicated by a total score of 41 or higher. Using the scores, it was determined that the percentage of sleep problems. Participants were assessed using tools like the Gross Motor Function Classification System (GMFCS) for CP severity, the Sleep Disturbance Scale for Children for sleep disorders, and the Pediatric Quality of Life Inventory (PedsQL) and CP-QoL for quality of life (QoL). Parent proxy reports were included for children unable to self-report. A reasonable sample size calculation that is frequently used for research involving proportions (like prevalence studies) is as follows, based on the technique outlined in your study where you are evaluating sleep disturbances in children with Cerebral Palsy (CP): $n=Z2 \cdot p \cdot (1-p)/ E2$, Confidence Level: 95% ($Z=1.96$), Estimated proportion of the population ($p=0.5$ can be used for maximum variability), Margin of Error: $E=0.1$, then total number were obtained of participants was 150. A demographic information was gathered, details about physiotherapy intensity, co-sleeping, and sleep habits from parents. Secondary data included the type of CP, severity of motor dysfunction (assessed by the Gross Motor Functional Classification System or GMFCS), presence of epilepsy, and medications that could affect sleep. The independent variables were the type of CP, GMFCS, and physiotherapy intensity. Data analysis was performed using SPSS 21 software, including descriptive, bivariate (Chi-square), and multivariate (logistic regression) analyses. The study was approved by the Institutional Review Board (IRB) under the reference number (KMC/RERC/106). Informed consent was obtained from all study participants prior to enrollment in the study.

RESULTS

The demographic characteristics of the participants are summarized in Table 1. Of the children, 46.7% were between the ages of 5 and 7, and the majority (53.3%) were between the ages of 8 and 10. There were marginally more females (53.3%) than males (46.7%) in terms of gender distribution. With regard to the various types of Cerebral Palsy (CP), dyskinetic CP (20.0%), ataxic CP (13.3%), and other forms (10.0%) were the most prevalent, accounting for 56.7% of the participants. Using the Gross Motor Function Classification System (GMFCS), the gross motor functional level was determined for each participant. Level I accounted for 26.7% of the participants, level II for 33.3%, and smaller percentages were at levels III (20.0%), IV (13.3%), and V (6.7%). 18% children did not have epilepsy, but twenty percent of them had it. While 53.3% of the families did not co-sleep, 46.7% of the households reported doing so. 40.0% of children underwent low-intensity physiotherapy, 33.3% underwent moderate-intensity therapy, and 26.7% participated in high-intensity physiotherapy programs (Table 1).

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Table 1: Demographic Characteristics of Study Participants

Variables	Category	N (%)
Age (Years)	5-7	70 (46.7%)
	8-10	80 (53.3%)
Gender	Male	70 (46.7%)
	Female	80 (53.3%)
Type of Cerebral Palsy	Spastic CP	85 (56.7%)
	Dyskinetic CP	30 (20.0%)
	Ataxic CP	20 (13.3%)
	Other	15 (10.0%)
Gross Motor Functional Level	GMFCS I	40 (26.7%)
	GMFCS II	50 (33.3%)
	GMFCS III	30 (20.0%)
	GMFCS IV	20 (13.3%)
	GMFCS V	10 (6.7%)
Presence of Epilepsy	Yes	30 (20.0%)
	No	120 (80.0%)
Co-Sleeping	Yes	70 (46.7%)
	No	80 (53.3%)
Physiotherapy Intensity	Low	60 (40.0%)
	Moderate	50 (33.3%)
	High	40 (26.7%)

Footnote Statistical: Calculate Frequencies and Percentages, **Chi-Square Test:** Used for Categorical Variables

Figure 1 represents the distribution of different sleep problems in 150 kids with cerebral palsy. Night waking (affecting 26.7% of the children) was the most common problem, followed by reluctance to bedtime (20%) and delayed sleep onset (16.7%). Ten percent of the individuals reported having sleep anxiety, while 13.3% reported having problems with duration of their sleep. Daytime drowsiness and sleep-disordered breathing were both recorded in 3.3% of patients, while parasomnias (6.7%) were less common problems. The results of this study underscore the fact that children with cerebral palsy experience nighttime awakenings and trouble falling asleep, which makes focused interventions necessary to address these particular sleep disruptions in this population (Figure 1).

