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Özgün araştırma

Serebral Palsi'li Çocuğu olan Annelerin Uyku Kalitesi: Çocukların Kaba Motor Fonksiyonu ve Uyku Alışkanlıkları ile İlişkisi

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Öz

Amaç: Bu çalışmanın amacı, serebral palsi'li çocukların uyku alışkanlıkları ve kaba motor seviyeleri ile annelerin uyku kaliteleri arasındaki ilişkinin araştırılmasıdır.
Gereç ve Yöntemler: Yaşları 3 ila 18 arasında değişen fiziksel yetersizliklere sahip 83 farklı klinik tipte serebral palsi'li çocuk ve onların bakımından sorumlu annelerine değerlendirme yapıldı. Üç farklı şehirdeki rehabilitasyon merkezlerinde değerlendirilen çocukların motor seviyeleri Kaba Motor Fonksiyon Sınıflandırma Ölçeği (KMFS), uyku alışkanlıkları Çocuk Uyku Alışkanlıkları (ÇUA) anketi ve annelerin uyku kalitesi Pittsburgh Uyku Kalitesi İndeksi (PUKİ) ile değerlendirildi.
Bulgular: Çocukların %86'sında uyku sorunları, annelerin %84'ünde kötü uyku kalitesi tespit edildi. KMFS, ÇUA ile ilişkili bulunurken (p=0.002), annelerin uyku kalitesi ile ilişki bulunmadı (p=0.164). Annelerin PUKİ skoru ile çocukların ÇUA skoru arasında istatistiksel olarak anlamlı ve aynı yönlü pozitif bir korelasyon mevcuttu (r=0.259 ve p=0.018). PUKİ ile cocukların toplam uyku süresi ve gece uyanma skoru arasında istatistiksel olarak anlamlı korelasyon bulunmadı (r=-0.087, p=0.433; r=-0.058, p=0.600).
Sonuç: Annelerin uyku kalitesinin serebral palsi'li çocukların uyku alışkanlıklarından etkilendiği tespit edildi. Kötü uyku kalitesi, bakım veren anneler için uzun vadede fiziksel ve psikolojik yönden yıpratıcı olabilir. Annelerin uyku kalitesine yönelik destek hizmetlerinin daha da geliştirilmesi esastır.

Anahtar Kelimeler: *Serebral Palsi, Uyku, Kaba Motor Fonksiyon, Anneler*

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Original Research

Sleep Quality in Mothers of Children with Cerebral Palsy: The Relationship between Children's Gross Motor Function, Sleep Habits

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Abstract

Purpose: The aim of this study was to investigate the relationship between the sleep habits and gross motor skill level of children with cerebral palsy and the sleep quality of their mothers.
Materials and Methods: Evaluation was made of 83 children, aged 3-18 years, with different clinical types of cerebral palsy and varying physical capabilities, and their mothers who were the carers. In the rehabilitation centres of three different cities, the children were evaluated with the Gross Motor Function Classification Scale (GMFCS) and the Children's Sleep Habits Questionnaire (CSHQ), and the sleep quality of their mothers with the Pittsburgh Sleep Quality Index (PSQİ).
Results: The sleep problems of 86% of the children and 84% of the mothers were determined to be poor sleep quality. The GMFCS was found to be correlated with the CSHQ (p=0.002), but not with the sleep quality of the mothers (p=0.164). A statistically significant positive correlation was determined between the PSQI score of the mothers and the total CSHQ score of the children (r=0.259, p=0.018). No statistically significant correlation was determined between the PSQI and the total sleep and waking at night scores (r=-0.087, p=0.433; r=-0.058, p=0.600).
Conclusions: The sleep quality of the mothers was determined to be affected by the sleep habits of their children with cerebral palsy. Poor sleep quality can be physically and psychologically destructive in the long term for mothers who are providing care. It is therefore essential that support services related to the sleep quality of mothers are further developed.

Keywords: Cerebral palsy, Sleep, Gross motor function, Mothers

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Introduction

The prevalence of sleep problems in children with cerebral palsy (CP) is seen to be higher than in healthily developing children (Horwood, Li, Mok, Shevell and Constantin, 2019; Newman, O'Regan and Hensey, 2006). The rate of sleep disorders in children with normal growth and development has been observed to be approximately 25%, while this rate increases to 85% in children with neurodevelopmental disorders (Horwood et al., 2019). Children with CP may have risk factors (brain damage, physical disability, comorbidities), rendering them more likely to experience sleep disorders than typically developing children. It has been reported that 1 in 4 children with CP has behavioral difficulties, and these have been associated with sleep problems (Newman et al., 2006). As a result of a systematic study, it was shown that children with CP have an extremely high probability of needing parental attention during the night, which was associated with poor sleep quality and depression in the primary caregiver of the child (Lee, 2013).

