ISSN 2616-5791 Vol.5, Issue 9: 31-39, DOI: 10.25236/AJMHS.2024.050906

A study on the correlation between family caregiver burden, anxiety, depression, and the sleep quality of adolescent depression patients

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Abstract: *This study is to investigate the relationship between the burden of family care, sleep quality, depression, and anxiety in adolescent patients with depression, and to provide a basis for reducing family caregiving burden and improving sleep quality in adolescents with depression. A total of 169 adolescent patients with depression who visited the department of psychosomatic medicine in our hospital from April 2023 to June 2023 were selected. The patients were divided into mild depression and moderate to severe depression groups based on HAMD scores. The moderate to severe depression group was further divided into the moderate depression group (134 cases) and the severe depression group (7 cases). The Zarit Burden Interview (ZBI), Pittsburgh Sleep Quality Index (PSQI), Self-Rating Anxiety Scale (SAS), and Self-Rating Depression Scale (SDS) were used to investigate the burden of family care, sleep, anxiety, and depression in adolescent patients. Non-parametric tests were used to compare the ZBI, PSQI, SAS, and SDS scores between the two groups. Spearman's correlation analysis was used to analyze the correlation between ZBI and SAS/SDS scores and between PSQI scores and SAS/SDS/ZBI scores in adolescent patients with depression. The total SAS, SDS, and PSQI scores of the mild depression group were significantly lower than those of the moderate to severe depression group, and the difference between the two groups was statistically significant ($P<0.05$). Comparing the moderate depression group with the severe depression group, there were statistically significant differences in SAS and PSQI scores ($P<0.05$), but no significant difference in SDS scores ($P>0.05$). Spearman's correlation analysis showed that all PSQI items, except for sleep efficiency and daytime dysfunction, were significantly positively correlated with SAS, SDS, and ZBI scores in adolescent patients with depression ($P<0.001$). Adolescent patients with depression experience anxiety, depression, and sleep disorders. Anxiety is positively correlated with depression, the burden of family care, and sleep disorders. Therefore, the relationship between these factors should be given attention in the treatment of adolescent depression.*

Keywords: *Adolescent; Depression; Sleep Quality; Family Caregiver Burden; Anxiety; Depression*

1. Introduction

Depression is a mood disorder characterized by low mood, lack of interest and pleasure, and low energy [1]. Among them, depression, as a kind of psychological disease that adolescents are very prone to and has been intensifying in recent years, is profoundly affecting the mental health of adolescents in China. Teenagers are a group of people whose body hormones are changing with age, whose neuroendocrine system is gradually maturing, whose learning tasks are increasing, and whose social needs are increasing, according to a report of the Chinese Academy of Sciences [2], in 2020, the nationwide depression among teenagers was 24.6%, of which 17.2% were mildly depressed, 7.4% were severely depressed, and the incidence rate of depression among children and teenagers was 15.4% in our country [3], due to the fact that adolescents are in a critical period of physical and mental development, their psychological growth is easily influenced by the surrounding environment, thus becoming a vulnerable group for depression. Sleep problems occur in a high percentage of depressed patients, so there is also literature suggesting caution in the diagnosis of depression in the absence of sleep problems. Regarding the sleep characteristics of depression, there has been considerable research in the past, and compared with non-depressed patients, depressed patients have significant differences

ISSN 2616-5791 Vol.5, Issue 9: 31-39, DOI: 10.25236/AJMHS.2024.050906

in objective sleep measures: longer sleep latency, higher post-sleep arousal, and lower sleep efficiency [4] and adolescents with depression are often also combined with varying degrees of insomnia, hypersomnia, and other symptoms of sleep disorders [5], and chronic insomnia leads to a lack of adequate sleep duration The chronic insomnia leads to a lack of adequate sleep time and sleep quality, which further aggravates the anxiety and depression symptoms of patients. Previous literature has shown that anxiety can lead to decreased sleep quality, and that sleep problems are also a precursor to recurrent depression, with depression and anxiety usually occurring in tandem. Residual sleep problems before and after treatment for depression increase the chances of recurrence of depression in adolescents [6]; therefore, it is urgent to improve sleep symptoms in adolescents with depression. In view of this, the present study was conducted by selecting adolescent patients with depressive mood episodes who attended outpatient clinics in our hospital from April 2023 to June 2023, and all the related matters were agreed by the ethical committee of the hospital, which are reported as follows.