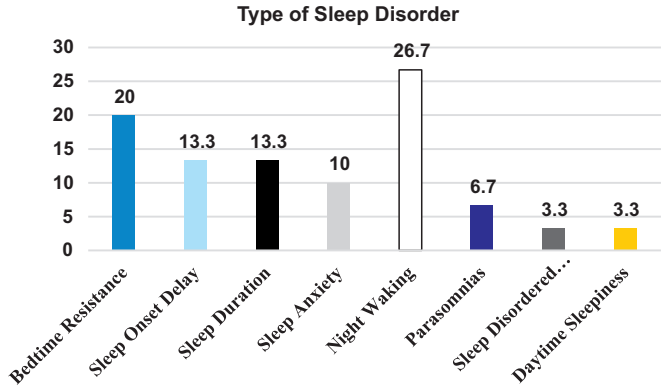

Figure 1: Different Types of Sleep Disorders among Study Participants

Table 2 presented the causes of sleep disturbances in children with cerebral palsy (N=150). A strong correlation was found between the kind of cerebral palsy and sleep disorders; children with specific types had odds of sleep disruptions 2.57 times higher (OR = 2.57, 95% CI: 1.35–4.87, P = 0.004). A child's motor function level also affected their sleep; according to the GMFCS, children at levels III and IV had nearly three times the odds of experiencing sleep disturbances than children at levels I and II (OR = 2.94, 95% CI: 1.56–5.52, P = 0.001). The existence of epilepsy was another significant risk (OR = 2.67, 95% CI: 1.22–5.83, P = 0.01), with children with epilepsy 2.67 times more likely to have sleep difficulties. The intensity of physical therapy was found to have a significant impact as well; children experiencing low-intensity therapy had 3.11 times higher odds of sleep disturbances than those receiving high-intensity therapy (OR = 3.11, 95% CI: 1.67–5.80, P < 0.001). The incidence of sleep abnormalities was shown to be 2.14 times higher in those who used anti-epileptic drugs (OR = 2.14, 95% CI: 1.12–4.08, P = 0.02). Co-sleeping, on the other hand, did not significantly correlate with sleep problems (OR = 1.33, 95% CI: 0.66–2.68, P = 0.30)(Table 2).

Table 2: Factors Associated with Sleep Disorders in Children with Cerebral Palsy (N=150)

Variables	Sleep Disorder: Yes	Sleep Disorder: No	OR (95% CI)	p-Value
Type of CP	75	40	2.57 (1.35 – 4.87)	0.004
GMFCS Levels				
III and IV	60	25	2.94 (1.56 – 5.52)	0.001
I and II	40	35	-	-
Presence of Epilepsy	40	50	2.67 (1.22 – 5.83)	0.01
Physiotherapy Intensity				
Low	70	30	3.11 (1.67 – 5.80)	<0.001
High	30	25	-	-
Anti-epileptic Use	55	35	2.14 (1.12 – 4.08)	0.02
Co-sleeping	25	45	1.33 (0.66 – 2.68)	0.30

Chi-square tests were used for categorical comparisons; p<0.005 indicate significant value

Table 3 presented the results of the multivariate analysis determining the variables linked to children with cerebral palsy's sleep issues. Even after controlling for other factors, children with certain forms of cerebral palsy had 2.45 times greater odds of having sleep disruptions (Adjusted OR = 2.45, 95% CI: 1.28–4.70, P = 0.007). This association between cerebral palsy and sleep disorders persisted. Compared to children at lower levels, those with more severe motor impairments—that is, those at GMFCS levels III and IV—had over three times the likelihood of having sleep disorders (Adjusted OR = 3.10, 95% CI: 1.55–6.22, P = 0.001). Another significant risk factor was epilepsy, which increased the likelihood of sleep problems by 2.89 times (Adjusted OR = 2.89, 95% CI: 1.24–6.72, P = 0.014). There was a significant correlation between low physiotherapy intensity and sleep disruptions. Children who had low-intensity therapy had an odds of 3.45 times higher sleep problems than those who received high-intensity