The sleep problems seen in children with CP are seen in the form of disrupted sleep and frequent waking during the night (Hemmingsson, Stenhammar, and Paulsson, 2009). Difficulty in falling asleep and remaining asleep, sleep apnea, and shorter than normal duration of total sleep are other sleep problems that are experienced. Postural changes in the body in spastic quadriplegic and dyskinetic/dystonic CP types may cause interrupted sleep and a deterioration in sleep duration (Halstead et al., 2021; Romeo et al., 2014; Atmawidjaja, Wong, Yang, and Ong, 2014). In addition, there has been shown to be a strong association of sleep disorders in children with CP with active epilepsy (Takano, Hayashi, and Harada, 2020). A range of symptoms or disorders, including visual disorders, epilepsy, and pain, which are commonly associated with CP, in addition to motor disorders, have been shown to be associated with sleep problems in these children. An increase in the severity of the motor disorder and related disorders may lead to an increase in the sleep problems of the child (Newman et al., 2006; Hemmingsson et al., 2009).

Family members of a child with CP may experience difficulty in dealing with the disease, in meeting the needs, and caring for the child (Lee, 2013; Wayte, McCaughey, Holley, Annaz, and Hill, 2012; Adiga, Gupta, Khanna, Taly and Thennarasu, 2014). In a study that investigated the physical and psychological health of parents, stress was determined to be higher in individuals with the care burden of a child with CP compared to caregivers of a healthy child. Most caregivers were reported to experience emotional disorders, unhappiness, difficulties in

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memory and problem-solving, and more health problems (Raina et al., 2005). This function of care is generally undertaken by mothers, resulting in them being more affected. The caregivers of children with neurodevelopmental disabilities, primarily CP, have been shown to have a worse quality of sleep than the mothers of typically developing children (Lang, Boucaut, Guppy and Johnston, 2021). As sleep problems affect the quality of life and emotional status of the parent, these can become psychological disorders. Sufficient sleep is essential for good psychological health, and therefore insufficient sleep can result in physical and psychological health problems for mothers. It has been reported that the mental health of mothers with children of various disabilities was significantly worse in the mothers experiencing interrupted sleep the most (Rassafiani, Kahjoogh, Hosseini and Sahaf, 2012; Mörelius and Hemmingsson, 2014).

The mothers of children with CP spend more time caring for their children (Hemmingsson et al., 2009; Raina et al., 2005; Rassafiani et al., 2012), and this is probably detrimental to both the physical and mental health of the mothers. The relationship between sleep and behavioural problems in children with CP has not been sufficiently investigated to date (Wayte et al., 2012; Romeo et al., 2010; Honomichl, Goodlin-Jones, Burnham, Gaylor and Anders, 2002). Despite the potential effects of sleep disorders on the physical and psychological health of mothers, there are very few studies in Turkey that have focussed on these effects (Haylı, 2022; Erdoganoglu and Kerem-Günel, 2007). This subject is especially important because there is evidence of a high prevalence, ranging from 26% to 80%, of behavioural problems in children with CP (Horwood et al., 2019; Halstead et al., 2021; Adiga et al., 2014). As it is known that sleep disorders leading to neurobehavioural disorders can be affected by daytime behavior, it can be hypothesized that there may be a relationship between the motor activities of children and behavioral disorders.

The aim of this study was to investigate the relationship between sleep disorders and motor functions by evaluating the sleep habits and behaviors of children with CP. It is important to identify and treat sleep problems related to behavioral difficulties in the care of children with CP. In addition, the effect of these factors was examined on the sleep quality of mothers with primary responsibility for the care of the child. The hypothesis of the study was that the gross motor function level and sleep habits of the child with CP would affect the sleep quality of the mother and that there would be a relationship between the sleep problems of the children and the sleep quality of the mothers.

