

Findings on Sleep of Children with Cerebral Palsy and Their Mothers' Sleep and Emotional Intelligence

Numan Bulut¹ , Bilge Nur Yardımcı-Lokmanoğlu¹ , İpek Alemdaroğlu-Gürbüz¹ , Selen Serel Arslan¹ , Öznur Yılmaz¹ 

¹Hacettepe University, Faculty of Physical Therapy and Rehabilitation, Ankara, Türkiye

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Corresponding Author

Numan Bulut, PT, PhD, Assist Prof.

Address: Hacettepe University, Faculty of Physical Therapy and Rehabilitation, 06100, Samanpazarı, Altındağ, Ankara, Türkiye

E-mail: nmn60_90@hotmail.com

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ABSTRACT

Objective: This study was aimed to explore (i) the sleep characteristics of children with cerebral palsy (CP), and the sleep and emotional intelligence results of their mothers, and (ii) the relationship between these parameters both with each other and with demographic characteristics of the children and their mothers.

Methods: Thirty-three children with CP and their mothers were included in this study. The functional level of children was evaluated with the Gross Motor Function Classification System (GMFCS), while sleep parameters with Child Sleep Habits Questionnaire-Abbreviated Form (CSHQ-AF). Sleep quality and emotional intelligence of mothers were evaluated by The Pittsburg Sleep Quality Index (PSQI) and Revised Schutte Emotional Intelligence Scale (RSEIS), successively.

Results: The highest percentage of children with CP participating in the study was at level 3 (GMFCS) with 24.24%. The mean sleep score of children with CP, according to CSHQ-AF, was 50.33 (SD: 9.38) points. Twenty-nine (87.9%) of children with CP had pediatric sleep problem while 17 (51.5%) of mothers had poor sleep quality. The total score of the mothers in the RSEIS was 149.54 (SD: 16.94). No relationship was found between sleep and emotional intelligence of mothers with sleep of children with CP ($p>0.05$).

Conclusion: The rate of sleep problems was found to be higher in children with CP compared to their mothers, as expected. The lack of relationship between sleep and emotional intelligence can be explained by the fact that both parameters can be affected by many factors.

Keywords: Cerebral Palsy, Mothers, Sleep, Emotional Intelligence

INTRODUCTION

Cerebral palsy (CP) is known as one of the most common causes of childhood disorders worldwide, although CP is seen in 2 to 3 per 1000 live births [1]. The definition of CP comprises persistent disorders of the development of movement, postural problems, activity restriction, and accompanied symptoms including secondary musculoskeletal problems and disturbances of sensation [2]. It has also been reported that sleep problems due to brain abnormalities, motor impairment, musculoskeletal

problems, pain, behavioral problems, or epilepsy are more common in children with CP than in typically developing children; however, it is not always clear what the underlying causes of sleep problems are [3-10].

Sleep refers to a period of neurological and physiologic activity [11]. Newman et al. revealed that 44% of the children with CP whose Gross Motor Function Classification System (GMFCS) level are between I and V had clinically significant

sleep disorder, such as difficulty in initiating and maintaining sleep, sleep-related breathing disorders [12]. Additionally, it was also reported that children with spastic quadriplegia, those with dyskinetic CP, and those with severe visual impairment had more often difficulty in initiating and maintaining sleep; however, GMFCS level was not associated with the total sleep quality [12].

As sleep quality can be affected by several factors in children with CP, children's sleep problems affect mothers' sleep quality [10, 13]. Wayte et al. reported that sleep quality scores of children with CP were related to sleep quality scores of mothers [10]. Similar to this study, Lang et al. also reported that sleep quality in children with CP were related to caregiver sleep quality which in turn was related to the psychological health and well-being of caregiver [13]. As a result, it has been reported that caregivers may feel more stress, thus their quality of life may decrease, and their mental well-being may also be affected [14].

Emotional intelligence is defined as the ability of the natural capacity to think, use, communicate, identify, remember, learn, control, and know emotions [14]. Miguez-Torres et al. showed that the sleep duration was related to the quality of emotional intelligence ability [15], in addition to the relationship with problems in decision making and inhibitory control [16-20], which are components of emotional intelligence. The components of emotional intelligence, including stress management, were found to be related to sleep which regulates by the circadian rhythm [21]. Previous study was emphasized the circadian rhythm was also related to emotional regulation [21]. Emotional intelligence in mothers of children with CP may also be related

to sleep which is affected by both their mood or stress and their children's sleep quality. However, when we look at the literature, no studies have been conducted on the sleep of children with CP and their mothers with mothers' emotional intelligence results together.

This study aimed to (i) describe sleep of children with CP and their mothers, and mothers' emotional intelligence, and (ii) explore the relationship between these parameters each other and with demographic characteristics of participants.