2. Subjects and Methods

2.1 Study subjects

169 patients with adolescent depressive mood episodes who attended the psychosomatic department of our hospital from April to June 2023 were selected as the study subjects. They were divided into observation group and control group according to their depression degree, and the observation group was further divided into moderate depression and severe depression group.

Inclusion criteria.

(1) HAMD-24 scale score >8;

(2) Consistent with the diagnosis of depression;

(2) Age between 12 ~ 18 years old (including 12 and 18 years old).

(3) Patients were aware of the purpose of this study and participated voluntarily.

Exclusion criteria:

(1) Suffering from severe somatic diseases;

(2) Secondary depression;

(3) Late conversion to bipolar disorder;

(4) Those who did not cooperate with the study.

2.2 Research tools

2.2.1 Hamilton Depression Scale (HAMD)

The Hamilton Depression Scale version 24 was used in this study: it was used to assess the situation at that time or in the week before enrollment, including 7 categories (anxiety/somatization, body weight, cognitive impairment, day and night changes, blockage, sleep disorder, and despair). Totaling 24 items, the scale has good reliability and validity tests and is widely used both nationally and internationally. The scoring criteria are normal <8 points, scores between 8 and 20 for possible depression, between 21 and 35 for moderate depression, and >35 for severe depression.

2.2.2 Self-Depression Scale (SDS)

The scale consists of 20 items, of which 10 items are positively scored and 10 negatively scored. A four-point scale was used. Developed by Zung [7] et al. in 1968, it is one of the most widely used measurement tools in current clinical practice for research and treatment. Its standardized score is calculated from the total score of the questionnaire × 1.25 and then rounded to the nearest whole number, with a critical value of 53; the higher the score, the more severe the level of depression, less than 53 is normal, and greater than or equal to 53 is depression. A score between 53 and 62 is considered mild depression, a score between 63 and 72 is considered moderate depression, and a score greater than 72 is considered severe depression.

2.2.3 Self-assessment scale of anxiety (SAS)

The scale consists of 20 items, of which 15 are positively scored and 5 are negatively scored. A

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four-level scale is used, and its score is derived from the total score of the questionnaire × 1.25 to obtain the standardized score. The higher the score, the more severe the level of anxiety, with a cut-off point of 50, less than 50 being normal and greater than or equal to 50 indicating a level of anxiety. The scale has good reliability and validity.

2.2.4 Pittsburgh Sleep Quality Index Scale (PSQI)

This scale is widely used for sleep quality assessment [8]. It is used to reflect an individual's sleep quality in the past 1 month and contains 7 dimensions. In this scale, 1 to 4 questions contain fill-in-the-blanks and 5 to 9 questions contain choices. The total score ranges from 0 to 20. Higher scores represent poorer sleep quality.

2.3 Data processing

Statistical software SPSS 26.0 was used to process the data, and the measurements that did not meet the normal distribution were expressed as the median; comparisons between the two groups were made using the nonparametric test, and Spearman's test for the correlation between anxiety and depression, and the quality of sleep was performed. $p < 0.05$ taken as the difference was statistically significant.

3. Results

Table 1: Description of general information of caregivers of patients with depression.