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Material and Methods

This cross-sectional study was conducted on children and adolescents with CP who were receiving care services in 3 different private rehabilitation centers in different cities. All the primary caregivers included in the study were the mothers of the children with CP. Information about the study was provided to all the mothers. This study was conducted in compliance with the Declaration of Helsinki and received ethical approval from the Human Research Ethics Committee of Hasan Kalyoncu University, Turkey (protocol number: 2020/035, dated 28.05.2020). All participants provided written informed consent.

Sample size calculation

A total sample size of 82 was required to detect at least a 0.80 effect size (a.k.a. Cohen's d) between groups with a power of 80% at the 5% significance level. The value of 0.80 was based on previous clinical experiments. Sample size estimation was performed using G*Power version 3.0.10 software (Faul, Erdfelder, Buchner and Lang, 2009).

The study inclusion criteria were defined as children and adolescents aged 3-18 years with a diagnosis of CP. A total of 83 children, aged 3-18 years, with a diagnosis of different types of CP and their mothers who were providing continuous care were included in the study. Children were excluded from the study if they had severe sight or hearing impairment, any cognitive deficit, a disabled sibling, a change in medication in the last 6 months, or a history of surgery or the use of botulinum toxin on the craniofacial region. The mothers were excluded if they were taking any sleep medicine and/or antidepressants receiving psychotherapy because of depression,

Evaluations

Data were collected from an evaluation form, clinical examination of the individuals, and interviews with the mothers. The demographic and clinical data, including age, gender, CP type, medication, history of epilepsy, were retrieved from the medical records. The child was coded as yes/no for whether they were using drugs for epilepsy. The Turkish version of the Gross Motor Function Classification Scale-Expanded and Revised (GMFCS-E&R) form was used to determine the level of impairment in gross motor functions of the children (Kerem Gunel et al., 2007). The GMFCS is a valid and reliable standardized system that classifies the impairment of gross motor functions of children with CP in 5 levels (I-II: mild; III: moderate; and IV-V: severe) based on the disabilities and level of dependence.

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The Children's Sleep Habits Questionnaire (CSHQ) was applied to the children with CP (Owens, Spirito and McGuinn, 2000), and the Pittsburgh Sleep Quality Index (PSQI) (Ağargün, Kara and Anlar, 1996) was applied to the mothers.

The Children's Sleep Habits Questionnaire (CSHQ): To evaluate the sleep quality of the children with CP, the CSHQ questionnaire was used. This questionnaire was developed to evaluate problems related to sleep and sleep habits in children (Owens, et al., 2000; Fiş, Arman, Topuzoğlu, Güler and Gökçe, 2010). The questionnaire consists of a total of 33 items grouped into 9 subscales/domains: "sleep patterns" (6 items), "bedtime resistance" (6 items), "sleep onset delay" (1 item), "sleep duration" (3 items), "sleep anxiety" (4 items), "night waking" (3 items), "sleep disordered breathing" (3 items), "parasomnias" (6 items), and "daytime sleepiness" (8 items). In the total points obtained, a cutoff value of 41 points is accepted, and values above this are evaluated as "significant sleep disorder at a clinical level". The CSHQ has satisfactory psychometric properties in children and has been used to investigate sleep in children.

Pittsburgh Sleep Quality Index (PSQI): The mothers' sleep quality was evaluated with the PSQI. The validity and reliability studies of the Turkish version of the PSQI were conducted in 1996 (Ağargün et al., 1996). The PSQI includes 7 components of subjective sleep quality, sleep latency, sleep duration, sleep efficacy, sleep disorders, the use of sleep medication, and daytime functioning. Points for each component range from 0 (no sleep problem) to 3 (severe sleep problems), providing total points of 0-21. A total score of ≥5 points is accepted as impaired sleep quality, with higher points indicating poorer sleep quality.

Statistical analysis

Kolmogorov-Smirnov test was used to investigate whether the normal distribution assumption was met. Homogeneity of variances was investigated Levene test. Categorical data were expressed as numbers (n) and percentage (%), while quantitative data were given as mean ± SD and median (25th-75th) percentiles. While the mean differences between two independent groups were compared Student's t-test, otherwise One-Way ANOVA was applied for comparisons among more than two independent groups. When the p-values from One-Way ANOVA were statistically significant, the post-hoc Tukey HSD test was used to know which group differed from which others. The continuous variables for which the parametrical test assumptions were not met were evaluated by Mann Whitney U or Kruskal Wallis tests depending on the number of independent groups. Categorical data were analyzed $\chi 2$ or Fisher

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Freeman Halton test; where appropriate. The degree of associations between continuous variables was calculated from Spearman's rank-order correlation analyses**.** Odds ratios and 95% confidence intervals for each independent variable were also calculated. Data analysis was performed using IBM SPSS Statistics version 25.0 software (IBM Corporation, Armonk, NY, US). A p-value less than 0.05 was considered statistically significant.

