Research Article

The prevalence of sleep problems among mothers of children with autism spectrum disorder: A case–control study

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ABSTRACT

Background: Sleep problems are common among children with neurodevelopmental disorders; however, the mothers sleep status of these children was not sufficiently investigated. **Objectives:** Measure the sleep quality of mothers of children with autism spectrum disorder (ASD) in comparison to mothers of children who have no ASD. **Materials and Methods:** Participants included mothers of children 3–17 years old children with ASD $n = 77$ and an equal number of mothers recruited from the community who have a child without ASD with similar age group. Both groups completed the Pittsburgh Sleep Quality Inventory (PSQI) and Excessive Sleep Scale (ESS). **Results:** The sleep quality of mothers with ASD children was not significantly different compared to mothers with TD children. Poor sleep quality was associated with the status of the mother's employment according to ESS. **Conclusion:** The status of the mother's employment is a determinant factor whether sleep quality is poor or good and not the presence of a difficult child. The association of employment with the mother's mental health should be investigated.

KEY WORDS: Autism Spectrum Disorder; Mothers; Pittsburgh Sleep Quality Index; Sleep

INTRODUCTION

Sleep problems are common public health issue. Sleep disorders are defined as clinical conditions that are a consequence of a disturbance in the ability to initiate or maintain the quantity and quality of sleep needed for optimal health, performance, and well-being.[1,2] Sleep problems are common and studies showed a worldwide increase in both sleep deprivation and sleep disorders.[3] In general, studies showed that one-third of the general population has sleep problems.[4] The prevalence of excessive daytime sleepiness and insomnia has been found to globally range from 10 to 36% and 12.5 to 33.5%, respectively.[5-7] Sleep problems can lead to impaired physical, social and emotional daytime functioning, and dangerous driving.[8,9] Many factors are associated with sleep problems and daytime sleepiness, such as age, gender, poor sleep hygiene, and working conditions.[10]

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Sleep disturbances have been incriminated for affecting the quality of life in children with autism spectrum disorder (ASD) through aggravating daytime symptoms. Several studies documented that sleep problems are greater among children with ASD and their parents when compared to typically developed children (TD) and their parents.[11] Factors that were found to be associated with sleep problems among children with ASD are male sex, age, gastrointestinal distress, and non-verbal intelligence quotient.[12] Moreover, regardless what causes poor sleep in children, this pattern of sleep is significantly reflected on their parents' sleep status.[13] Other studies showed that sleep problems are more prevalent among children with ASD compared to TD children and mothers' stress was related to the severity of autism.[14,15] Giallo, in a study concerning mothers of children with ASD, reported a higher level of fatigue which

was related to poor maternal sleep quality.[16] Parents of children with ASD are more likely to report sleep problems and daytime sleepiness.[17] Mothers of children with ASD may report sleep problem with a mean global Pittsburgh Sleep Quality Inventory (PSQI) score of around 8.0, which exceeds the cutoff of 5.0, indicating poor sleep quality.[18,19]

In the Arab region, studies on sleep disorders among children with ASD were scarce. In Bahrain, the prevalence of sleep problems among children with ASD was high (39%).[20] Studies from K.S.A. reported a prevalence of obstructive sleep apnea risk and symptoms as 30% and 40% among men and women, respectively.[8,21] These studies included mothers of children without ASD.

By reviewing the available related reports, it was clear that the mother sleep quality was not sufficiently assessed. Thus, the current study aimed to determine the prevalence of sleep problems among Bahraini mothers of children with ASD in comparison to the general population and identify associated factors affecting poor sleep. The hypothesis was that mothers of children with ASD are more likely to have sleep problems in comparison to mothers of TD children.

MATERIALS AND METHODS

This comparative cross-sectional study was planned and completed using the principles of the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).[22]

Ethical Consideration

The Research Ethics Committee (REC) of the Secondary Healthcare Research Committee/Ministry of Health, Bahrain approved the research (SHCRC/EF/16/02/2018), and data collection was started after receiving the approval. Information consent was sought and obtained from each participant. Participation was voluntary, with no monetary or non-monetary incentives were given, and the participant was permitted to withdraw at any time. The study was conducted following the Declaration of Helsinki for human research.