Variable	Category	N	%
Sex	Mmale	48	28.4
	Female	121	71.6
Age	30-40	22	26.8
	41-50	55	67.1
	>50	5	6.1
Marital status	Unmarried	2	1.2
	Married	157	92.9
	Divorcee	9	5.3
	Bereaved of one's spouse (literary)	1	0.6
Education level	Junior high school and below	86	50.9
	Senior secondary	28	16.6
	University and above	55	32.5
Relationship with patients	Grandparents	2	1.2
	Maternal grandparents	1	0.6
	Parents	157	92.9
	Siblings	2	1.2
	Else	7	4.1
Profession	Business unit	30	17.8

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	Functionary	6	3.6
	Workers	7	4.1
	Peasants	55	32.5
	Else	71	42
Family residence	Countryside	34	20.1
	County seat	88	52.1
	Cities	47	27.8
Revenues	<2000	18	10.7
	2000-4999	66	39.1
	>4999	85	50.3

Among 169 patients, there were 28 cases in the mild depression group and 141 cases in the moderate to severe depression group. In the mild depression group, there were 15 males (53.6%) and 13 females (46.4%), with ages ranging from 12 to 18 years and an average age of 15.35 ± 1.687 years. In the moderate to severe depression group, there were 51 males (36.2%) and 90 females (63.8%). The moderate to severe depression group was further divided into 134 cases of moderate depression and 7 cases of severe depression. In the moderate depression subgroup, there were 48 males (35.8%) and 86 females (64.2%). In the severe depression subgroup, there were 3 males (42.9%) and 4 females (57.1%). The age range in this group was 12 to 18 years, with an average age of 15.46 ± 1.654 years.

As Table 1 shows: 71.6% of family members are female caregivers, 67.1% are between the ages of 41-50, 50.9% have a middle school education or less, and about half of the families live in the county and have incomes greater than 4999.

3.1 Comparison of SAS, SDS and PSQI in two groups of adolescents with depression

The results show that the SAS, SDS, and PSQI scores of adolescents in the mild depression group are lower than those in the moderate to severe depression group, and the inter-group differences are statistically significant ($P < 0.05$).

Table 2: Comparison of SAS, SDS, and PSQI scores in two groups of adolescents with depression

Group	SAS	SDS	PQSI Total Score	Sleep Quality	Sleep Onset	Sleep Duration	Sleep Efficiency	Sleep Disturbances	Hypnotic Medication	Daytime Functioning
Mild Depression Group	56(48.5,65.25)	60(54.25, 71.25)	9(7,12)	1(1,2)	2(1,2.75)	2(1,2)	0(0,1)	1(1,1.75)	0(0,0)	3(2,3)
Moderate to Severe Depression Group	69(60,75.5)	78(69,83)	12(10,15)	2(2,3)	3(2,3)	2(1,3)	1(0,1)	2(1,2)	0(0,1)	3(2,3)
Z	-4.174	-4.850	-3.437	-3.931	-3.608	-0.982	-2.082	-3.073	-1.117	-1.100
p	0.000	0.000	0.000	0.001	0.000	0.326	0.037	0.002	0.264	0.271

3.2 Comparison of SAS, SDS, PSQI in adolescents with depression of different levels of depression

The results indicate that the SAS scores of adolescents with moderate depression are significantly lower than those with severe depression, with a statistically significant difference ($P < 0.05$). However,

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the SDS and PSQI scores, while lower in the severe depression patients, do not show statistically significant differences (P > 0.05).