Results

The evaluation was made of 83 children with different clinical types of CP, comprising 39 (47%) girls and 44 (53%) boys with a mean age of 8.8±4.1 years (range, 3-18 years). CP was spastic type in 75.9% of the children, ataxic in 16.9%, and dyskinetic in 7.2%. Medication was used by 31 (37.3%) children, and there was a history of epilepsy in 25 (30.1%). The GMFCS grades were determined to be mostly at levels 2 and 3 at the rate of 22.9% (19 children

Table 1. Demographic characteristics of children with CP

	n=83
Age (years)	8.8±4.1
Gender	
Boys	44 (53.0%)
Girls	39 (47.0%)
Body mass index (kg/m^2)	17.1±4.7
Type of CP	
Spastic	63 (75.9%)
Ataxic	14 (16.9%)
Dyskinetic	6 (7.2%)
GMFCS	
I	17 (20.5%)
II	19 (22.9%)
III	19 (22.9%)
IV	15 (18.0%)
V	13 (15.7%)
Drug usage	31 (37.3%)
History of epilepsy	25 (30.1%)

GMFCS: Gross Motor Function Classification Scale

at each level) (Table 1). All the mothers were married, were homemakers, and were responsible for the full-time care of the child.

A statistically significant association was determined between the CHSQ points and the GMFCS (p=0.002) (Table 2). This was due to children in GMFCS grade V having higher CSHQ points than those in GMFCS grades 1 and 2 (p=0.013, p<0.001). The rates of children with

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CSHQ points ≥42 was found to be similar in both groups (p=0.466). No statistically significant correlation was determined between the GMFCS levels and total sleep and waking in the night (p=0.360, p=0.771, respectively). No statistically significant correlation was determined between the GMFCS and PSQI (p=0.164).

Table 2. The comparisons among GMFCS stages in terms of clinical measures in children with Cerebral Palsy

	GMFCS I (n=17)	**GMFCS II (n=19)**	**GMFCS III (n=19)**	**GMFCS IV (n=15)**	**GMFCS V (n=13)**	**p**
Waking during the night (min)	10.0 (0.0-20.0)	10.0 (1.0-30.0)	10.0 (5.0-20.0)	10.0 (3.0-15.0)	10.0 (2.0-20.0)	0.771†
Total sleep duration (hrs)	10.0 (8.2-11.0)	9.0 (8.3-10.0)	10.3 (9.0-11.0)	10.0 (8.0-10.3)	9.0 (8.2-10.0)	0.360†
CSHQ	50.8±10.1[a]	48.6±8.4[b]	53.3±8.0	53.5±8.6	60.9±5.7[a,b]	**0.002**‡
CSHQ						0.466¶
<41	4(23.5%)	3(15.8%)	2(10.5%)	2(13.3%)	0(0.0%)	
≥42	13(76.5%)	16(84.2%)	17(89.5%)	13(86.7%)	13(100.0%)	
PSQI	5.0 (4.0-8.0)	5.0 (4.0-10.0)	10.0 (5.0-12.0)	8.0 (5.0-11.0)	6.0 (4.5-7.0)	0.164†

p<0.05, † Kruskal Wallis test, ‡ One-Way ANOVA, ¶ Fisher Freeman Halton test, a: GMFCS I *vs* GMFCS V (p=0.013), b: GMFCS II *vs* GMFCS V (p<0.001), GMFCS: Gross Motor Function Classification Scale, CSHQ: Children's Sleep Habits Questionnaire, PSQI: Pittsburgh Sleep Questionnaire İndex

A mean PSQI value of ≥5 was evaluated as poor sleep quality. The median PSQI score of the mothers was found to be 7 (range, 1-19) and 84% had poor sleep quality. There was a statistically significant positive correlation between the PSQI points and the total CSHQ points (r=0.259, p=0.018). No statistically significant correlation was determined between the total sleep and waking at night and the PSQI and CSHQ points (p>0.05) (Table 3). The PSQI points of the mothers of the children with CSHQ points ≥42 [6.5 (5.0-10.0)] were determined to be statistically significantly higher than those of the mothers of children with CSHQ points of <41 [4.0 (3.0-5.0)] (p<0.001) (Table 4).

