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Correlation between sleep and quality of life in cerebral palsy

Correlação entre sono e qualidade de vida na paralisia cerebral

ABSTRACT

Purpose: To investigate and correlate the sleep pattern and quality of life in individuals with cerebral palsy (CP) compared to healthy controls. **Methods:** Seventy-eight subjects (aged 4–18 years, both genders) comprised two groups: CP, composed of 43 individuals with CP, and control, composed of 35 individuals without neurodevelopmental disorders. General Sleep Habits Questionnaire, Sleep Disturbance Scale for Children, sleep diary, Child Health Questionnaire, and Children's Quality of Life Scale were used. **Results:** This study identified that 60.5% individuals with CP had sleep disorders. The respiratory disorders (25.6%) and the sleep hyperhidrosis (34.9%) were the most common disturbances in the group with CP. Moreover, 23.2% individuals of the group with CP reported awaking in the middle of the night and 37.2% of them snore, both percentages were higher than those in the control group. The sleep diary showed that individuals in the group with CP spend more time to initiate sleep (around 21 minutes). The group with CP also showed deficits in all parameters analyzed by the Child Health Questionnaire, except in family activity and the sleep–wake pattern, and quality of life showed negative correlation in several respects. **Conclusion:** The altered pattern of sleep in individuals with CP directly affects their physical and emotional well-being.

RESUMO

Objetivo: Investigar e correlacionar o padrão sono-vigília e a qualidade de vida na paralisia cerebral (PC). **Métodos:** Setenta e oito indivíduos, de 4 a 18 anos de idade, de ambos os gêneros, compuseram dois grupos: PC, composto por 43 indivíduos com PC; e controle, com 35 indivíduos sem distúrbios no neurodesenvolvimento. Os procedimentos utilizados foram: Questionário de Hábitos de Sono, Escala de Distúrbios do Sono em Crianças, Diário de sono, Questionário de Saúde da Criança e Escala de Qualidade de Vida da Criança. **Resultados:** Identificou-se que 60,5% dos indivíduos com PC apresentaram distúrbios do sono, sendo os mais comuns, os respiratórios e a hiperhidrose do sono, com 25,6 e 34,9%, respectivamente. Além disso, 23,2% dos indivíduos do grupo PC acordam no meio da noite e 37,2% deles roncam, percentuais estes maiores do que os do grupo controle. O Diário de sono mostrou que os indivíduos do grupo PC demoraram mais para iniciar o sono (em média 21 minutos) do que o grupo controle. Quanto à qualidade de vida, o grupo PC apresentou déficit em todos os parâmetros analisados, exceto em atividade familiar e os distúrbios de sono encontrados e a qualidade de vida indicaram correlação negativa na maioria dos parâmetros. **Conclusões:** O padrão de sono alterado nos PCs afeta diretamente aspectos do seu bem-estar físico e emocional.

Study carried out at the Center of Studies of Education and Health, auxiliary units, Universidade Estadual Paulista “Júlio de Mesquita Filho” – UNESP – Marília (SP), Brazil.

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INTRODUCTION

Cerebral palsy (CP) consists of a group of disorders of tonus, movement, and posture attributed to nonprogressive injuries that occurred during the development of the central nervous system (CNS)⁽¹⁾.

Considered one of the most common causes of chronic childhood motor dysfunction, the CP may impair the ability to perform daily activities, besides limiting social and cognitive activities, which implies the need for multidisciplinary assistance⁽²⁾.

The consequences vary according to the CNS area affected, the time since the injury, and its intensity, being the motor disorders often accompanied by disturbances in sensation, cognition, perception, and behavior⁽³⁾. The classification according to topographical distribution is hemiplegic, diplegic and tetraplegic⁽⁴⁾.

As the CP is a chronic and incurable condition, the treatments are used in an attempt to improve general health condition and well-being of the individual. The treatment is considered as successful corresponding to the improvement in both functional performance and degree of personal satisfaction of the patient. For new therapeutic strategies, including speech language and auditory therapy, to be developed in this sense, it becomes important to understand the impact of this condition on the quality of life (QOL) of patients, that is, the identification of areas in which they feel most affected or vulnerable. This has been proven a promising path to enable the health professional team into searching for more effective resources and in therapeutic decision-making.

In general, the concept of QOL refers to objective and subjective indicators of happiness and satisfaction⁽⁵⁾, and they may be measured by different instruments, being most of them self-report questionnaires supposedly to be answered by the individual themselves or by a representative, in cases there are limitations due to motor impairment or in cases in which the perception of the individual leads to limitations in obtaining the answers.

It is known that the association of CP to other health conditions tends to worsen the patients' well-being. One remarkable aspect, though yet little investigated of CP, is that several of its factors, whether motor disorders^(6,7) or injuries of pathways or other structures related to the control of biological rhythms, may alter the sleep-wake pattern of this population⁽⁸⁾. Thus, the sleep is still one of the factors that gets altered in individuals with CP, disorders which are the cause of frequent complaints in these cases⁽³⁾.

However, there is probably an aggravating factor in the aspects of QOL of an individual with CP, already so much affected by motor impairment⁽⁹⁾, given that sleep disorders usually cause decrease in motivation and concentration, memory deficit, daytime sleepiness, mood shifts, and immunity decline^(10,11).

The hypothesis of this study is that the occurrence of sleep disorders negatively affect the QOL of individuals with CP. Based on this hypothesis, the objectives of this study were to investigate the sleep-wake pattern in individuals with CP

and their respective controls, to characterize the QOL of both groups, and to evaluate the relation between sleep disorders and QOL of both groups.

METHODS

Seventy-eight individuals, aged between 4 and 18 years, took part in the analysis of the QOL and sleep pattern (average age: 10.1 ± 3.9 years). The group with CP comprised legal guardians of 43 individuals diagnosed with CP (25 boys and 18 girls), and the control group comprised guardians of 35 individuals without neurodevelopment disorders paired up to the CP group by gender and age.