Table 3: Comparison of SAS, SDS, and PSQI in adolescent depression patients with different levels of depression

Group	SAS	SDS	PQSI Total Score	Sleep Quality	Sleep Onset	Sleep Duration	Sleep Efficiency	Sleep Disturbances	Hypnotic Medication	Daytime Functioning
Moderate Depression	68.5(59,75)	76(68.75, 83.25)	12(10,15)	2(2,3)	3(2,3)	2(1,3)	1(0,1)	2(1,2)	0(0,1)	3(2,3)
Severe Depression	76(71,81)	81(80,83)	17(14,18)	3(2,3)	3(3,3)	3(1,3)	1(0,1)	2(2,2)	3(0,3)	3(3,3)
z	-2.327	-1.644	-2.348	-2.181	-1.372	-1.212	-0.346	-1.330	-2.765	-0.926
P	0.020	0.100	0.019	0.029	0.170	0.225	0.730	0.183	0.006	0.355

3.3 Depression Patients' Family Caregiver Burden, SAS and SDS, PSQI Correlation Analysis

The correlation between SAS and SDS, as well as PSQI, in adolescent depression patients was analyzed using Spearman's analysis. Except for sleep efficiency and daytime functioning impairment, the total PSQI score and all other items in adolescent depression patients were positively correlated with anxiety, depression, and family caregiver burden (P < 0.05), as shown in Table 4.

Table 4: Correlation Analysis of Family Caregiver Burden, SAS, SDS, and Sleep Quality in Depression Patients

Variable	SAS	SDS	ZBI
PQSI Total Score	.551**	.473**	0.058
Sleep Quality	.432**	.398**	0.044
Sleep Onset	.302**	.329**	0.016
Sleep Duration	.251**	.239**	0.082
Sleep Efficiency	.241**	.261**	-0.011
Sleep Disturbances	.528**	.385**	0.038
Hypnotic Medication	.387**	.266**	0.035
Daytime Functioning	.355**	.312**	-0.074

** Significance was observed at the 0.01 level (two-tailed).
* Significance was observed at the 0.05 level (two-tailed).

3.4 Regression Analysis of Anxiety, Depression, and Family Caregiver Burden on Sleep Quality in Adolescent Depression Patients

The dependent variable is the PQSI total score, with anxiety, depression, and family caregiver burden scores as independent variables in the regression analysis. The table below shows the regression equation with anxiety as an independent variable entering the PQSI total score as the dependent variable.

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Table 5: Regression Analysis of Sleep Quality in Adolescent Depression Patients with Anxiety, Depression, and Family Caregiver Burden

Dependent Variable	Independent Variable	Regression Coefficient	SE	Regression Coefficient	t	P
PQSI	SAS	0.179	0.02	0.591	9.11	0.000
	SDS	-0.001	0.005	-0.013	-0.194	0.847
	ZBI	0.023	0.021	0.07	1.096	0.275

