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Evaluation of Sleep Quality and Quality of Life in Female Adolescents with Post-Traumatic Stress Disorder Related to Sexual Abuse

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ABSTRACT

Objective: This study aims to evaluate the sleep quality of adolescents with PTSD related to sexual abuse and to investigate the relationship between sleep quality, PTSD symptoms, and quality of life. Our study was designed as a cross-sectional study.

Materials and Method: Forty adolescents who were diagnosed with PTSD related to sexual abuse and 40 healthy adolescents as a control group were included in the study. Structured interview scale Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA) were applied to children by the clinician. All participants also filled out the Pediatric Quality of Life Inventory (PedsQL), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Insomnia Severity Index (ISI).

Results: The analyses of the data revealed that the quality of life scores of the case group was significantly associated with worse results. Sleeplessness index (ISI) and morning sleepiness scores (ESS) were higher in the case group than the control group ($P < .001$; $P < .001$) and perceived quality of sleep (PSQI) was determined to be lower ($P < .001$). A statistically significant relationship between PTSD total score and PSQI ($P < .001$; $r=0.550$), ESS ($P < .05$; $r=0.369$), ISI ($P < .001$; $r=0.613$), and PedsQL ($P < .001$; $r=-0.473$) were identified. PSQI, ESS, and ISI were also found to be correlated with each other (PSQI, ESS $r=488$; PSQI, ISI $r=0.755$; ESS and ISI $r=0.514$). Moreover, PSQI scores explain the deterioration in quality of life more significantly than CAPS-CA-TOTAL scores (PSQI $P=.008$; CAPS $P=.572$).

Conclusion: In cases with PTSD related to sexual abuse, we found that sleep affects the quality of life more than the symptoms of PTSD. Sleep-based approaches in PTSD may affect both quality of life and functionality positively, and PSQI may be used in clinical practice to assess both sleep and quality of life in the follow up of patients with PTSD related to sexual abuse.

ARTICLE HISTORY

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INTRODUCTION

According to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM-5*), "child sexual abuse encompasses any sexual act involving a child that is intended to provide sexual gratification to a parent, caregiver, or other individual who has responsibility for the child" (DSM-5).[1] In the DSM-V and PTSD criteria, sexual abuse was stated as a condition.[1] Approximately 70.4% of people in the general population encounter a traumatic event in a certain period of their lives.[2] Among the types of trauma, exposure to trauma through sexual abuse is an important predictor for the development of PTSD.[3] It has been shown that 37-57% of sexually abused children develop PTSD.[3,4] Another important point is that PTSD findings related to sexual abuse take longer and recovery takes longer.[5] Both exposure to trauma and post-traumatic symptoms can lead to impairment in the social, physical, and emotional areas of individuals.[6,7] Similarly, the literature on this subject shows that exposure to trauma worsens the perceived quality of life.[8-10] One of the other important problem areas reported by people exposed to trauma is sleep-related disorders. The rate of reporting sleep-related problems in children with traumatic experiences varies between 3% and 77%.[11] There are limited studies evaluating the deterioration of sleep quality in adolescents who developed PTSD after sexual abuse.[12] Another important point is that among PTSD patients with sleep-related complaints, there is more substance use disorder, suicidal tendency, and health-related complaints.[13] As can be seen, PTSD affects both quality of life and sleep. However, deterioration in sleep quality in both clinical and

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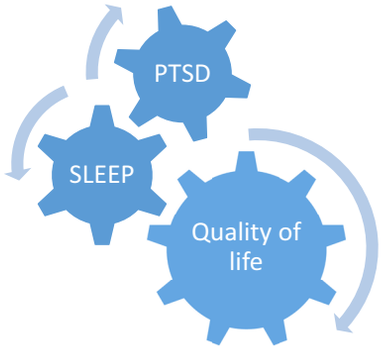

Figure 1. Picture of the relationship between PTSD, sleep, and quality of life.

non-clinical samples can affect the quality of life.[14-17] This complex relationship can be compared to what we call a gear wheel system (Figure 1).

