J Compr Ped. 2023 May; 14(2):e132383. https://doi.org/10.5812/compreped-132383.

Published online 2023 March 14. **Research Article**

The Prevalence of Sleep Disorders Among Children with Chronic Functional Constipation, a Study in Arak, Iran

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Received 2022 October 14; **Revised** 2023 February 01; **Accepted** 2023 February 09.

Abstract

Background: Functional constipation (FC) is a common problem in childhood worldwide. This disorder can lead to various physical and behavioral problems and ultimately reduce the quality of life. Sleep disorders are also among the complaints of patients with FC.

Objectives: In this study, we aimed to investigate the prevalence of sleep disorders in children with chronic FC.

Methods: This cross-sectional study was conducted on 140 children aged 5 to 12 with chronic FC referred to the specialized pediatrics clinic of Amirkabir Hospital of Arak, Iran. The functional constipation was diagnosed based on Rome IV criteria. Children and their parents were requested to complete the Children's Sleep Habits Questionnaire (CSHQ). Data analysis was performed in SPSS version 22 using the chi-square and Mann-Whitney tests to find significant associations at the significance level of 5%.

Results: The mean (SD) age of the participants was 7.36 ± 1.6, and most participants were boys (65.7%). The prevalence of sleep disorders in children with chronic FC was 62.9% (95% CI: 54.5 - 70.2). Sleep resistance and sleep apnea were the most common minor sleep disorders. The prevalence of sleep disorders was significantly higher in girls (81.3%) than in boys (53.3%) with chronic FC (P = 0.001). There was no significant difference in the prevalence of sleep disorders in children with chronic FC aged 5 to 8 and 9 to 12.

Conclusions: In the present study, the results showed that the prevalence of sleep disorders in children with chronic FC was significant, and it was higher compared to other studies conducted on healthy children, and also it was found that girls had a significantly higher rate of sleep disorders than boys.

Keywords: Sleep Disorders, Children, Chronic Functional Constipation

1. Background

Functional constipation (FC) is a common childhood problem worldwide and is defined as idiopathic constipation diagnosed based on symptom-based Rome IV criteria (1). The global prevalence of FC in the world varies from 0.5% to 32%, with a male-to-female ratio of 1 to 2.1 (2, 3). It is believed that the etiology of this disorder is multifactorial due to interactions between psychological, physiological, social, behavioral, and cultural determinants (3). It has been estimated that 3% of referrals to a general pediatrician and 25% to a pediatric gastroenterologist are attributed to problems caused by this disorder (2). Among the systemic dysfunctions caused by FC in children, we can mention chronic and recurrent abdominal pain, fecal incontinence, rectal and anal pain, appetite suppression, fissures, fistulae, perineal infection, and enuresis and urinary tract infections (4). In addition, this disorder can lead to various behavioral problems, including low self-esteem, social isolation, psychological problems (e.g., depression, anxiety, aggression, and increased emotional reactivity), poor academic performance, and decreased quality of life (3-5).

Sleep disorders are also among the complaints of patients with FC (6-9) and, in general, among common problems in childhood. Epidemiological studies have estimated the prevalence of sleep disorders in children to be up to 50%, while only about 4% of these cases are officially diagnosed (10). Sleep is indispensable for childhood development, affecting physical and behavioral growth and emotional and cognitive performance. Therefore, sleep

disorders can have adverse short- and long-term effects on a person's life. Some short-term effects include low productivity, concentration, attention deficits, absence from classes or work, and decreased quality of life. On the other hand, long-term effects encompass increased mortality due to obesity, type 2 diabetes, hypertension, coronary artery disease, cardiac failure, cerebral infarction, memory loss, depression, immunodeficiency, and increased risk of traffic accidents (10, 11).