4. Discussion

Among the 169 adolescents included in the study, 28 were adolescents with possible depression (control group) and 141 were adolescent patients with depressed mood (observation group), and As shown in tables 2, 3, it was known that SAS with SDS and PSQI scores of the patients in the control group were lower than those of the adolescents in the observation group, and the difference was statistically significant (P<0.05). The level of anxiety and depression of family members and the severity of the patient's condition interact with each other. The exacerbation of the patient's symptoms increases the level of anxiety and depression in family members, while the emotional state of family members also affects the patient's condition . Family members tend to have emotional empathy with the patient, and the emotional state of family members can affect the atmosphere of the whole family. Especially in the face of a patient's deteriorating condition, family members can be upset by the patient's mood swings, which may create a stressful environment and negatively affect the patient's mental health. Family members can therefore mitigate possible misunderstandings and discrimination by educating themselves about depression and understanding the patient's condition. Seek help from mental health professionals to learn effective mood management techniques such as deep breathing, meditation or exercise to deal with their anxiety and depression, as well as to provide better support to the patient. The results of this study showed that the sleep scores of patients in the mild depression group were significantly lower than those in the moderate to severe depression group, and the difference was statistically significant (P<0.05). Depressed patients often experience insomnia or decreased sleep quality, and there is a strong correlation between sleep problems and the severity of the condition. Depression can cause insomnia, which in turn affects the patient's mental status, meaning that insomnia may prolong the duration of the illness and aggravate existing symptoms. And some studies have found that the probability of first-onset anxiety and depression in insomnia patients is 6 times and 3 times higher than that of those without insomnia, and anxiety and depression are the main reasons for the prolongation of insomnia, and foreign studies have shown that 90% of anxious patients will develop depression , and 85% of depressed patients will have comorbid anxiety. This shows that the co-morbidity of anxiety and depression is high. Compared with depressed patients without anxiety, depressed patients with anxiety have more severe symptoms, worse treatment outcomes, and the most severe sleep problems, and they have the highest percentage of sleep problems. Therefore, while studying depression, it is also important to focus on patients' accompanying anxiety. There is no difference in the scores of family care burden between the two groups in the above results, and the reason for this may be analyzed that family care burden is affected by the severity of the patient's depressive symptoms. If the patient's symptoms are relatively mild, the caregiving burden faced by the family is less, resulting in a non-significant difference. Also if the family has a strong social support network, caregiving tasks can be shared, thus reducing the individual burden. Each family's situation is unique, so the caregiving burden for families may vary depending on factors such as family structure, social support, and the severity of the patient's condition. Some families may be better able to cope with the challenges of caregiving, while others may feel more stressed.In this study, SAS with SDS and PSQI scores were analyzed in 141 adolescent patients with depressed mood and it was found that SAS with SDS and PSQI scores of adolescents with moderate depression were lower than those of adolescents with severe depression, but except for SAS and PSQI the difference between the two groups was statistically significant. the difference of SDS scores between the two groups was not significant. This is inconsistent with the findings of related studies [9]. Analyzing the reasons may be on the one hand, this study did not distinguish between the initial and follow-up patients, the initial patients due to the lack of knowledge of the disease, insecurity increased, fear, fear, worry and other emotions, which in turn affects their sleep quality and aggravates the depression, while the follow-up

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patients may be due to the fact that they have received treatment, and there is no relevant triggers to stimulate the condition of their depressed mood and sleep quality will be relatively better. On the other hand, the study population was only adolescent depression patients who attended our hospital and the number of cases was 169, so there may be geographical differences and sample size limitations. It is also possible that it is related to the evaluation method and the time of investigation.

In this study, the SAS scores of adolescent depression patients were significantly and positively correlated with the SDS and PSQI scores ($P<0.01$). That is, the higher the level of anxiety, the higher the level of depression, and the worse the sleep quality of the patients. Foreign studies have shown that 90% of anxious patients will be depressed [10], and 85% of depressed patients will be combined with anxiety. This shows that the co-morbidity of anxiety and depression is high. Compared with depressed patients without anxiety, depressed patients with anxiety have more severe symptoms, worse treatment outcomes, and the most severe sleep problems, and they have the highest percentage of sleep problems. Therefore, while studying depression, it is also important to focus on the anxiety that accompanies the patient.

And a typical symptom in the early stages of the onset of depression is insomnia [11]. There is an interaction between depression and sleep quality. Sleep quality belongs to one of the evaluation indexes for the diagnosis and treatment of depression, and depression can cause insomnia, which in turn affects the mental status of patients, which means that insomnia may prolong the duration of the disease and aggravate the existing symptoms. And it has been found [12] that the probability of initial anxiety and depression in patients with insomnia is six times and three times higher than in those without insomnia, and anxiety and depression are the main causes of insomnia prolongation, which are causative of each other. In addition, poor sleep quality can also lead to a decrease in the individual's ability to control their emotions, which in turn can lead to some negative emotions. Analyzing the reasons may be due to the fact that adolescents are easily affected by external adverse factors due to the unstable development of their emotional and physiological functions, and their own regulation ability is poor, which leads to different degrees of mental health problems. Facing academic pressure, interpersonal relationships, life events, parental emotional neglect and other situations can not self-regulation, emotions can not be cathartic, resulting in pessimism and negative emotions, often toss and turn at night, difficult to sleep, and then produce some radical behavior to ease the emotions, such as self-injury, suicide and so on. This is consistent with the findings of related studies that insomnia increases the risk of suicide. Difficulty in sleeping at night leads to an increased sense of despair, distress and isolation in individuals, and it is more likely to generate some negative cognitions and emotions at night than during the day, which may also be the cause of suicidal ideation or behavior.