MATERIALS AND METHODS

Design and Participants

This retrospective study was conducted in Faculty of Physical Therapy and Rehabilitation, Hacettepe University between January 2019 – September 2023. Ethical approval of this study was obtained from Health Science Research Ethics Board (SBA 23/249). Data were collected in accordance with the Declaration of Helsinki.

Children aged between 4-10 years with CP were included. Excluded from the study were children with co-morbidities and those who had undergone surgery in the previous six months. The inclusion criterion for mothers was having a child with CP, while the exclusion criteria were (i) having another person with other care needs at home, (ii) having an orthopedic, neurological, or psychological disorder, and (iii) using any medications that affect sleep.

Assessments

Demographic information and data on the children included in the study were obtained from archive files.

The level of motor activity and function: GMFCS was used to assess the clinical level of children with CP. The GMFCS is a system that assesses a child's independence in performing basic motor activities such as walking, climbing stairs, or moving with assistive equipment. In this system consisting of 5 different levels; Level 1 means that the child can walk independently and has a mild limitation in high-level functions, while Level 5 means that the child cannot move independently and is carried in a wheelchair by a caregiver [22]. The Turkish version of the scale was found to have high reliability (ICC: 0.94) [23].

Sleep (for children): The sleep of the children were assessed using the Child Sleep Habits Questionnaire-Abbreviated Form

Main Points;

- Children with cerebral palsy have high risk for sleep problems although the causes of sleep problems are not always clear.
- Mothers of children with cerebral palsy have poor sleep quality, and this is not related to their emotional intelligence and sleep problems of children with cerebral palsy.
- The study highlights that sleep problems of both children with cerebral palsy and their mothers may depend on many internal and external factors such as pain, stress, or sleep environments.

(CSHQ-AF). This questionnaire is used in children aged 4 to 10 years. It consists of 33 items with eight sub-items including parameters such as bedtime resistance, night wakings, parasomnias, and daytime sleepiness. Items are scored on a scale of 1 (rarely) - 3 (usually), with a score of 1 (rarely) given for a behavior occurring 0-1 times per week, 2 (sometimes) for 2-4 times per week, and 3 (usually) for 5-7 times per week [24]. However, certain items are scored in the reversed way. A threshold above 41 points of total score is considered to be of clinical significance [24]. Higher scores indicate a pediatric sleep disorder. The Turkish version of the questionnaire is validated (Cronbach alpha: 0.78) and reliable (ICC: 0.81) [25].

Sleep (for mothers): The Pittsburg Sleep Quality Index (PSQI) was preferred to examine the sleep quality of mothers of children with CP. The PSQI assesses the average sleep quality over the last month. The questionnaire consists of 19 questions and the 7 components [26]. Each component is scored on a 4-point Likert scale between 0-3 points, and the total score ranges between 0-21 points. A total score above five points indicates poor sleep quality [26]. The Turkish version of the questionnaire was found to have high internal consistency [27].

Emotional intelligence (for mothers): Mothers' emotional intelligence was determined with the Revised Schutte Emotional Intelligence Scale (RSEIS). Although the original form has 33 items, the revised version used in this study consists of 41 items. This scale comprises three factors: a) Optimism/Mood Regulation, b) Utilization of Emotions, and c) Appraisal of Emotions. 21 of the items are scored as forward-keyed while others are reverse-keyed [28]. Each item is scored with five point likert scale between 1-5 points [28]. RSEIS was found to be a valid (Cronbach's alpha= 0.82) and reliable (r=0.49) instrument for measuring emotional intelligence in the Turkish population [29].

Statistical Analysis

IBM SPSS Statistics 26 (Statistical Package for the Social Sciences) analysis program was used for statistical analyses. Kolmogorov-Smirnov tests were performed to evaluate whether the variables were parametrically distributed. Numerical variables were expressed as mean±standard deviation (mean (SD)) for parametric conditions, and median (interquartile range (IQR)) for non-parametric conditions. Ordinal and nominal values were expressed as number (n) and percentage (%). Independent Sample(s) T Test and Chi-square Test was performed for the comparison of numeric and nominal values.

The relation between the variables were calculated using Pearson correlation coefficient under parametric conditions and Spearman correlation coefficient under non-parametric conditions. Correlation levels were accepted as weak (0.01-0.39); moderate (0.4-0.69); and strong (0.7-0.99) [30]. The value of statistical significance was set at p<0.05.