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therapy (Adjusted OR = 3.45, 95% CI: 1.65–7.22, P < 0.001). There was a moderate correlation between the use of anti-epileptic drugs and sleep disturbances (Adjusted OR = 2.01, 95% CI: 1.03–3.90, P = 0.04). By contrast, an adjusted OR of 1.25 (95% CI: 0.60–2.62, P = 0.55) showed that co-sleeping was not significantly linked with sleep problems. This implies that co-sleeping did not significantly affect the population's sleep issues (Table 3).

Table 3: Multivariate Analysis of Factors Associated with Sleep Disorders in Children with Cerebral Palsy

Variables	Adjusted OR (95% CI)	p-Value
Type of CP	2.45 (1.28 - 4.70)	0.007
GMFCS Level (III and IV)	3.10 (1.55 - 6.22)	0.001
Presence of Epilepsy	2.89 (1.24 - 6.72)	0.014
Physiotherapy Intensity (Low)	3.45 (1.65 - 7.22)	<0.001
Anti-epileptic Use	2.01 (1.03 - 3.90)	0.04
Co-sleeping	1.25 (0.60 - 2.62)	0.55

Multivariate Logistic Regression Analysis Was Used to Determine Independent Predictors Of Sleep Disorders

DISCUSSION

This study highlights the prevalence and predictors of sleep disorders in children with Cerebral Palsy (CP), providing key insights into demographic, clinical, and therapeutic factors influencing sleep quality. Below is a detailed discussion of the findings, aligned with existing literature. The majority of the kids in these samples (53.3%) were between the ages of 8 and 10 years old, and there were slightly more girls (53.3%) than boys (46.7%). This distribution is consistent with other research showing that there is no persistent gender difference in CP populations, while certain cohorts have shown a slight female predominance [11]. As it turned out, 56.7% of the individuals had spastic CP, which is the most common subtype of CP. Previous research has shown that spastic CP accounts for 60–70% of cases of CP. A strong foundation was correlated between sleep problems and spastic CP (adjusted OR = 2.45, 95% CI: 1.28–4.70, P = 0.007). This study confirms previous studies' findings that children with spastic CP frequently have pain, rigid muscles, and restricted movement, all of which can lead to poor sleep quality [12]. A significant predictor of sleep disturbances was motor function, as measured by the Gross Motor Function Classification System (GMFCS). Over three times as many children at GMFCS levels III and IV experienced sleep disturbances (adjusted OR = 3.10, 95% CI: 1.55–6.22, P = 0.001). It has been shown by earlier research that kids with higher GMFCS scores typically sleep worse, probably as a result of physical restrictions, increased reliance, and a heavier caregiver load [13]. This highlights the necessity of specialized sleep therapies for kids with severe motor deficits. A significant risk factor for sleep disorders, epilepsy was found in 20% of sample of this study (adjusted OR = 2.89, 95% CI: 1.24–6.72, P = 0.014). Similar results have been documented in the literature, where it is frequently seen, that epilepsy is linked to frequent awakenings, disturbed sleep architecture, and daytime sleepiness [14, 15]. Adjusted OR = 2.01, 95% CI: 1.03–3.90, P = 0.04), the use of anti-epileptic medications was also somewhat linked to sleep disruptions. This is in line with earlier studies that have demonstrated that various anti-epileptic medications might increase sleep difficulties or induce sedation [16, 17]. These results imply that physiotherapy intensity significantly affects the quality of sleep. When comparing children undergoing high-intensity programs to those getting low-intensity therapy, the risks of sleep disturbances were 3.45 times greater (adjusted OR = 3.45, 95% CI: 1.65–7.22, P < 0.001). These findings are consistent with research showing that exercise enhances sleep quality by lowering anxiety, exhaustion, and muscular tone [18]. Additionally, high-intensity physical treatment may improve motor function and hence improve sleep indirectly. It's interesting to note that this study's adjusted OR = 1.25, 95% CI: 0.60–2.62, P = 0.55) showed no evidence of a significant effect of co-sleeping on sleep problems. Co-sleeping has shown conflicting findings in the past; while some studies have suggested that it can ease discomfort and lessen anxiety, others have shown that it may impair parents' and kids' sleep quality [19]. The samples of this study lacked of statistically significant correlation raises the possibility that co-sleeping is not the main factor influencing sleep problems in kids with cerebral palsy [20]. In this group, bedtime resistance (20%), sleep start delay (16.7%), and nocturnal waking (26.7%) were the most prevalent sleep disorders. These results are consistent with earlier studies that highlight how children with CP frequently experience physiological pain, seizures, or adverse drug reactions, which can cause them to wake up during the night or have trouble going asleep [21].