Individuals with CP were examined in a school clinic and in health-care institutions in the cities of Marília, Ourinhos, Bauru, and Santa Bárbara d'Oeste (SP).

This research was approved by the research ethics committee of the Faculdade de Filosofia e Ciências of the Universidade Estadual Paulista "Júlio de Mesquita Filho" (CEP/FFC/UNESP), No. 0013/2000. All participants signed the informed consent.

Selection criteria

The inclusion criteria for the research group were the following: children and adolescents aged between 4 and 18 years, both genders, diagnosed with CP and clinical classification based on the predominant type of motor impairment (topographical distribution) according to one of the international criteria proposed for cerebral palsy (hemiplegic, diplegic, tetraplegic and hemiparetic, diparetic, tetraparetic)⁽⁴⁾.

Individuals outside the age range of 4–18 years and without neurological diagnosis by medical report were excluded from the study.

The control group, in turn, comprised individuals in the same age range as that of the research group. The absence of medical history of psychiatric and neurologic disorders, and the absence of audiological, speech, and/or auditory processing complaints were the inclusion criteria.

The profile of the participants of both groups with the clinical characterization on motor impairment in the CP group is described in Table 1.

Table 1. Characterization of the participants in the group with cerebral palsy and the control group

Characteristics	Cerebral palsy group n (%)	Control group
Age in years (mean±standard deviation)	9.9±4.3	10.3±3.7
Motor classification		
Hemiparetic	2 (4.6)	
Diparetic	16 (37.2)	
Diplegic	6 (13.9)	
Tetraparetic	9 (20.2)	
Tetraplegic	10 (23.2)	

Procedures

To investigate the sleep–wake patterns, we used a Questionnaire on Sleeping Habits⁽¹²⁾, the Sleep Disturbance Scale for Children (SDSC)⁽¹³⁾, and the Sleep Diary⁽¹⁴⁾.

The questionnaire on sleep habits, adapted and validated into Portuguese⁽¹²⁾, and the SDSC⁽¹³⁾ were filled out by the child's guardian. In the Brazilian version of the Scale used in this study, there were 26 items meant to evaluate sleep in children and adolescents aged between 3 and 18 years, each item numbered in a score from one (never) to five (always), by the frequency it was presented in the last six weeks. The score in the scales are grouped into six factors, according to the instrument's proposal: disorders of initiating and maintaining sleep (DIMS), respiratory sleep disorders (RSD), arousal disorders (AD), sleep–wake transition disorders (SWTD), excessive daytime sleepiness (EDS), and sleep hyperhidrosis (SH).

To complete the evaluation, we used a sleep diary as a tool for investigating the sleep routine of the individuals for 5 days, with information on the time they would go to bed and wake up, time length in bed, naps throughout the day, ways to awake, and night awakenings⁽¹⁴⁾.

To characterize the QOL of the studied population, we used the Children Health Questionnaire (CHQ-PF50)⁽¹⁵⁾ and the Children's Quality of Life Scale (AUQEI)⁽¹⁶⁾.

The CHQ-PF50 is a generic instrument that allows analyzing the QOL related to health, validated to assess children and individuals with CP over 5 years of age, and adolescents through the answers of the parents as to the patient's physical, emotional, and social well-being⁽¹⁵⁾. It includes 50 items, which are composed of 14 scales, 10 of them used to verify the physical and psychosocial functions. The score is calculated through the sum of the points, which vary from 0 to 100. Thus, the higher the sum of points, the better the QOL.

Besides, in the assessment of the QOL, the AUQEI was also used, based on the child's point of view of satisfaction, observed through four figures (faces that express different emotional states) associated to various domains of life. Through 26 questions that explore family and social relations, health, bodily functions, and separation, this generic instrument makes possible the comparison between children affected by some disease and healthy individuals⁽¹⁶⁾.

Data analysis

The data were analyzed using descriptive analysis through the median (Med) or mean (M) \pm standard error of the mean (SEM) or standard deviation of the mean (SD). For the comparison between the two groups, the Student's *t*-test was used. However, for the correlation analysis, the Spearman's rank correlation coefficient, with the aid of the Prism 5.0 (GraphPad Software) software, was used. The significance value taken into consideration was 5% ($p < 0.05$).

RESULTS

Through the general sleep habits questionnaire, it was verified that no individual in the control group was on medication

that could interfere the sleep pattern. However, in the group with CP, 65.1% individuals were on medication that could exert these effects (Chart 1).

As for family structure, the highest percentage of members in the control group (80.0%) and the CP group (77.4%) was found to live with three to four people. In the CP group, we found individuals who live with up to seven people and share the room with up to three individuals (Figure 1).

Among the sleep disorders, the RSD and the SH stand out from the group with CP, with 25.6 and 34.9%, respectively. This group also presented 11.6% in the DIMS and 2.3% in the EDS, whereas the control group had 5.7% in the DIMS and in the SH. When comparing the mean scores of the SDSC, the group with CP registered a statistically higher mean (5.27 ± 0.54) than the control group (3.28 ± 0.31) for the SH (Figure 1 and Table 2).

As for the health conditions of the individuals, the data show a higher percentage (69.8%) of individuals in the group with CP than in the control group (22.8%) with health problems, taking medicines and currently on therapy (Figure 1).

The data show that 23.2% researched people ingest matte or black tea in the group with CP, whereas in the control group this proportion is 17.1%. The highest percentage of individuals who ingest, respectively, chocolate and soft drinks (85.7 and 100.0%) was found in the control group. The groups did not differ as for the intake of coffee.