RESULTS

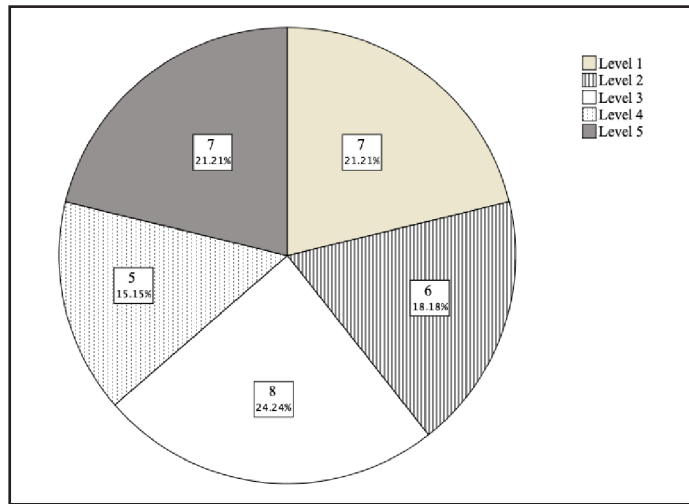
A total of 33 children with CP and their mothers participated in this study. Demographic characteristics of children and mothers are given in Table 1. Also, most of the mothers were housewives (n=29; 87.9%), and none of the mothers used alcohol.

The distribution of children with CP according to GMFCS is shown in Figure 1. There was no difference in sleep and emotional intelligence values between GMFCS levels (p>0.05).

Table 1. Clinical characteristics of children with Cerebral Palsy and their mothers (n=33).

	Children with Cerebral Palsy
Female - n (%)	13 (39.4)
Birth weight (kg) - median (IQR)	2.50 (1.30-3.16)
Gestational age (weeks) - median (IQR)	36.00 (32.50-39.00)
Age (years) - median (IQR)	8.00 (6.00-10.00)
Height (m) - median (IQR)	1.28 (1.10-1.35)
Weight (kg) - mean (SD)	25.73 (10.24)
Body mass index (kg/m²) - median (IQR)	15.50 (13.60-20.35)
Types of Cerebral Palsy	
Spastic - n (%)	27 (81.8)
Dyskinetic - n (%)	4 (12.1)
Ataxic - n (%)	2 (6.1)
Presence of visual impairment, n (%)	7 (21.2)
Presence of epilepsy, n (%)	0
	Mothers of Children
Age (years) - mean (SD)	36.24 (5.71)
Height (m) - mean (SD)	1.60 (5.39)
Weight (kg) - median (IQR)	68.00 (62.50-80.00)
Body mass index (kg/m²) - mean (SD)	27.34 (4.55)
The number of pregnancy - median (IQR)	2.00 (2.00-3.00)
Cigarette use (yes) - n (%)	5 (15.2)
Employment status (Employed) – n (%)	4 (12.1)

Figure 1. Distribution of the functional level of children according to the GMFCS



GMFCS: Gross Motor Functional Classification System

The sleep parameters of both children and their mothers, and emotional intelligence of mothers are shown in Table 2. However, it was found that 87.9% (n=29) of the children with CP had pediatric sleep problems and 51.5% (n=17) of the mothers had poor sleep quality. 9.1% (n=3) of the mothers had a poor sleep quality while the absence of sleep problems in their child. There was no difference between sleep and emotional intelligence values in the groups with and without visual problems (p>0.05).

It was determined that there was no relationship between sleep parameters and emotional intelligence (p>0.05). However, age of children was weakly related with PSQI (p=0.04, r=-0.35), and CSHQ-AF was moderately related with age of mothers (p=0.02, r=-0.40) and BMI of mothers (p=0.007, r=0.45) (Table 3).

Table 2. The results of sleep parameters and emotional intelligence children with Cerebral Palsy and their mothers (n=33).

	Children with Cerebral Palsy
CSHQ-AF - mean (SD)	50.33 (9.38)
	Mothers of Children
PSQI - median (IQR)	6.00 (4.00-8.50)
RSEIS	
Optimism/Mood Regulation - median (IQR)	80.00 (75.00-81.50)
Utilization of Emotions - mean (SD)	23.36 (4.45)
Appraisal of Emotions - mean (SD)	46.39 (9.60)
Total Score - mean (SD)	149.54 (16.94)

CSHQ-AF: Children Sleep Habit Questionnaire- Abbreviated Form, IQR: Inter-quartile range, PSQI: Pittsburg Sleep Quality Index, RSEIS: Revised Schutte Emotional Intelligence Scale, SD: Standart Deviation.