In a recent study, veterans diagnosed with PTSD reported that they had worse sleep quality than those who were not diagnosed, and a significant relationship was found between PTSD symptom severity and impaired sleep quality, as well as cognitive functioning, mental health functioning, and physical functioning. The main emphasis of the researchers is that the deterioration in sleep quality in veterans with PTSD mediates the deterioration in the quality of life.[18]

The aim of this study is to evaluate the quality of life and sleep quality of female adolescents who developed PTSD after exposure to sexual abuse and also to investigate how much PTSD symptom severity and deterioration in the quality of life explain the decrease in perceived sleep quality.

MATERIALS AND METHODS

In the study, 80 female adolescents between the ages of 12 and 18 who were exposed to sexual abuse between 2019 and 2020 and treated at the Düzce University Faculty of Medicine (DUMF) Child and Adolescent Psychiatry Outpatient Clinic were evaluated. Among the adolescents evaluated according to DSM-5-TR diagnostic criteria, 60 cases of PTSD were found; 14 of the adolescents diagnosed with PTSD were not included in the study group because they had additional depression diagnosis, 5 had ADHD diagnosis, and 1 had an intellectual disability (Figure 2). Study exclusion criteria were additional psychiatric illness including PTSD, additional psychotropic medication use in the last 6 months, intellectual disability, and additional physical illness, and as a result, according to the DSM-V, the study group comprised 40 female adolescents who were sexually abused and who did not have additional psychiatric disease other than PTSD. Exclusion criteria for the control group were psychiatric illness, history of trauma, a severe physical illness that required treatment, history of drug use. The control group

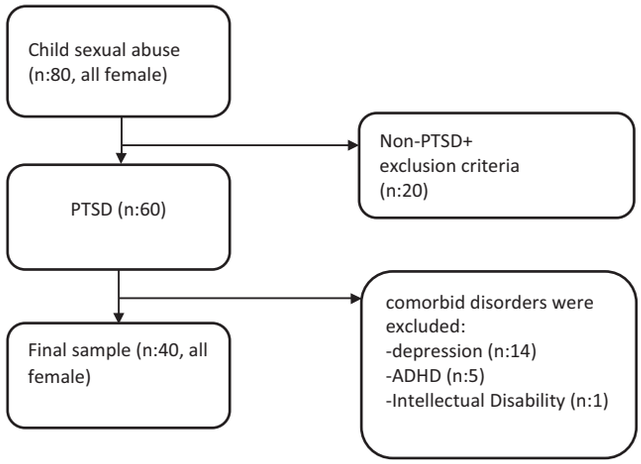

Figure 2. Flow chart of the study.

included 40 healthy female adolescents who did not meet the exclusion criteria and matched by age and gender. The flow chart for the study is shown in Figure 2. Ethical approval for the study was procured from the Ethics Committee of Düzce University [2019/88]. All of the study procedures were in accordance with the WHO Declaration of Helsinki and local laws and regulations. The researcher explained the informed consent in written and verbal form to all the cases referred and to the responsible parent present. Written consents were obtained from the parents and the child who volunteered to participate in the study. Clinical evaluations were performed with the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Now and Lifetime Version (ÇGDŞ-ŞY-T) (Kiddie-SADS-PL, Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Life-time). Clinician-Administered Post-Traumatic Stress Disorder Scale (CAPS-CA=PTSD-SSI) was administered by the researcher to adolescents diagnosed with PTSD due to sexual abuse to determine the severity of symptoms and to evaluate the current and lifelong process by the researcher. In addition, the participants were asked to fill in the Children's Quality of Life Scale (PedsQL), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Insomnia Severity Index (ISI).