Since FC is a chronic disease associated with abdominal pain, anal pain, etc., it can affect sleep quality in children. Soiling (fecal incontinence or fecal leak to underwear) is a common phenomenon in children with chronic FC, which can decrease their self-confidence and expose them to punishment by parents and other psychological issues that consequently compromise sleep quality (12). Based on those mentioned above, it is essential to evaluate sleep disorders and their prevalence in children with chronic FC to be able to appropriately manage and treat these disorders along with the treatment of constipation to protect the child against other emotional and psychological consequences in the future (13).

2. Objectives

The relationship between sleep disorders and chronic constipation is relatively unknown. Besides, there are inadequate studies and no accurate reports on the prevalence of sleep disorders in children with chronic FC. In this study, we aimed to investigate the prevalence of sleep disorders in children with chronic FC so that we can take a step toward planning for the appropriate management and treatment of these disorders in these children.

3. Methods

This study started after obtaining ethical approval from the institutional ethics committee. Inclusion criteria were the diagnosis of FC and age 5 to 12 years. Exclusion criteria encompassed the diagnosis of concurrent gastrointestinal or other underlying chronic diseases, history of sleep disorders, taking medicines for constipation, diagnosis of psychiatric or chronic disease in parents, raising the kid in places other than the family, and the child's suffering from any psychiatric disorder. This cross-sectional study was conducted on 140 children between 5 and 12 with chronic FC referred to the specialized pediatrics clinic of Amirkabir Hospital in Arak, Iran, who were selected through convenience sampling. Informed consent was obtained from the parents after providing them with a complete explanation of the study's objectives. The parents were also assured of the confidentiality of their children's data. Finally, necessary explanations were provided to children and their parents about completing the Children's Sleep Habits Questionnaire (CSHQ), and they were requested to complete the questionnaire.

The CSHQ questionnaire was developed by Owens et al. (14) and contains 45 items aiming to assess sleep quality and sleep habits in children between 4 and 12, and parents completed it in this study. The tool items are conceptually grouped into eight subscales: (1) resistance to sleep, (2) delayed sleeping, (3) sleep duration, (4) sleep anxiety, (5) nocturnal awakenings, (6) parasomnias, (7) sleep apnea, and (8) daytime sleepiness. The questionnaire contains 45 queries, some of which have diagnostic and therapeutic value but no research value. So only 33 of the questions were considered for scoring. Each question has a score between 1 and 3 (from rarely to usually), and items 26, 11, 10, 3, 2, and 1 are scored reversely. The total score of the questionnaire ranges between 33 and 99, with a higher score reflecting more sleep problems.

The threshold for the diagnosis of sleep disorders is 42 and above. The score of each subscale is calculated by summing the scores of the respective questions. The questionnaire's domains include sleep resistance (resisting going to bed at night or crying, calling out, or leaving their room after bedtime) (15, 16) (six items), delayed sleeping (difficulty falling asleep) (one item), sleep duration (three items), sleep anxiety (four items), nocturnal awakenings (three items), parasomnia (seven items), sleep apnea (three items), and daytime sleepiness (eight items). This tool has been standardized for Iranian people, its validity was evaluated through content validity, and its reliability was evaluated using Cronbach's alpha coefficient (α = 0.81) and test-retest reliability (r = 0.98) (17).

Data analysis was done in SPSS version 22 using the central tendency and dispersion indices to express the data and the chi-square and Mann-Whitney tests to find significant associations at the significance level of 5%. This research (No. 6040) was approved by the Research Ethics Committee of Arak University of Medical Sciences (IR.ARAKMU.REC.1399.066).

4. Results

This study studied 140 children aged between 5 and 12 with chronic FC. The mean (SD) age of the participants was 7.36 ± 1.6. Most participants were boys (65.7%) aged 5 to 8 (79.3%). In this study, the prevalence of sleep disorders in children with chronic FC was obtained as 62.9% (95% CI: 54.5 - 70.2) (Table 1). This study's most and least common sleep disorders were sleep resistance and sleep

apnea, respectively (Table 2). There was no significant difference in the prevalence of sleep disorders comparing the age groups of 5 - 8 and 9 - 12 (P = 0.739). However, the prevalence of sleep disorders was significantly higher in girls (81.3%) than in boys (53.3%) with chronic FC (P = 0.001) (Table 3).