Table 3. Relationship between sleep parameters and emotional intelligence (n=33)

	Age (children)		BMI (children)		Age (Mothers)		BMI (mothers)		CSHQ-AF		PSQI		RSEIS	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p
Age (children)			0.08	0.6	0.40^b	0.02	-0.32	0.07	-0.15	0.4	-0.35^b	0.04	-0.07	0.7
BMI (children)	0.08	0.6			0.02	0.9	-0.19	0.3	-0.12	0.5	-0.08	0.6	-0.16	0.3
Age (Mothers)	0.40^b	0.02	0.02	0.9			-0.12	0.5	-0.40^a	0.02	-0.05	0.8	-0.02	0.9
BMI (mothers)	-0.32	0.07	-0.19	0.3	-0.12	0.5			0.45^a	0.007	-0.05	0.08	-0.35	0.05
CSHQ-AF	-0.15	0.4	-0.12	0.5	-0.40^a	0.02	0.45^a	0.007			-0.05	0.8	-0.33	0.06
PSQI	-0.35^b	0.04	-0.08	0.6	-0.05	0.8	-0.05	0.08	-0.05	0.8			0.03	0.9
RSEIS	-0.07	0.7	-0.16	0.3	-0.02	0.9	-0.35	0.05	-0.33	0.06	0.03	0.9		

BMI: Body mass index, CSHQ-AF: Children Sleep Habit Questionnaire- Abbreviated Form, PSQI: Pittsburg Sleep Quality Index, RSEIS: Revised Schutte Emotional Intelligence Scale. ^a Pearson Correlation Coefficient, ^b Spearman's Correlation Coefficient.

Bold values indicate statistically significant at the p < 0.05 level

DISCUSSION

The results of our study provide further support on the claims children with CP and their mothers experience a high frequency of sleep problems. However, there was no relationship between sleep quality of children with CP and mothers' sleep quality, which was unexpected and contrary to the literature [10, 13]. In addition to these unexpected findings, the mothers' sleep quality was not related to their emotional intelligence results.

The rate of sleep problems in children with CP was determined to be 72.2% by Hulst et al. [31], 55% by Lang et al. [13], 44% by Newman et al. [12], and 20.7% by Horwood et al. [32], although it is difficult to identify the underlying mechanism of sleep problems in children with CP and to completely explain the relationship between CP and sleep problems. In this study, it was determined that children had a high rate of sleep problems and sleep was not affected by GMFCS level in parallel with the study of Newman et al [12]. It was found that sleep problems in children with CP were related to the having visual impairment [12, 13]. However, the relationship between the sleep problems and having epilepsy was controversial [12, 13]. Contrary to the literature, our study did not find a relationship with having visual impairment, and none of them had epilepsy. No relationship between sleep and emotional intelligence may be due to the fact that the quality of sleep depends on many internal and external factors, such as pain, stress, or sleep environments [32-34].

A systematic review in 2018 by Micsinszki et al. [35] reported that parents of children with developmental problems, including children with CP, had poorer sleep quality than typically developing children. In studies that included only children with CP the rate of sleep disorders was reported as 40% by Wayte et al. [10], and 71% by Lang et al. [13], which are in line with rate of present study. Recently, Hulst et al. [36] reported that only 13.6% mothers of children with CP satisfied about their own sleep. In addition to the child's physical problems, parents of children with CP had many concerns about safety and well-being of their child during sleep [36]. According to family statements, they wake up 10-15 times a night to monitor their child [36]. The mothers who had any orthopedic, neurological, or psychological disorder were not included in present study, and 9.1% of the mothers had a poor sleep quality despite the absence of sleep problems in their child. Children's sleep can be an important criterion for parents' sleep, but it is not the only criterion.

The sleep quality was related to depression, anxiety, stress, pain,

and well-being [32-34]. However, our findings obtained in the relationship between the sleep quality and emotional intelligence show us that there was no relationship in mothers. In contrast to our study, previous studies tended to be the relationship between the sleep quality and emotional intelligence [15, 37, 38]. Miguez-Torres et al. [15] found that some subdomain of emotional intelligence was related to the sleep duration, and Bavafa et al. [38] revealed that there was relationship between emotional intelligence and sleep quality. Possible explanation for our findings may have been the emotional intelligence is a complex and complicated process, including self-awareness, managing emotions, motivating one-self, empathy, and handling relationships.

There are some limitations of the current study, including the sample size, which was result from the nature of the retrospective study. Another limitation was that we could not compare our findings with typically developing children. In addition, some characteristics information such as marital and educational status was missing and not included in the statistical analysis could have affected the results.

CONCLUSION

In conclusion, to our knowledge, the current study is the first study to examine the sleep quality in children with CP and their mothers with the emotional intelligence of the mothers. Most of the children with CP were having sleep problems in this study, while more than half of mothers had poor sleep quality. However, there were no relationship between each of them. Further studies are needed in which more detailed information can be collected prospectively and advanced analyzes can be performed.

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