Measures

1. Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children- Present and Lifetime Version (K-SADSPL)-Turkish: This semi-structured interview tool, which evaluates existing and lifelong psychopathology in children and adolescents according to DSM-V criteria, was developed by Kaufman et al.[19] and updated according to DSM-V criteria in 2016.[19,20] The Turkish reliability and validity study of the DSM-5 version was conducted by Ünal et al. in 2018.[21]

2. Clinician-Administered Post-Traumatic Stress Disorder Scale for Children and Adolescents (CAPS-CA): It is a scale applied by the clinician based on PTSD diagnostic criteria according to DSM. In addition to evaluating PTSD symptoms, the scale also questions other PTSD-related symptoms such as guilt, shame, dissociation, and fears associated with trauma.[22]
3. Pediatric Quality of Life Inventory (PesdQL): Developed by Varni et al.,[23] the scale evaluates the health-related quality of life in children aged between 2 and 18 years and questions physical health, emotional functionality, and social functionality.[23] The Turkish reliability and validity study of the scale was conducted by Çakın et al. in 2008.[24]
4. Pittsburgh sleep quality index (PSQI): PSQI consists of 24 questions in total, and 19 of these questions are filled by the owner of the scale, while the other 5 questions are filled by the person he/she shared his/her room with. PSQI has 89.6% sensitivity and 86.5% specificity for identifying cases with sleep disorders. It has been translated into 48 languages and is widely used in clinical research.[25]
5. Epworth Sleepiness Scale (ESS): The ESS is a self-report questionnaire that can be administered in a simple form that questions daytime sleepiness and 8 different life areas.[8,9] The scale, which was designed in 1991, was adapted to Turkish in 2008 by a validity and reliability study by Bilgay İzci et al.[26,27]
6. Insomnia Severity Index (ISI): ISI is a self-report scale that evaluates an individual's level of insomnia.[28] The scale, designed by Morin et al.,[28] was adapted to Turkish in 2011 by a validity and reliability study by Boysan et al.[29]

Statistical Analysis

All analyses were conducted with the use of Statistical Package for the Social Sciences (SPSS) version 21.0 (IBM SPSS Corp.; Armonk, NY, USA) for Windows. All continuous variables were tested for normality and homogeneity of variance. The Kolmogorov-Smirnov test and histograms were used to evaluate the distribution of the numeric variables. Student's *t*-test was used for normally distributed data, and Mann–Whitney U test was used for data that were not normally distributed. Correlations between continuous variables were evaluated using Spearman's correlation test. Logistic regression analyses were conducted to assess the adjusted effect of independent variables on the quality of life. A *P*-value below .05 was considered statistically significant.

RESULTS

The demographic characteristics of all subjects and the abuse-related features of the PTSD group are summarized in Table 1. All subjects were female. There were no differences between the two groups in age ($P > .05$). It was found that the participants were exposed to abuse for an average of 12.73 ± 16.35 months and the abuse was reported about 61.5 ± 67.35 days before the evaluation. All participants were abused by a single person and the number of times abuse took place varied. The family history of psychiatric illness (37.5%) was higher in the PTSD group, and the family history of physical (20%), emotional (17.5%), and sexual abuse (51%) was significantly higher ($P < .05$). Addictive substance use was more frequent among adolescents in the PTSD group (35%) and their families (80%).

Table 1. Demographic and Clinical Characteristics of Subjects

	PTSD group ($n=40$) Mean ± SD (range)	Control group ($n=40$) Mean ± SD (range)
Age	15.29 ± 1.75 (12-18)	15.06 ± 1.66 (12-17.11)
Total duration of the abuse (months)	12.73 ± 16.35 (0-60)	
How many days ago the abuse was reported (days)	61.5 ± 67.35 (1-360)	
CAPS-CA scores		
CAPS-CA-B (re-experiencing)	21.63 ± 5.22 (7-31)	
CAPS-CA-C (avoidance)	25.6 ± 6.93 (13-42)	
CAPS-CA-D (hyperarousal)	19.23 ± 5.03 (9-30)	
CAPS-CA-Total	67.25 ± 13.23 (43-95)	
	n %	*n* %
Family history of psychiatric disorders	15 (37.5)	7 (17.5)
Physical abuse in the family	8 (20.0)	1 (2.5)
Emotional abuse in the family	7 (17.5)	0 (0.0)
Sexual abuse in the family	6 (15.0)	0 (0.0)
Substance use in the family	32 (80.0)	14 (35.0)
Adolescent substance use	14 (35)	5 (12.5)