Design

A case–control design

Sample

The cases (n = 77) were mothers of children (3–17 years) diagnosed as ASD at The Child and Adolescent Psychiatric Unit (CAPU), Psychiatric Hospital and were recruited from two autism centers. The diagnosis of ASD was based on a clinical interview using the Modified Checklist for Autism for the Toddler (M.CHAT), DSM4-TR, DSM-5, Child Autism Rating Scale (CARS), and ADOS (Autism Diagnostic Observation Schedule) for certain cases.[23] Mothers were recruited from Center 1 (caring for autistic children younger than 10 years) n = 38, Center 2 (caring for autistic adolescents from 11 to 19 years) n = 26, and Center 3 n = 13, as a convenience sample. All children in the centers were included in the study. Out of 123 contacted mothers, seven did not respond, 116 responded with a response rate = 94.3%. The total number of eligible cases was reduced to 77 as 39 cases met the exclusion criteria.

The inclusion criteria of the cases were mothers, having a child with ASD with or without comorbidities and a child's age of 3–17 years.

The exclusion criteria were, having another child with another disability or with a chronic illness (an illness that continued more than 6-months duration) and having a source of stress in the last month such as legal, marital difficulties, financial, and physical or mental disorders.

Controls

Mothers of children 3-17 year who do not have a child with ASD or neuro developmental disorder. The control group was recruited from employees of the same centers – Center 1 (18), Center 2 (20), and Center 3 (12) Other participants were recruited from Mother and Child Care of Primary Health Care Centers, community, and other sources (27). Out of 104, two refused, six did not respond, and 96 responded (response rate = 92.3%). The total number was reduced to 77 as 19 met the exclusion criteria.

The exclusion criteria of the control group were the same as those applicable to cases. All eligible mothers were recruited as a convenience sample.

Procedures

The data collection was held between June 15 and December 15, 2019. The data collection sheet included a fact sheet, an Arabic version of PSQI, and Epworth Sleepiness Scale (ESS); the data were collected by three methods, phone interviews, hard copies, or through links to Google Forms.

Instruments

PSQI

PSQI is a self-report questionnaire that assesses the quality, patterns, and disturbances of sleep over the past 1-month period and not to provide a clinical diagnosis. It consists of 19 items that generate seven subscales. These subscales are subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Each statement has a score from 0 (better sleep quality) to 3 (worse sleep quality). The scores given by each subscale are summed to give one global score that ranges from 0 to 21. A global score of more than 5 indicates poor sleep

quality and distinguishes it from a good sleep quality.[19] PSQI was translated into Arabic version and validated. The internal consistency reliability showed a Cronbach's alpha of 0.65.[24]

ESS

ESS is a self-administered questionnaire. It measures and assesses the general level of daytime sleepiness. It is a short questionnaire that consists of eight items, that is, situations engaged by most people in daily life. Each item is scored from 0 (never) to 3 (always). The scores are summed to yield a single number that ranges from 0 to 24. In general, the higher the final number, the higher possibility of sleep problems daytime sleepiness.[25] The Arabic version is validated.[26]

Data analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) software version 23.0. Descriptive statistics were summarized for the demographic characteristics and outcome measures. The mean and standard deviation (SD) were reported for continuous variables, and applicable counts and percentages were reported for categorical variables. Pearson Chi-square test, odds ratio along with 95% confidence interval and independent samples *t*-test were used as appropriate to investigate the differences between groups. $P = 0.05$ was considered significant.

RESULTS

Table 1 shows the demographic characteristics of both cases and controls. Maternal and children's age were matched in both the study groups while variations were observed in the education qualification and employment status. More mothers among the control group were highly educated (54.5%) and working (54.5%) compared to cases (13.51%) and (19.5%), respectively.

Table 2 shows the sleep quality according to PSQI and ESS. There was no significant difference in PSQI between the two groups (Odds ratio [OR] = 1.1–95% CI = 0.487–2.543, $P = 0.827$). The same finding regarding ESS among controls ([OR] = 0.652, 95% CI = 0.261–1.628, $P = 0.357$).

Table 3 shows the PSQI and ESS scores among working mothers versus non-working mothers. On PSQI, similar scores were observed in both the groups. ([OR] = 1.824, 95% CI = 0.499–6.659, $P = 0.359$) on ESS – non-working mothers scored significantly much less (5.9% vs. 50%) among working mothers (OR = 15.750–95% CI = 3.182–77.960, $P = 0.001$.