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Table 3. The results of correlation analyses

	PSQI	**CSHQ**
CSHQ		
Coefficient of correlation	0.259	
p-value †	**0.018**	
Total sleep duration		
Coefficient of correlation	-0.087	0.039
p-value †	0.433	0.729
Waking during the night		
Coefficient of correlation	-0.058	0.048
p-value †	0.600	0.664

p<0.05, † Spearman's rank order correlation analysis, CSHQ: Children's Sleep Habits Questionnaire, PSQI: Pittsburgh Sleep Questionnaire İndex

Tablo 4. Sleep Quality of the mothers according to CSHQ level

	PSQI
CSHQ	
<41	4.0 (3.0-5.0)
≥42	6.5 (5.0-10.0)
p-value †	<0.001

p<0.05, † Mann Whitney U test, CSHQ: Children's Sleep Habits Questionnaire, PSQI: Pittsburgh Sleep Quality Index

Discussion

There are few studies in Turkey related to sleep problems in children with common pediatric diagnoses such as CP (Haylı, 2022; Sarı, 2010). Therefore, the aim of this study was to investigate the relationship between sleep problems and the motor function level in children with CP and to examine the effect of these components on the sleep of the mothers who are primarily responsible for the care of the child. The hypothesis of the study was that the sleep quality of the mother would be related to the sleep status of the child. The results of this study demonstrated that the sleep quality of mothers was affected by the sleep habits of the children with CP.

A higher rate of sleep disorders may be seen in children with CP than in typically developing children, associated with anatomic and motor disorders together with the brain damage that occurs in CP (Horwood et al., 2019). In a study by Newman et al. (2006), of 173 cases of CP aged 6-11 years, the total sleep score was determined at a pathological level in 23% of the cases. Hemmingsson et al. determined sleep problems in 50.5% of 216 cases with CP

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and reported that pain was the most important factor contributing to these problems (Hemmingsson et al., 2009). In addition, problems maintaining sleep may occur associated with pain, spasms, and muscle cramps due to changing position during sleep because of positional disorders of the child (Lang et al., 2021; Rassafiani et al., 2012; Mörelius et al., 2014). In the current study, the sleep problems of the children were found 86%. No statistically significant correlation was determined between the GMFCS levels and total sleep and waking in the night; however, a statistically significant association was determined between the children's sleep habits and the GMFCS. This was due to children in GMFCS grade V having higher sleep habits degrees than those in GMFCS grades 1 and 2.

The CSHQ is a parent-reported sleep screening questionnaire, which was designed especially for school-age children. The CSHQ design takes into consideration the clinically most common symptoms according to the International Classification of Sleep Disorders (ICSD) (Owens et al., 2000). In a study by Honomichl et al. (2002), sleep disorders were evaluated with the CSHQ in 100 children with developmental disorders, aged 2-11 years, and compared with the reports of age-matched typically developing children, all the children were found to experience problems related to the time of the onset of sleep. Families reported that children were most resistant to sleeping. In a study by Wayte et al. (2012), the total CSHQ scores of the children with CP were determined to be significantly higher than those of normally developing children. In addition, the sleep anxiety and waking during the night scores were found to be higher in the children with CP. The sleep habits of the children in the current study were questioned with the CSHQ, and the results were found to be consistent with the literature. The total CSHQ score of the CP cases was 62.5±6.5 (range, 47-78). The cutoff value for the total score of the CSHQ was accepted as 41 points, and values above this level were evaluated as a significant sleep disorder. Of the total children with CP in the current study, 72 (86.74%) were determined to have CSHQ scores of ≥ 42.