Table 2. Examination of PedsQL and Sleep Scales Sleep Scales in PTSD and Control Groups

	PTSD Group (n = 40) Mean ± SD	Control Group (n = 40) Mean ± SD	t	P Value	ES
Physical Health Summary Score*	51.3 ± 13.7	77.4 ± 12.7	-8.866	<.001	1.97
Psychosocial Health Summary Score*	55.7 ± 14.6	76.2 ± 13.4	-6.512	<.001	1.46
PedsQl Total Scale Score*	55 ± 13.7	76.4 ± 12.2	-8.073	<.001	1.65
Sleep Scales**	PTSD Group (n=40) Median (IQR)	Control Group (n=40) Median (IQR)	Z	P Value	ES
PSQI**	9.0 (4.0)	4.0 (3)	-6.267	<.001	0.49
ESS**	6.50 (5.75)	3.0 (5.0)	- 4.252	.001	0.23
ISI**	11.0 (9.0)	5.0 (5.75)	- 3.194	<.001	0.13

* Independent samples t-test; ** Mann-Whitney U test.

When the PTSD group and the age and gender-matched case group were compared, PedsQL total score, Physical Health Summary Score, Psychosocial Health Summary Score were significantly lower in the PTSD group (P < .001 Cohen's d=1.65; P < .001 Cohen's d=1.97; P < .001 Cohen's d=1.46). Sleep-related scales (PSQI, ESS, and ISI) were found to be significantly higher in the PTSD group (P < .001; P=.001; P < .001, respectively) (Table 2).

CAPS-CA scale scores and PedsQL and sleep scales were evaluated using Spearman's correlation test (Table 3). There was a moderate positive correlation between PSQI and CAPS-CA B-C-D-Total (P < .05 r: 0.370; P < .001 r: 0.464; P < .001 r: 0.562; P < .001 r: 0.550, respectively). There was a significant relationship between the Physical Health Summary Score and CAP-CA BD-Total, respectively (P < .05 r: -0.347; P < .001 r: -0.445; P < .05 r: -0.391; P < .001 r: -0.550), Psychosocial Health Summary Score, there was a statistically significant correlation between only and CAPS-CA Total score (P < .05 r: - 0.314).

PedsQL scores of the PTSD and control groups and scores of sleep scales were evaluated using Spearman's correlation test (Table 4). While significant correlations were found with PSQI and PedsQL total score, Physical Health Summary Score, and Psychosocial Health Summary Scores in the PTSD group (P < .001 r: 0.558; P < .001 r: 0.496; P < .05 r: 0.385, respectively), in the case group significant correlations were found with ISI and Physical Health Summary Score and Psychosocial Health Summary Scores (P < .001 r: 0.558; P < .001 r: 0.496; P < .05 r: 0.385, respectively) (Table 4).

Sleep scales were found to be significantly correlated with each other in both the PTSD group and the control group (Table 5). The relationship between PSQI and ISI was stronger in the PTSD group.

The effect of CAPS-CA Total on the quality of life of PSQI scores was investigated. Since PedsQL does not have a cut-off value, the median value of 52 in the case group was taken as a cut-off score and the effect of CAPS and PSQI on quality of life was compared (Table 6). The modeling was found to be statistically significant (x^2=11.282, df=2, P=.004) and explains 32.8% of the dependent variable. According to our model, the PSQI total score had a statistically significant effect on the quality of life (P=.008), while the CAPS score was not found (P=.572).

DISCUSSION

In this study, we evaluated the quality of life and sleep quality in girls who developed PTSD due to sexual abuse, and the study evaluated sleep and characteristics in three different areas (subjective sleep perception, daytime sleepiness, and insomnia) and their correlations with each other were given as a separate finding. In the final stage, an answer was sought to the question of whether sleep quality, which we think is important, or PTSD severity, better explains the decrease in quality of life.