CONCLUSIONS

This research identified a number of important variables, such as the kind of CP, motor function, epilepsy, and the severity of physiotherapy, that are linked to sleep disturbances in children with CP. The significance of timely detection and customized measures in the handling of sleep disturbances in this demographic is highlighted by these results.

Authors Contribution

Conceptualization: UB
Methodology: MAB, TH, BAB
Formal analysis: MAB, FKA
Writing, review and editing: KA, FKA

All authors have read and agreed to the published version of the manuscript

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Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Gulati S and Sondhi V. Cerebral palsy: an overview. The Indian Journal of Pediatrics. 2018 Nov; 85: 1006-16. doi: 10.1007/s12098-017-2475-1.

[2] Vova JA. Cerebral palsy: an overview of etiology, types and comorbidities. Open Biology and Medicine Neurobiology. 2022 Apr; 6(2): 1-25. doi: 10.21926/obm.neurobiol.2202120.

[3] Ríos CA, Basantes GP, Barros DH. Literature review: Infantile cerebral palsy, causes, symptoms, diagnosis and treatment. Centro Sur. 2023 Feb; 7(1). doi: 10.37955/cs.v7i1.300.

[4] Blair E and Watson L. Epidemiology of cerebral palsy. InSeminars in Fetal and Neonatal Medicine. 2006 Apr; 11(2): 117-125. doi: 10.1016/j.siny.2005.10.010.

[5] van Gorp M, Dallmeijer AJ, van Wely L, de Groot V, Terwee CB, Flens G *et al.* Pain, fatigue, depressive symptoms and sleep disturbance in young adults with cerebral palsy. Disability and rehabilitation. 2021 Jul; 43(15): 2164-71. doi: 10.1080/09638288.2019.1694998.

[6] Lang CP, Boucaut A, Guppy M, Johnston LM. Children with cerebral palsy: A cross-sectional study of their sleep and their caregiver's sleep quality, psychological health and well-being. Child: Care, Health and Development. 2021 Nov; 47(6): 859-68. doi: 10.1111/cch.12897.

[7] Bhanudeep S, Madaan P, Sankhyan N, Saini L, Malhi P, Suthar R, Saini AG, Ahuja CK, Vyas S, Singh P, Kaur A. Long-term epilepsy control, motor function, cognition, sleep and quality of life in children with West syndrome. Epilepsy Research. 2021 Jul; 173: 106629. doi: 10.1016/j.eplepsyres.2021.106629.

[8] Planas-Ballvé A, Grau-López L, Jiménez M, Ciurans J, Fumanal A, Becerra JL. Insomnia and poor sleep quality are associated with poor seizure control in patients with epilepsy. Neurología (English Edition). 2022 Oct 1;37(8):639-46. doi: 10.1016/j.nrl.2019.07.006.