Table 1. Demographic Information of Children with Functional Constipation

Variables (Subgroup)	Frequency (%)
Sex	
Female	48 (34.3)
Male	92 (65.7)
Age, y	
5 - 8	111 (79.3)
9 - 12	29 (20.7)
Sleep disorders	
Yes	88 (62.9)
No	52 (37.1)

5. Discussion

Sleep is an essential and regulated process, and its quality and duration can be affected by factors such as demographic (age and sex), environmental, psychological, socio-economic, ethnic, and cultural factors, as well as physical activity, dietary regimens, and the presence of underlying diseases (18). In the present study, the prevalence of sleep disorders in children with FC was obtained at 62.9%, which is very high and indicates a serious problem in these children; therefore, it needs special attention in this regard, while few studies have investigated it in children with functional constipation.

Behavioral and psychological problems associated with chronic constipation encompass a wide spectrum of disorders. However, most of these psychological disorders are not well known and generally remain uninvestigated, which can be due to the lack of an objective understanding of the link between constipation and psychological-behavioral problems. It may be difficult to differentiate these problems from direct constipation-caused complications. Pain during defecation gives these children an unpleasant feeling that can predispose them to develop psychological and behavioral problems, including isolation, decreased self-confidence, and depression, all of which can affect sleep quality (3, 4, 12).

In a relatively large population-based study in China (19), excessive daytime sleepiness (EDS) was investigated in individuals suffering from functional gastrointestinal disorders (FGIDs). Out of about 3000 participants in this study, FC was diagnosed in 191 individuals, 33.5% of whom had EDS, one of the common sleep disorders, indicating a significant relationship between FC and this disorder (OR = 1.68, 95% CI: 1.20 - 2.35). Another study in China (9) enrolled 1200 patients with FGID, and the prevalence of sleep disorders among patients with FC was reported as 88%. The spectrum of sleep disorders in children is wide, and different studies have reported different rates of these problems in healthy children. In a study by Ghaneian and Kazemi Zahrani, the prevalence of sleep disorders in healthy children of primary school age was reported to be 41.14% (20).

Furthermore, Mohsenzadeh et al., in their study on 7 - 12-year-old children, noted a prevalence of 48.9% for sleep disorders. In the mentioned study, 43.5%, 24.7%, 20.3%, and 1.5% of the participants suffered from one, two, three, and four sleep disorders, respectively (21). In addition, in another study in Iran, Ozgoli et al. assessed 400 children aged 4 - 6 and reported a relatively higher rate of sleep disorders (63.25%) than in previous studies. In a recent study, behavioral sleep disorders (13%), nocturnal awakening disorders (37.5%), morning awakening disorders (45.25%), and daytime sleep disorders (14.5%) were reported to be at moderate to severe levels (22).

In the current study, we observed no significant difference in the prevalence of sleep disorders between the age groups of 5 - 8 and 9 - 12 (P = 0.739), which was in opposed to the findings of Ozgoli et al., who reported a rise in the prevalence of sleep disorders with advancing age towards 68 months (i.e., six years old) and above (22). Moreover, in the study of Mohsenzadeh et al., the prevalence of sleep talking increased with age; nevertheless, other sleep disorders did not show a significant relationship with age (21). In our study, the prevalence of FC was highest in the age group of 5 - 8. This observation highlights the need to pay attention to sleep disorders of children in this group (i.e., primary school and preschool phases), where they may be predisposed to many psychological and behavioral disorders. Adequate attention and appropriate interventions during this period can help prevent the child from acquiring adverse behavioral habits in the future.