The quality of life of adolescents with PTSD was found to be significantly impaired compared to the control group. The PTSD group was found to be associated with worse results in all three areas evaluated by the scale. Studies in this area generally focus on areas such as earthquakes, traffic accidents, and wars in the child group, the effect of childhood abuse on the quality of life in adulthood, and the

Table 3. Correlations of CAPS-CA Scores With PedsQL and Sleep Scales in the PTSD Group

	Physical Health Summary Score	Psychosocial Health Summary Score	PedsQl Total Scale Score	ESS	PSQI	ISI
CAPS-CA-B (re-experiencing)	-0.347*	-0.125	-0.288	0.408**	0.370*	0.382*
CAPS-CA-C (avoidance)	-0.254	-0.244	-0.301	0.274	0.464**	0.453**
CAPS-CA-D (hyper arousal)	-0.445**	-0.185	-0.415**	0.367*	0.562**	0.638**
CAPS-CA-Total	-0.391*	-0.314*	-0.473**	0.369*	0.550**	0.613**

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Table 4. Correlations of PedsQL and Sleep Scales in PTSD and Control Groups

	PTSD Group ($n=40$)			Control Group ($n=40$)		
	PSQI	ESS	ISI	PSQI	ESS	ISI
Physical Health Summary Score	-0.496**	-0.524**	-0.381*	-0.282	-0.224	-0.458**
Psychosocial Health Summary Score	-0.385*	-0.234	-0.261	-0.508**	-0.345*	-0.694**
PedsQl Total Scale Score	-0.558**	-0.384*	-0.428**	-0.492**	-0.282	- 0.631**

** Correlation is significant at the 0.01 level (2-tailed).

Table 5. Correlations Between Sleep Scales in PTSD and Control Groups

	PTSD Group ($n=40$)		Control Group ($n=40$)	
	PSQI	ESS	PSQI	ESS
ESS	0.488**	1	0.484**	1
ISI	0.755**	514**	0.577**	0.519**

** Correlation is significant at the 0.01 level (2-tailed).

evaluation of the quality of life in war veterans.[8,10,30-32] Almost all of the studies emphasized that PTSD affects the quality of life. This study is different and bears importance in terms of evaluating the quality of life, PTSD severity, and the effects of sleep on the quality of life in young people who have recently been sexually abused.

Sleep-related characteristics (subjective sleep perception, daytime sleepiness, and insomnia) were found to be more impaired in adolescents with PTSD compared to the control group. It has long been known that PTSD affects sleep. In a large-scale community study conducted without a face-to-face interview in China, it was reported that single or multiple traumas predicted poor sleep quality in female adolescents who were evaluated on gender.[33] In our study, the control group had approximately 1/4 poor sleep quality, which was found similar to studies with community samples.[33] A study by Krakow friends in an adult population also found an association between PTSD and sleep quality in women who survived sexual assault.[34]

In the adolescents in the study, it was determined that as the severity of the re-experiencing and hyper-arousal symptoms of PTSD increased, their physical functionality deteriorated. This may be related to the withdrawal of the patients, the disruption of their daily routine by being constantly vigilant, and the decrease in their desire to participate in physical activities. Consistent with our study, it was reported in a recent study that the deterioration in sleep quality in veterans with PTSD mediated the impairment in physical functionality.[18] Also, there are studies showing that sleep quality in PTSD affects parameters that limit physical activities during the day such as chronic pain and fatigue.[35-37] There was a correlation between PSQI, ESS, and ISI and the symptoms of re-experiencing, avoidance, and hyper-arousal of PTSD. PTSD, which develops due to sexual abuse, disrupts subjective sleep quality, causes daytime sleepiness, and causes sleeplessness at night. Considering the relationship between quality of life and sleep scales, a relationship was found in the PTSD group. When looking at the article on this subject, there are mixed results. While there is strong evidence that self-reported impairments in sleep quality are associated with impairment in health-related quality of life, it is noteworthy that this relationship could not be established completely when using sleep measurement tools.[38] The situation is not different in the non-clinical group. While some studies reported a weak relationship between sleep and quality of life, some studies pointed out that there is a strong relationship between sleep and quality of life.[39-43] Mccharty evaluated the American war veterans with and without PTSD using pathway analyses and reported that sleep quality and quality of life were worse in the PTSD group compared to the non-PTSD group and that the impairment in sleep quality mediated the deterioration in physical functionality.[18] Few studies have looked at the relationship between sleep and quality of life in studies on PTSD. We think that our study is very important in terms of evaluating the relationship between sleep and quality of life in three different scales in female adolescents who developed PTSD after sexual abuse. Although it is recommended to use objective measurements simultaneously with sleep, the use of a scale may be more useful in terms of clinical conditions, ease of use, and patient follow-up.[44]

Table 6. Investigation of the Relationship Between Decreased Perceived Sleep Quality and PTSD Symptom Severity With Impairment in Quality of Life.