It was also observed that more individuals with difficulties in initiating sleep (48.6%) and with daytime sleepiness (57.1%) were in the control group in relation to the group with CP (41.9 and 48.8%, respectively). However, a higher percentage (23.2%) of individuals with frequent awakenings during the night was found in the group with CP (Figure 2).

It was also possible to understand that 37.2% individuals of the group with CP has snoring problems. However, the highest percentage of individuals with teeth grinding problems and sleep talking was found in the control group (31.4 and 40%, respectively) (Figure 2).

As for the time of going to bed and waking up during the week and on weekends, there are no significant differences between the means of the group with CP and the control group (Figure 2). The data show that there are no statistically significant differences between the two groups in relation to the percentage of individuals who nap during the day. However, for the variables "wake up by oneself during the week" and "wake up by oneself during the weekend (wknd)", the group with CP presents highest percentage of individuals with the characteristics mentioned (60.5 and 100.0%, respectively) (Figure 2). Also, members of the group with CP take longer to initiate sleep (21 minutes on average) than the control group (about 14 minutes) (Figure 2).

As for the QOL parameter CHQ-PF50, a difference was found between the control group and the group with CP in all parameters (overall health, physical function, limitation in activities due to physical function, pain, behavior, well-being or mental health, self-esteem, health perception, changes in health, parents' emotional impact, impact on parental time, and family cohesion). With the exception of family activities, in the

Chart 1. Characterization of the medication used by the participants of the cerebral palsy group at the time of the research

Active principle	Commercial name	Primary indication	Side effects (regarding sleep)
Valproic acid	Valpakine	Anticonvulsant	Sleepiness
Amitriptyline	Tryptanol, Tryptil	Antidepressant	Sedation
Baclofen	Baclofen, Lioresal, Baclon	Antispastic	Sedation
Carbamazepine	Tegretol	Anticonvulsant	Sleepiness
Clobazam	Frisium, Urbanil	Anxiolytic Anticonvulsant	Sedation
Ranitidine hydrochloride	Label	Treatment of gastroesophageal reflux	Sleepiness
Clorazepam	Rivotril	Anticonvulsant	Sedation
Valproic acid	Depakene	Anticonvulsant	Sleepiness
Divalproex sodium	Depakote	Antimanic	Sleepiness
Domperidone	Motilium, Peridal, or Peridona	Treatment of gastroesophageal reflux	Sleepiness
Phenytoin	Hidantal, Epelin	Anticonvulsant	Sedation
Phenobarbital	Gardenal	Anticonvulsant	Sedation
Hydroxyzine	Hidroalerg	Antihistaminic	Sedation or sleepiness
Imipramine	Tofranil	Nocturnal enuresis (children and adolescents)	Sleepiness and sleep disorders
Lamotrigine	Lamitor	Anticonvulsant	Sleepiness
Levomopromazine	Neozine	Antipsychotic	Sedation or sleepiness
Methylphenidate	Ritalina, Concerta	Treatment of attention deficit and hyperactivity disorder	Insomnia
Omeprazole	Losec, Peprazol	Antiulcer	Sleepiness
Oxcarbazepine	Trileptal	Anticonvulsant	Sleepiness
Pericyazine	Neuleptil	Antipsychotic	Sedation or sleepiness
Piracetam	Nootron	Activator of cerebral metabolism	Sleepiness
Primidone	Primid	Anticonvulsant	Sleepiness
Promazine	Amplictil	Antipsychotic	Sedation
Risperidone	Respidon	Antipsychotic	Insomnia
Sertraline	Zoloft	Antidepressant	Insomnia or sleepiness

remaining parameters, the group with CP presented the lowest values, which shows lower quality of health for individuals in this group (Figure 3). All the same, the analysis of the AUQEI showed higher scores in the control group (79.29 ± 0.97) when compared to the group with CP (67.58 ± 1.93) (Figure 3).

The correlation analysis shows that the EDS disorder negatively affected the overall health of both groups and their physical function, self-esteem, parents' emotions, and in family activities in the group with CP (Figures 4A, 4B, 4D, 5E, 5F, and 5J). The SWTD, however, has negatively affected the overall health of the control group (Figure 4C).

The AD negatively affected the time of parents and the behavior in the CP group (Figures 4F and 5I), whereas DIMS did so in the limitations in the physical aspects of the CP group and in the self-esteem of both groups (Figures 4E, 5C, and 5D), and the SH, in the quality of health of the individuals in the CP group and in the well-being of both groups (Figures 4G, 5A, and 5B). Besides, the sleep disorders negatively affected the behavior and the emotions of parents of the participants in both groups (Figures 4H, 4I, 5G, and 5H).

DISCUSSION

In the investigation of the sleep pattern and the quality of health of individuals with CP, the results of this study showed

that 60.4% of them present sleep disorders, surpassing the prevalence reported in the literature, which estimates that sleep problems affect approximately 33.0% of the population with CP⁽¹⁷⁾. This percentage difference may be due to methodological differences such as the use of different scales in the assessment and age ranges.

The high incidence of sleep disorders in this population may still be underestimated, because, in this study, most people with CP (65.1%) reported to be on medication that may interfere with sleep. It is known, for example, that convulsive crisis and seizures spasticity, among other symptoms of this condition, may be treated with the help of drugs, which may result in side effects such as sedation and sleepiness⁽¹⁸⁾. In some cases, this may induce sleep, without necessarily providing its quality and, consequently, the quality of wake time activities, but it is capable of masking the diagnosis and prevalence of disorders⁽¹⁹⁾.