DISCUSSION

Contrary to the study hypothesis and several related studies; no statistically significant differences were found in sleep quality and excessive day sleepiness between mothers of ASD children and community controls. However, when the role of employment on sleep quality and excessive day time sleepiness was assessed, there was a significant difference in excessive day sleepiness among working mothers in both cases and control groups compared to non-working mothers ($P = 0.001$). This could be explained by the fact that non-working mothers, the majority of sample cases can find time to compensate for the short and poor-quality night sleep the night before by sleeping extra hours during next day. Working mothers who have to go to work during the day do not have this option; hence, feel sleepy during day working hours compared to the homemakers. Other factors which might have played a role and not investigated are the availability of domestic help by others. Furthermore, the presence of severe behavioral problems among children from both groups was not identified. It could be that children from both groups had similar pattern of behavioral problems and that affected mothers sleep quality equally.[27] Another important finding was concerning the demographic characteristics of mothers in both groups.

The number of college-educated mothers in the control group exceeds that among cases, this is a mere reflection of selection bias as some staff in the participated autism centers were recruited among the community control group. A caution should be exercised in future similar studies to avoid the discrepancy in socio-economic status. Employment and the

Table 1: Baseline features of the study groups

Measure	Case (%)	Control (%)
Mean child age	7.30 years	8.34 years
Mothers' age		
20–30	24.7	26.0
31–60	75.3	74.0
Mothers' education		
Secondary	50.6	27.3
University	19.5	54.5
Mothers' employment		
Working	13.0	54.5
Non-working	87.0	45.5

Table 2: ESS and PSQI scores for cases and control groups

Instrument	Cases (*n*=77)	Controls (*n*=77)	OR	CI	*P*-value*
PSQI					
Good sleep	83.1%	84.4%	1.1	0.467–2.593	0.827
Poor sleep	16.9%	15.6%			
ESS					
No EDS	88.3%	83.1%	0.652	0.261–1.628	0.357
EDS	11.7%	16.9%			

*Pearson Chi-square *P*-value; EDS - Excessive daytime sleepiness; OR: Odds ratio; CI: Confidence interval. ESS: Excessive sleep scale, PSQI: Pittsburgh sleep quality inventory

Table 3: Sleep quality in working and non-working mothers among cases and control groups

Instrument	Cases (*n*=77)		OR	CI	*P*-value*	Control (*n*=77)		OR	CI	*P*-value*
	Working (*n*=10)	Non-working (*n*=67)				Working (*n*=42)	Non-working (*n*=35)			
PSQI										
Good sleep	80%	83.6%	1.273	0.237–6.821	0.778	81%	88.6%	1.824	0.499–6.659	0.359
Poor sleep	20%	16.4%				19%	11.4%			
ESS										
No EDS	50%	94.1%	15.750	3.182–77.960	0.001	81%	85.7%	1.412	0.417–4.784	0.579
ESS	50%	5.9%				19%	14.3%			

*Pearson Chi-square *P*-value; OR: Odds ratio; CI: Confidence interval; PSQI: Pittsburgh sleep quality inventory; EDS: Excessive Daytime Sleepiness; ESS: Epworth sleepiness scale.

use of screen device were studied among mothers of children with ASD in a previous study. The study showed that working mothers used screen-based media especially smart phones, I-Pad, and videogames much more than homemakers.[28] In another study conducted recently that examined the sleep disturbances among children with ASD, Attention-Deficit/ Hyperactivity Disorder, and matched siblings emphasized the role of parental sleep hygiene in shaping the sleep pattern of their children.[29]

This study is the first study in the Arabian Gulf region that examined the sleep quality of mothers of children of ASD. The study adds knowledge to the cultural aspect of this public health problem. Despite of small number of cases, the results were compared to an equal number of community control. Another strength of this study was the elimination of possible sources of stress among both cases and controls.

Study Limitations

The study is a cross-section type and the results were based on the mother's recollection of information. This design has its limitations and subjectivity. In spite of the fact that individuals in the control group were recruited from different sites, mothers who were working were not equally represented in both groups. Finally, the severity of behavioral problems among the children in both groups was not assessed; hence, the impact of such challenging behavior on the mother's sleep quality was not addressed.

CONCLUSION

Sleep quality of mothers of children with ASD and mothers with TD children was assessed in a case–control study design using PSQI and ESS. The results indicated that the overall sleep pattern was not significantly different between both groups. However, working mothers had poor sleep quality measured by ESS in comparison to non-working mothers. The status of mother employment is a determinant factor in assessing mother sleep quality and not child diagnosis. As sleep is a necessity for good general functioning, further research on the effect of employment on mother's sleep is mandatory to enhance the health of children and their families.

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