	B	*P* Value	Odds Ratio	95% GA	
				Lower	Upper
PSQI**	-0.608	**.008**	0.544	0.347	0.854
CAPS-CA-Total*	0.018	.572	1.018	0.956	1.085
Constant	4.017	.056	55.542		
$x^2=11.282$, $df=2$, $P=.004$		Cox & Snell *R* Square = 0.246		Nagelkerke *R* Square = 0.328	

Bold value: $P<.05$.

Another important point we want to underline in this study is that sleep scales (PSQI, ESS, ISI) are highly correlated with each other. However, although a weak correlation was found between PSQI and ESS in the general population in the study conducted by Buysee, the developer of the PSQI scale, a very high correlation was found between PSQI, ESS, and ISI in our study.[44] The high correlations of sleep scales in our study may be explained as that we worked with a very specific group with PTSD. Also, Buysee's study is based on an adult sample, and there is no similar study in adolescents.

Sleep scales (PSQI, ESS, and ISI) were found to be correlated with PedsQL in the PTSD group. This situation indicates the relationship between sleep and quality of life. In addition, CAPS-CA, PedsQL, and sleep scales are also correlated in the PTSD group. This relationship has brought us to the question whether PTSD or sleep is more related to the quality of life. In response to this question, we examined it using further analysis to examine sleep and PTSD quality of life. PSQI, which has a high relationship with CAPS-CA and shows a high correlation with the PTSD group, was chosen among the sleep scales because of the low number of our patients, the higher correlation of ISI in the case group, and the lower correlations between ESS and CAPS-CA. In our study, while the PedsQL score was not found to be significantly related to the CAPS-CA score in further analyses, it was found to be significantly related to sleep quality (PSQI). In the literature, there is no study investigating how sleep and PTSD symptoms affect the quality of life in adolescents exposed to sexual abuse. Although there are some limitations to this data, it may make a significant contribution toward developing sleep-oriented approaches in order to increase the quality of life in clinical conditions in patients with PTSD. In the literature, the number of studies showing the importance of sleep in the treatment of PTSD and the effectiveness of sleep-focused treatment approaches is increasing.[45-48] Although the number of studies on sleep therapy in adolescents with PTSD is limited, there are studies showing that it can be effective.[49]

Among the limitations of our study, we could not reach enough male cases to compare gender. It was also not possible to exclude all possible factors affecting the quality of life, and the fact that the cases were not evaluated by objective sleep measurement methods can be considered as further limitations of the study. In addition, it may be the first study to directly evaluate the relationship between quality of life and sleep in adolescents who developed PTSD as a result of sexual abuse, and we think that the evaluation of the correlations between the three scales related to sleep increased the importance of our study. Although it partially explains the relationship between sleep quality and PTSD symptoms with quality of life, this information may be used for future research.

CONCLUSION

In conclusion, quality of life and sleep quality deteriorate significantly in adolescents who are sexually abused, and deterioration in sleep quality is associated with impaired quality of life. When evaluating PTSD patients, it may be important to pay attention to their sleep evaluation with a scale such as PSQI and focus on sleep during the treatment phase in order to improve the quality of life in adolescents in this age group.
Considering the complex structure of PTSD and the difficulties experienced in maintaining long-term therapy conditions, the results of our study indicate that sleep-oriented interventions may make significant contributions to the quality of life of this group of patients. Further studies with objective sleep assessment tools on how sleep-focused therapies affect the quality of life in the treatment of PTSD are needed.

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