In the present study, among the most common disorders, the respiratory ones and the SH stood out in the group with CP, with 25.6 and 34.9%, respectively. It is known that individuals with CP may present deficit in respiratory movements, as a consequence of tonus disorders and posture during breathing^(6,7). Thus, it is expected that the lack of coordination of the respiratory movements would lead some individuals with CP to a high risk of obstructive sleep apnea⁽²⁰⁾, assessed in this study using the SDSC in the RSD parameter. A possible hypothesis

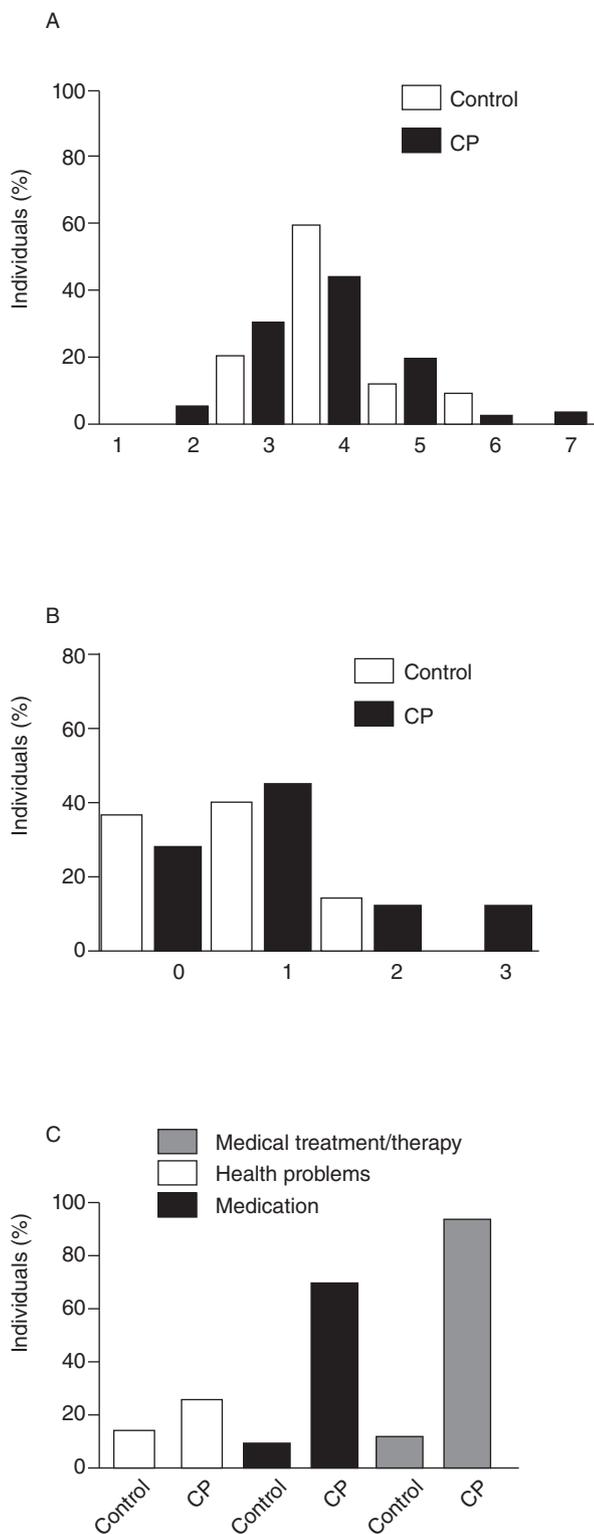


Figure 1. Characterization of the profile of the control and cerebral palsy (CP) groups according to the general sleep habits questionnaire. (A) Percentage of people who live in the same house of the participants in the CP and control groups. (B) Percentage of people who sleep in the same room that the participants in the CP and control groups. (C) Percentage of participants in the CP and control groups with health problems, who take medication (drugs) or are on medical treatment or therapy.

Table 2. Sleep Disturbance Scale for Children applied in the cerebral palsy and control groups

Disorders	Group	Mean	Median	SEM	p-value
DIMS	CP	13.19	12.00	0.89	0.1195
	Control	11.80	10.00	0.67	
RSD	CP	5.11	4.00	0.39	0.1187
	Control	4.48	4.00	0.32	
AD	CP	3.30	3.00	0.16	0.3264
	Control	3.51	3.00	0.11	
SWTD	CP	9.69	9.00	0.66	0.6011
	Control	10.20	9.00	0.66	
EDS	CP	8.58	8.00	0.51	0.3438
	Control	7.88	7.00	0.50	
SH	CP	5.27	4.00	0.54	0.0037*
	Control	3.28	2.00	0.31	

*p<0.05.

Caption: SEM = standard error of the mean; DIMS = disorders of initiating and maintaining sleep; CP = cerebral palsy; RSD = respiratory sleep disorders; AD = arousal disorders; SWTD = sleep-wake transition disorders; EDS = excessive daytime sleepiness; SH = sleep hyperhidrosis.

for the high percentage of SH is the involvement of brain areas, more specifically the hypothalamic nuclei, involved in the regulation of the autonomic nervous system, responsible for thermoregulation and sweating regulation⁽²¹⁾.

In this study, the questionnaire of sleep habits showed that 23.2% of the participants with CP wake up in the middle of the night and that 37.2% of them snore, both percentages being higher than in the control group. It is speculated that these disorders may be due to factors such as motor impairment, chronic pain, respiratory disorders, alterations in the circadian rhythm by visual impairment, epilepsy, and alterations in the sleep architecture⁽¹⁷⁾.

Another factor to be considered is that the group with CP did not present high percentage of disorders, such as daytime sleepiness and difficulty to wake up. The result meets the one from the group, which presented the highest ingestion of matte or black tea as a stimulant beverage and the highest number of people sleeping in the same room causing more noise in the early morning.

Although the time to go to bed and to wake up are not different between both groups, the sleep diary showed that the individuals in the group with CP take longer to fall asleep, thus resulting in a probably shorter real sleep time. New studies, with objective analysis, such as actigraphy and polysomnography, will be necessary to clarify this matter, as well as the sleep architecture of these individuals.