The GMFCS is known to be a suitable test battery that accurately and effectively determines the level of motor development in children with CP (Palisano et al., 2007). Previous studies have shown that high levels of GMFCS can potentially cause musculoskeletal system injuries in caregivers (Takano et al., 2020; Lang et al., 2021). Raina et al (2005) reported that the physical health of mothers was strongly affected by the care demands of children with CP. Therefore, it can be generally stated that a high level of gross motor functions in children with CP can have a negative effect on the physical health of the mothers. In the current study, the

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motor levels of the children were evaluated with the GMFCS. It was seen that 20.5% of the children with CP were at level 1, 22.9% at level 2 and 3, 18% at level 4, and 13% at level 5. As the GMFCS level increased in all the cases with CP, so the CSHQ score significantly increased. A statistically significant association was determined between the CHSQ points and the GMFCS, and this was due to children in GMFCS grade 5 having higher CHSQ points than those in GMFCS grades 1 and 2. However, there was not found to be any association between the GMFCS levels of the children and the sleep quality values of the mothers.

There are research findings showing that sleep problems have effects on attention, memory, creative thought, academic performance, behavioral problems, depressive mood, and irritable behavior (Horwood et al., 2019; Halstead et al., 2021). The sleep problems observed in children with developmental deficiencies have a profound negative effect on family members. Just as this situation increases the stress levels of parents, it can also cause a lack of sleep in other family members (Wright, Tancredi, Yundt and Larin, 2006; Bourke-Taylor, Pallant, Law and Howie, 2013; Mannion and Leader, 2014). As sleep disorders in children cause a need for night-time care of the child and additional problems, they have been associated with an increase in the risk of psychological stress and a decrease in the physical health of the caregiver (Lee, 2013; Raina et al., 2005; Romeo et al., 2010). Sleep quality is a potential reason for these effects. In studies of sleep disorders and treatment approaches of children with neurodevelopmental disorders, including CP, the sleep problems have been shown to be difficulty in falling asleep, night-time waking or sleeping with parents, and resistance to going to bed or sleeping at bedtime (Richdale and Wiggs, 2005; Brossard-Racine et al., 2012). Shorter sleep duration and insufficient sleep have been reported to be seen in 65% of mothers due to the sleep disorder of the child (Richdale and Wiggs, 2005). In the verbal statements of families, it has been reported that they experienced a greater lack of sleep than the children when dealing with their sleep problems. This was stated to negatively affect the quality of life and daily work performance both for themselves and the child (Khayatzadeh, Rostami, Amirsalari and Karimloo, 2013; Albayrak, Biber, Çalışkan and Levendoğlu, 2019). In the study by Wayte et al (2012), the sleep of mothers and children with CP were similarly shown to be significantly correlated. It was determined that 40% of the mothers of children with CP have poor sleep quality, and a moderate level correlation was found between the sleep quality of mothers and the sleep problems of the child, In the current study, 84% of the mothers were determined to experience low sleep quality. We found no statistically significant correlation between the

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GMFCS and PSQI. On the other hand, we found a weak level correlation between the PSQI points of the mother and the CSHQ points of the child (r=0.259, p=0.018). These findings demonstrate that the sleep quality of the individual responsible for night-time care is related to the sleep problems of the child.

An association was found between the sleep quality of the caregiver and the sleep problems of the child, which revealed the need for routine examination of sleep disorders of parents as much as children. Sleep problems in children are significant health problems that require attention. To be able to look after a child with disabilities, it is necessary to be healthy and have the ability to meet the needs of the child. The mothers of children with CP have limited access to support services. There is an urgent need for prospective support services to deal with the sleep quality and psychological health of caregivers. Therefore, clinicians should focus on the quality of life of these individuals, and this focus can be targeted at different levels and in different formats. Thus, a basic information packet about the characteristics and needs of children with CP can be provided for them, which would create awareness in the families. Interventions to improve the sleep quality of both mothers and children are essential to help the mothers to continue to provide the important care that is necessary for the children. Taking the effects on the child and the family of sleep disorders of a child with CP into consideration, rehabilitation programs can be planned in light of this information. Nevertheless, there is a need for further detailed studies on this subject, which will assess the quality of life of the mother and child.

Conclusion

The results of this study should be interpreted with the consideration of some limitations. The CSHQ used in the study is oriented to the sleep habits of children and their outcomes and does not evaluate all sleep disorders in children. The use of objective measurements evaluating sleep problems is recommended for future studies. Another limitation could be said to be the cross-sectional design of the study, which prohibited the determination of the direction of causality of the relationships. Long-term studies investigating the interaction of the quality of life and sleep quality of the caregivers of children with CP could provide information about the direction of these types of relationships and would be helpful in understanding the definitive etiology pathways leading to sleep disorders in individuals undertaking the care of children with CP.

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Conflict of Interest

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