In the present study, the prevalence of sleep disorders was significantly higher in girls than in boys with constipation (P = 0.005). This finding was in parallel with the results of some studies in the field (20, 23) but in contrast with the results of other studies. In the report of Mohsenzadeh et al., bed-wetting and teeth grinding (bruxism), two common sleep disorders, were significantly higher among boys than in girls, but other sleep disorders were not significantly different between the two genders (21). In addition, Shamsaei et al. noted that the mean (SD) scores of sleep habits were 64.46 (8.98) and 64.98 (9.71) in girls and boys,

Table 2. Total Score of Sleep Disorders Score and It is Domains in Children with Functional Constipation

Variables	Frequency	Mean ± SD	Min	Max	Weighted Mean
Total score	140	45.25 ± 6.71	33	61	1.39
Resistance to sleep	140	10.29 ± 2.99	6	18	1.72
Delayed sleeping	140	1.53 ± 0.74	1	3	1.54
Sleep duration	140	4.51 ± 1.51	3	9	1.50
Sleep anxiety	140	6.10 ± 2.36	4	12	1.53
Nocturnal awakenings	140	4.00 ± 1.17	3	7	1.34
Parasomnias	140	8.04 ± 1.32	7	14	1.20
Sleep apnea	140	3.27 ± 0.83	3	7	1.09
Daytime sleepiness	140	10.57 ± 2.33	8	17	1.32

Table 3. Compare Sleep Disorders Status in the Age and Sex Subgroups of Children with Functional Constipation

Variables	Sleep Disorders		P-Value
	Yes, Frequency (%)	No, Frequency (%)	
Sex			0.001
Female	39 (81.3)	9 (18.7)	
Male	49 (53.3)	43 (46.7)	
Age (y)			0.739
5 - 8	69 (62.2)	42 (37.8)	
9 - 12	19 (65.5)	10 (34.5)	

respectively, indicating no significant difference between the two genders (P = 0.669) (24).

Here, we merely investigated the prevalence of sleep disorders in children with chronic FC, so it cannot be generalized to the relationship between sleep disorders and chronic constipation. Nevertheless, other studies have emphasized that sleep disorders may exaggerate the physical and mental well-being of patients with chronic constipation and indirectly reduce their quality of life by enforcing the combinational impacts of anxiety, depression, and constipation (13). Therefore, it is important to inform the parents of these children about healthy sleep patterns and implement appropriate non-pharmaceutical interventions to manage sleep disorders in these children. In this study, the parents completed the questionnaire, so it is possible that the parents included their own opinion in some questions, or they might not have had enough accuracy in completing the questionnaires. In addition, although the mentioned center is a referral center for children, it may not represent the whole society. It is also suggested to conduct larger analytical studies with a comparison group considering the impacts of environmental, cultural, and other possible confounding factors in this field to adjust their effect.

5.1. Conclusions

The present study showed that the prevalence of sleep disorders in children with chronic FC was significant and higher than in other studies conducted on healthy children. There was no significant difference in the prevalence of sleep disorders in children with chronic FC aged 5 - 8 or 9 - 12; however, the result related to girls showed a significantly higher rate of sleep disorders than boys.

Footnotes

Authors' Contribution: MM and MH conceived of the presented idea. MH developed the theory. MM and MH carried out the experiment. MZ and MH verified the analytical methods. PY and M.Sh. supervised the findings of this work. All authors discussed the results and contributed to writing the manuscript. All authors contributed to the final version of the manuscript.

Conflict of Interests: The authors have no conflict of interest.

Data Reproducibility: The data presented in this study are openly available for readers upon request.

Ethical Approval: This research (No. 6040) was approved by the Research Ethics Committee of Arak Univer-

sity of Medical Sciences (IR.ARAKMU.REC.1399.066; link: ethics.research.ac.ir/ProposalCertificateEn.php?id=137004).

Funding/Support: This thesis (No. 6040) was approved and supported by the Arak University of Medical Sciences.

Informed Consent: Informed consent was obtained from the parents after providing them with a complete explanation of the study's objectives.

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