Besides the sleep data, this study describes the parameters of QOL using two instruments. The first result for this analysis showed that 93% of the individuals in the group with CP take multidisciplinary treatment, which, according to parents' reports, brings desired results in the aspects of their children's health. Despite this finding, the QOL of the group with CP, according to the evaluations of the CHQ-PF50 questionnaire, in most of the analyzed parameters showed the lowest values,

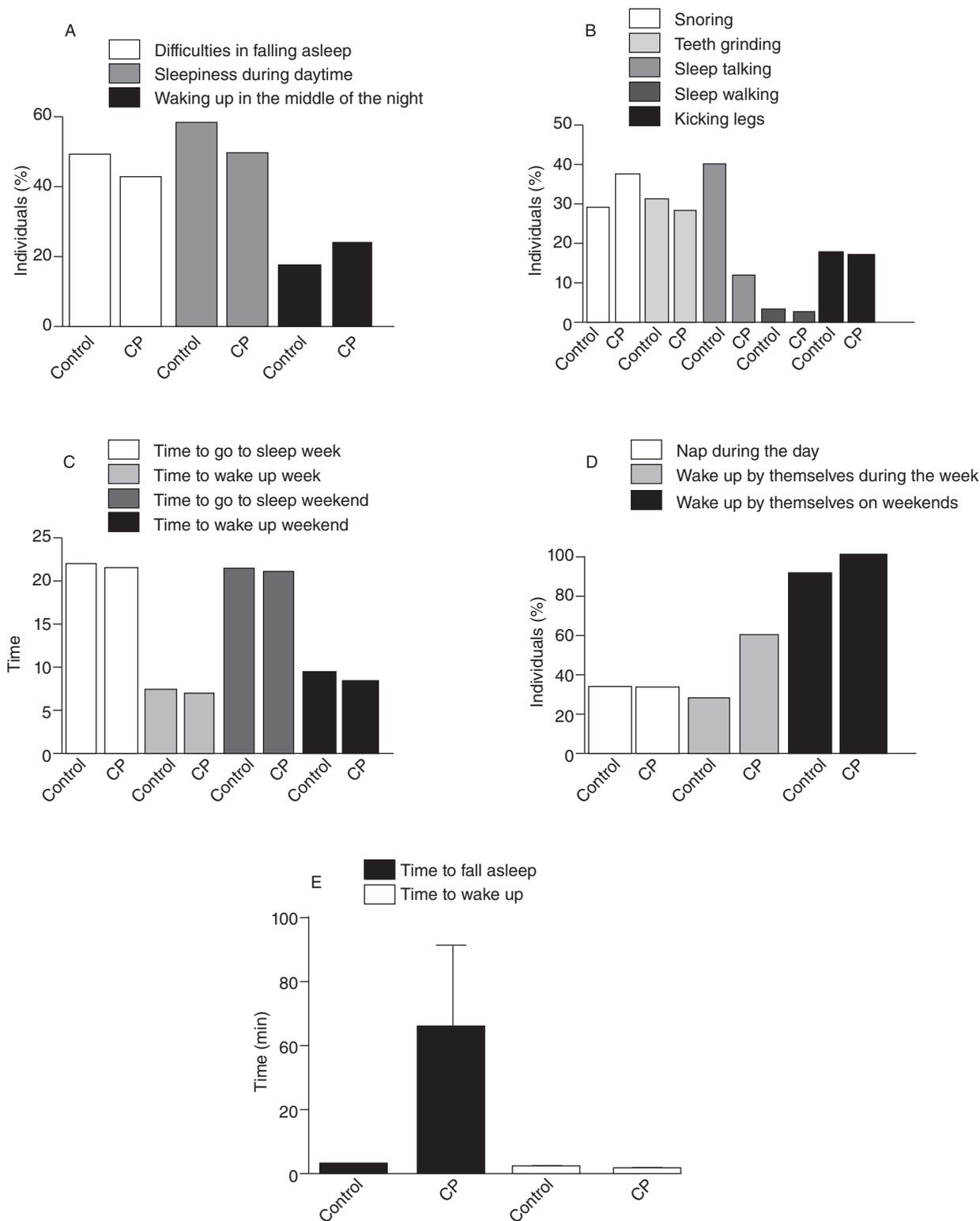
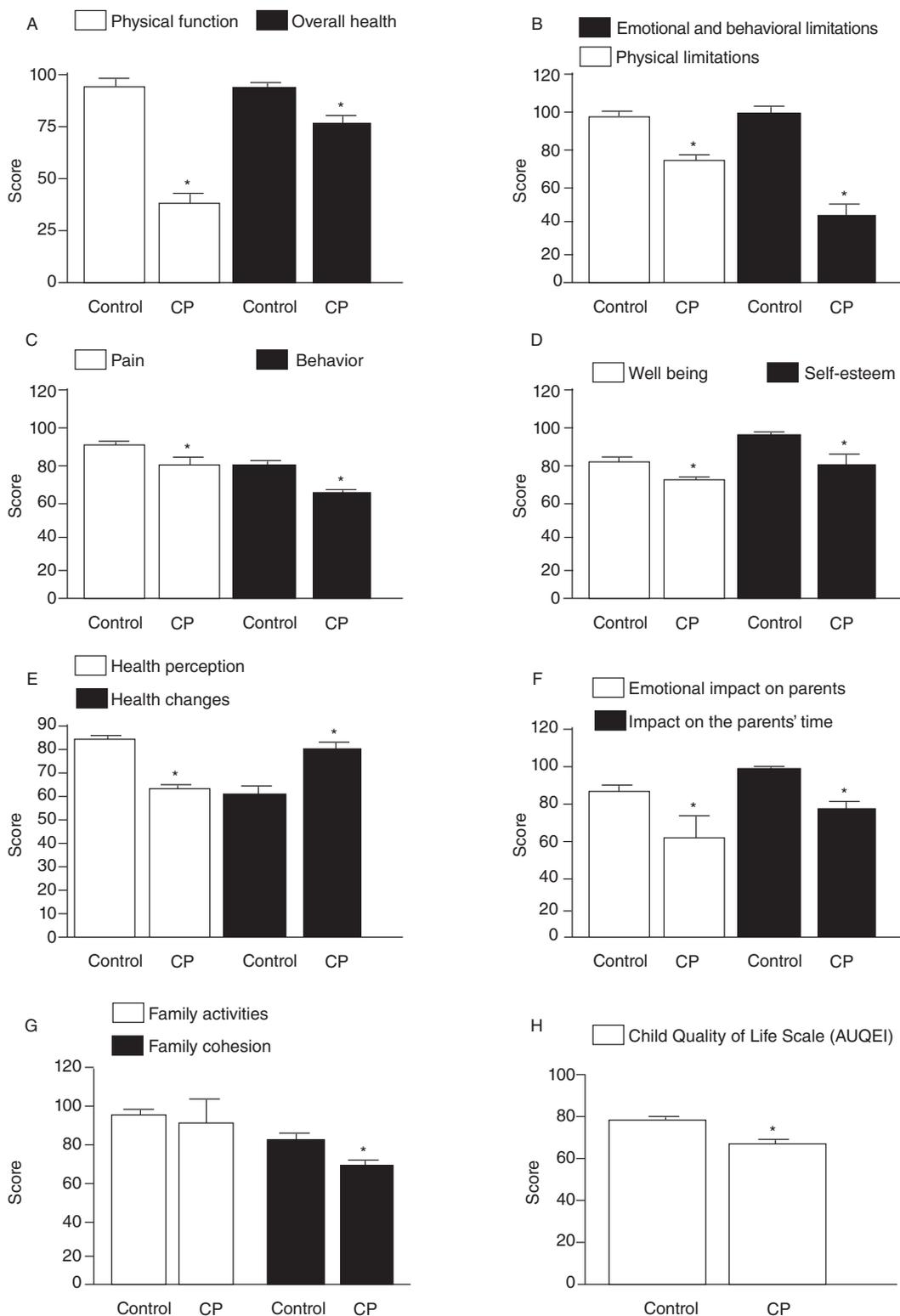