[9] Barry ES. Sleep consolidation, sleep problems, and co-sleeping: rethinking normal infant sleep as species-typical. The Journal of Genetic Psychology. 2021 Jul; 182(4): 183-204. doi: 10.1080/00221325.2021.1905599.

[10] Reddihough D, Leonard H, Jacoby P, Kim R, Epstein A, Murphy N *et al.* Comorbidities and quality of life in children with intellectual disability. Child: care, health and development. 2021 Sep; 47(5): 654-66. doi: 10.1111/cch.12873.

[11] Exploring the Relationship between Maternal Anxiety, Sleep Disturbances, and Family Quality of Life in Children with Cerebral Palsy. 2024; 48(2): 129-134. doi: 10.5152/cjm.2024.23123.

[12] Obrecht A, de Almeida MF, Maltauro L, da Silva WD, Zonta MB, de Souza Crippa AC. The relationship between gross motor function impairment in cerebral palsy and sleeping issues of children and caregivers. Sleep Medicine. 2021 May; 81: 261-7. doi: 10.1016/j.sleep.2021.02.055.

[13] Chia AZ, Tan YH, Yeo TH, Teoh OH, Ng ZM. Epidemiology and risk factors for sleep disturbances in children and youth with cerebral palsy: An ICF-based approach. Sleep Medicine. 2022 Aug; 96: 93-8. doi: 10.1016/j.sleep.2022.04.021.

[14] Löwing K, Gyllensvärd M, Tedroff K. Exploring sleep problems in young children with cerebral palsy-A population-based study. European Journal of Paediatric Neurology. 2020 Sep; 28: 186-92. doi: 10.1016/j.ejpn.2020.06.006.

[15] End C, Propst EJ, Cushing SL, McKinnon NK, Narang I, Amin R *et al.* Risks and benefits of adenotonsillectomy in children with cerebral palsy with obstructive sleep apnea: a systematic review. The Laryngoscope. 2022 Mar; 132(3): 687-94. doi: 10.1002/lary.29625S.

[16] anguino H, Brunton L, Condliffe EG, Kopala-Sibley DC, Noel ME, Mish SJ *et al.* Sleep Characteristics of Children and Youth with Cerebral Palsy. Journal of Child Neurology. 2024 Oct: 08830738241285074. doi: 10.1177/08830738241285074.

[17] Williams K, Jacoby P, Whitehouse A, Kim R, Epstein A, Murphy N *et al.* Functioning, participation, and quality of life in children with intellectual disability: an observational study. Developmental Medicine & Child Neurology. 2021 Jan; 63(1): 89-96. doi: 10.1111/dmcn.14657.

[18] Lansdown K, Irving M, Mathieu Coulton K, Smithers-Sheedy H. A scoping review of oral health outcomes for people with cerebral palsy. Special Care in Dentistry. 2022 May; 42(3): 232-43. doi: 10.111/scd.12671.

[19] Günal A, Pekçetin S, Wagman P, Håkansson C, Kayıhan H. Occupational balance and quality of life in mothers of children with cerebral palsy. British Journal of Occupational Therapy. 2022 Jan; 85(1): 37-43. doi: 10.1177/0308022621995112.

[20] Moraleda-Cibrián M, Edwards SP, Kasten SJ, Warschausky SA, Buchman SR, Monasterio-Ponsa C *et al.* Impact of sleep-disordered breathing on

DOI: https://doi.org/10.54393/pjhs.v6i1.2582

behavior and quality of life in children aged 2 to 7 years with non-syndromic cleft lip and/or palate. Pediatric Pulmonology. 2021 Oct; 56(10): 3358-65. doi: 10.1002/ppul.25611.

[21] Almeida MF, Mello S, Zonta MB, Crippa AC. Cerebral palsy and sleep: nonpharmacological treatment and impact on the life of caregivers-an integrative review. Arquivos de Neuro-psiquiatria. 2024 Apr; 82(3): s00441781464. doi: 10.1055/s-0044-1781464.