Figure 2. Characterization of the sleep profile of the control and the cerebral palsy (CP) groups, according to the general sleep habits questionnaire and to the sleep diary. (A) Percentage of participants in the CP and control groups who present sleeping problems such as difficulties in falling asleep, daytime sleepiness, and waking up in the middle of the night. (B) Percentage of participants in the CP and control groups with sleep behaviors such as snoring, teeth grinding, sleep talking, sleep walking, and kicking legs. (C) Average of the time to go to sleep during the week, to sleep on the weekend, and to wake up on the weekend in the CP and control groups. (D) Percentage of participants in the CP and control groups who nap during the day, wake up by themselves during the week, and wake up by themselves on the weekend. (E) Mean \pm standard deviation of the average time to fall asleep and of the time to wake up for the CP and control groups.



*p<0.05.

Figure 3. Characterization of the aspects of quality of life in the control and cerebral palsy (CP) groups, according to the Children Health Questionnaire (CHQ-PF50) and the Children’s Quality of Life Scale (AUQEI). (A) Mean±standard errors of the mean (SEM) of the scores of the parameters physical function and overall health of participants in the CP and control groups. (B) Mean±SEM of the scores of the parameters emotional and behavioral limitations and physical limitations of the participants in the CP and control groups. (C) Mean±SEM of the scores of the parameters pain and behavior of the participants in the CP and control groups. (D) Mean±SEM of the scores of the parameters well-being and self-esteem of the participants in the CP and control groups. (E) Mean±SEM of the scores of the parameters health perception and health changes of the participants in the CP and control groups. (F) Mean±SEM of the scores of the parameters emotional impact on parents and on parents of the participants in the CP and control groups. (G) Mean±SEM of the scores of the parameters family activities and family cohesion of the participants in the CP and control groups. (H) Mean±SEM of the scores of the AUQEI scale of the participants in the CP and control groups.

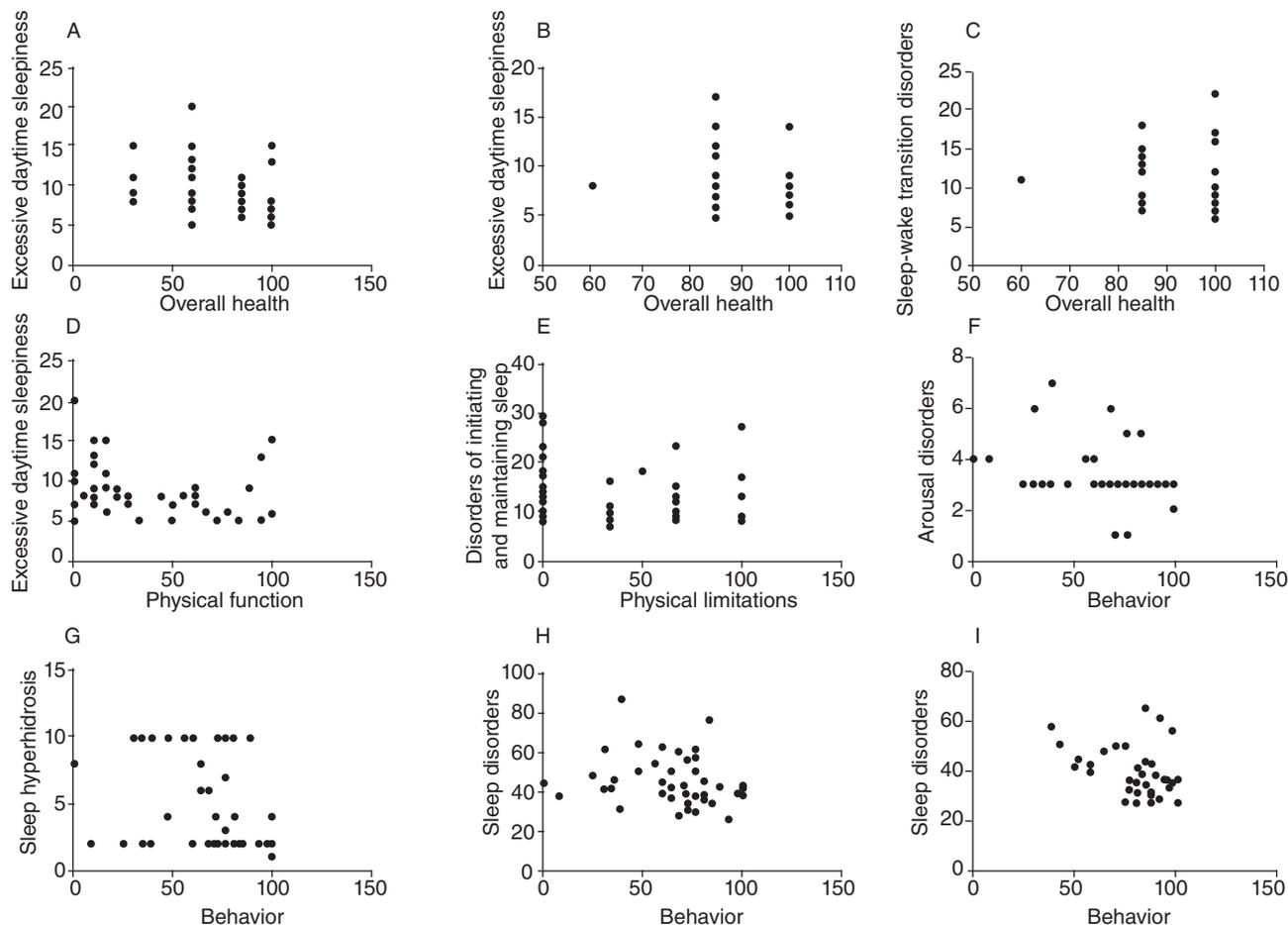


Figure 4. Correlation between the parameters analyzed in the Sleep Disturbance Scale for Children and the Child Health Questionnaire. (A) Correlation between overall health and excessive daytime sleepiness (EDS) in the cerebral palsy (CP) group, $p=0.0151$, $r=-0.3311$. (B) Correlation between overall health and EDS in the control group, $p=0.0192$, $r=-0.3515$. (C) Correlation between overall health and sleep-wake transition disorders (SWTD) in the control group, $p=0.0193$, $r=-0.3510$. (D) Correlation between physical function and EDS in the CP group, $p=0.0054$, $r=-0.3850$. (E) Correlation between the physical limitations and the disorders of initiating and maintaining sleep (DIMS) in the CP group, $p=0.0284$, $r=-0.2928$. (F) Correlation between behavior and arousal disorders (AD) in the CP group, $p=0.0134$, $r=-0.3378$. (G) Correlation between behavior and sleep hyperhidrosis (SH) in the CP group, $p=0.0269$, $r=-0.2962$. (H) Correlation between behavior and sleep disorders in the CP group, $p=0.0375$, $r=-0.2744$. (I) Correlation between behavior and sleep disorders in the control group, $p=0.0221$, $r=-0.3421$.

which evidences lower quality of these aspects when the individuals are compared to the individuals of the control group. Here it is important to stress that, besides the severity of the motor impairment, which notoriously influences the limitations of individuals with CP, the sleep disorders found may cause changes in behavior that, in turn, also affect the well-being of the individuals⁽²²⁾.

According to this study, the sleep disorders are correlated to all the parameters analyzed in the QOL except for family activities, parameters showing the frequency by which a child interrupts activities causing family tension. The SH had a negative correlation with behavior and well-being, which may be verified in the literature, that states the population in general who have this disorder feel uncomfortable and it may also result in social damages⁽²³⁾.

The negative correlation of this and other sleep disorders with the different QOL parameters shows that the more

severe the disorders, the worse the QOL aspects. The lack of significant correlation in family activities may be due to the lack of sensitivity of the instruments in assessing family relationships, because those are the aspects that vary according to the state of health of the individuals of the group with CP⁽²⁴⁾.

There are few studies in the literature approaching specifically this relation between sleep disorders and the QOL parameters. Some authors claim that physical factors such as motor impairment, epilepsy, severe visual impairment, and even environmental factors, between single-parent families and the sharing of the bed, are related to findings of sleep disorders in children with CP; however, there is a consensus that new studies are necessary to investigate the causes and consequences of sleep disorders in the QOL of this population and their families. This relation has also been described between its

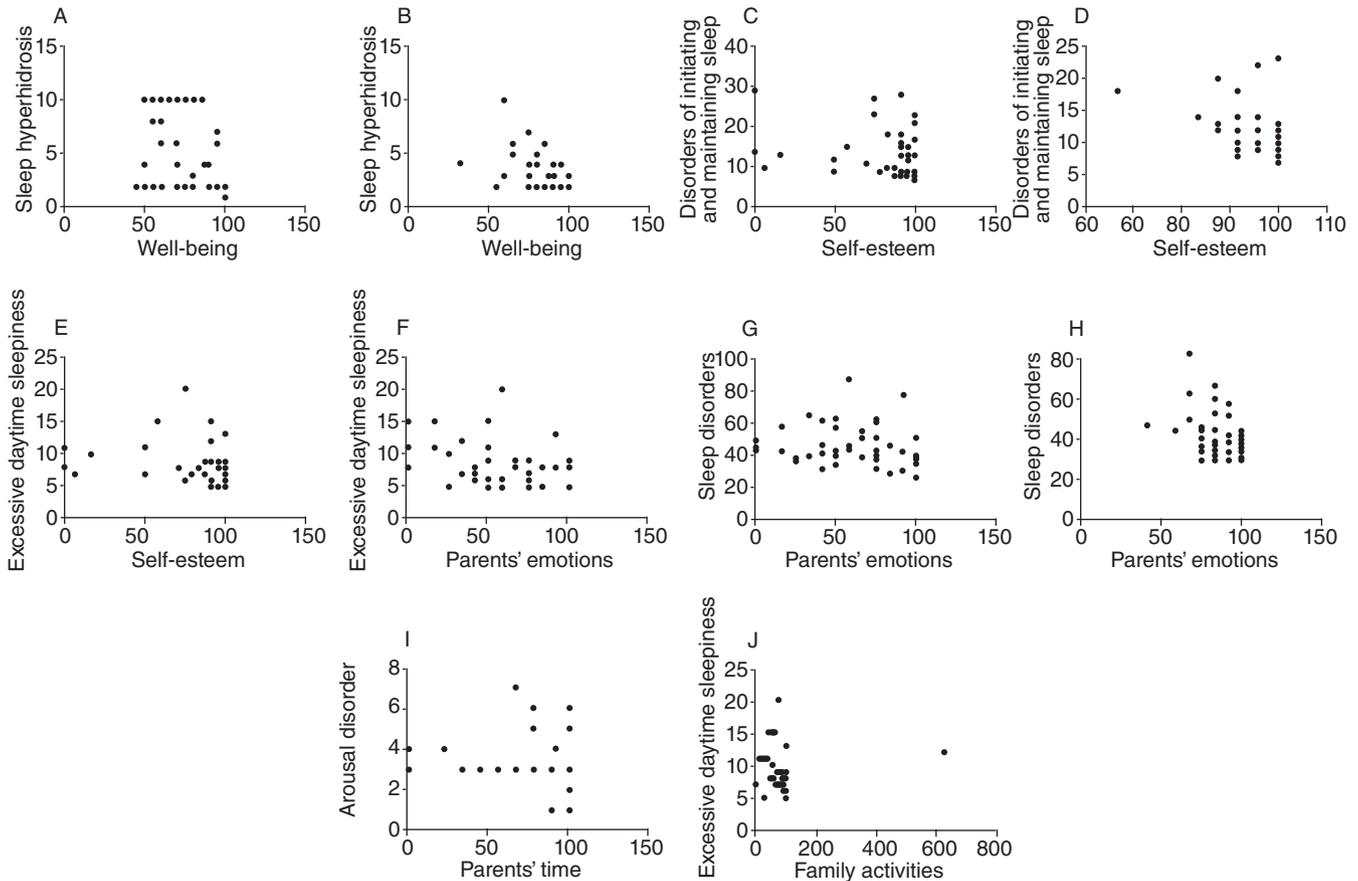


Figure 5. Correlations between the parameters analyzed in the Sleep Disturbance Scale for Children and the Child Health Questionnaire. (A) Correlation between well-being and sleep hyperhidrosis (SH) in the cerebral palsy (CP) group, $p=0.0296$, $r=-0.2900$. (B) Correlation between well-being and sleep hyperhidrosis (SH) in the control group, $p=0.0360$, $r=-0.3079$. (C) Correlation between self-esteem and disorders of initiating and maintaining sleep (DIMS) in the CP group, $p=0.0337$, $r=-0.2815$. (D) Correlation between self-esteem and disorders of initiating and maintaining sleep (DIMS) in the control group, $p=0.0045$, $r=-0.4350$. (E) Correlation between self-esteem and excessive daytime sleepiness (EDS) in the CP group, $p=0.0211$, $r=-0.3113$. (F) Correlation between the emotional impact on parents and EDS in the CP group, $p=0.0450$, $r=-0.2617$. (G) Correlation between the emotional impact on parents and EDS in the CP group, $p=0.0437$, $r=-0.2639$. (H) Correlation between the emotional impact on parents and sleep disorders in the control group, $p=0.0445$, $r=-0.2918$. (I) Correlation between the impact on parents' time and arousal disorders (AD) in the CP group, $p=0.0457$, $r=-0.2607$. (J) Correlation between family activities and EDS in the CP group, $p=0.0067$, $r=-0.3741$.

effect in the family and sleep disorders in children with intellectual impairment⁽²⁵⁾.

Insomnia has also been associated to EDS, with low QOL in children with CP⁽²⁶⁾. In this study, DIMS, which include insomnia, also presented negative correlation to the physical aspects in the research group and the self-esteem of both groups. The EDS disorder, however, negatively affected aspects such as overall health, physical function, self-esteem, parents' emotions, and family activities, having been shown already that the EDS and the remaining sleep disorders cause decrease in motivation and concentration, memory deficit, and immunity decline in the population in general^(9,10).

The results stress the importance of the dissemination of these findings to speech language pathology and audiology therapy. The speech language pathology and audiology may intervene in cases when the CP affects language, speech, memory, concentration and learning, swallowing and hearing,

among others⁽²⁷⁾, parameters that are directly under the influence of SQ. Thus, knowledge and treatment of sleep disorders, if any, are important to increase the efficiency of the treatment. Besides, the importance of studying the aspects of the QOL of this population is to humanize care, getting to know the factors that affect it, as to better direct therapeutic decisions in a multidisciplinary way.

CONCLUSIONS

On the basis of the results presented, it is concluded that the sleep-wake pattern in individuals with CP was altered when compared to the control group, as well as their QOL presented at low levels. The presence of sleep disorders and the QOL parameters showed negative correlation, indicating that the low sleep quality in this population directly affects their physical and emotional well-being.

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