As shown in table 5, the regression analysis of sleep quality and anxiety, depression, and family caregiving burden in adolescents with depression showed that family anxiety was an influencing factor on the quality of sleep of the patients, especially females, and the reason for this was analyzed that females were more likely to experience difficulty in falling asleep. Anxiety and negative thinking may increase at night, making falling asleep more difficult. It is more common for women to report decreased sleep quality. This may include problems with waking up during the night, light sleep, and early awakenings. Certain studies have found that women are more likely to experience nightmares and nightmares, which may be linked to emotional dysregulation. There are also the effects of biological cycles, hormonal changes, and more. It is important to note that these gender differences can be complex and multifactorial, and that each patient's experience is unique. Different studies may yield different results, and individual differences, sociocultural and other environmental factors may also have an impact on these relationships.

Sleep plays an important role in the development of mood regulation and cognitive functioning in adolescents. A good night's sleep leads to more happiness and joy, while adolescents with poor sleep quality have more emotional problems detected. The condition of depressed patients is easy to recur and has a long duration, which increases the psychological burden of patients and produces a large number of negative emotions. Previous studies have shown [13] that insomnia and sleep problems are more common in clinically depressed adolescents than in adults [14], and that depressed adolescents are accompanied by sleep disorders, poor sleep quality, and long sleep duration [15]. Insomniacs in the study of Shen Baoyun [16] are often accompanied by mood disorders, especially depression, anxiety, tension and agitation. And the condition worsened over time. Related studies have shown that sleep disorders and severity of depressive symptoms are independently correlated, which is consistent with the results of the present study. 94.6% of patients with incomplete remission of depression continued to have insomnia symptoms. This suggests that treating depression by itself does not cure insomnia [17]. Whereas most studies have shown that insomnia treatment has a positive clinical effect on depression,

ISSN 2616-5791 Vol.5, Issue 9: 31-39, DOI: 10.25236/AJMHS.2024.050906

most results are not statistically significant [18]. So in addition to focusing on treating depression, the quality of the patient's sleep is also very important. Therefore depressed patients need to be aware of the dangers of sleep problems during the onset of the disease. Previous studies have shown that depressed patients have sleep disorders mostly due to their mindset decisions, and patients with negative emotions have decreased sleep quality [19], further exacerbating the emergence of suicidal attitudes and behaviors [20]. As an important period of individual growth and development, it is crucial to closely monitor their mental health during adolescence, so it is particularly important to provide health education to adolescent patients with depression, encourage them to strictly follow the medical prescription of medication, and introduce the prevention of depression to their families, in order to play the role of family support to improve the patient's adherence. And patients can be encouraged to actively participate in sports, such as fitness, swimming, dancing, etc., which can help them regulate their mood and improve the quality of sleep, and help patients better return to society [21]. What's more, some studies have shown that psychological nursing intervention helps to improve the sleep quality of depressed patients, reduce negative emotions and improve the quality of life, so it has the value of promotion.

5. Conclusion

In summary, it is concluded that adolescent patients generally have sleep problems, which in turn bring psychological and physical harm to the patients and produce negative emotions, which in turn affect their sleep quality, leading to a vicious circle. Whereas adolescent depressed patients are at greater risk of self-injury and suicide, their insomnia symptoms further aggravate the incidence of self-injury and suicide. Therefore, whether it is to reduce the risk of suicide or self-injury, or to reduce the physiological function damage, the sleep problem deserves our attention. However, the mechanism of sleep problems in adolescent depressed patients is still unclear and needs more exploration. Families can seek professional mental health support and learn effective emotion regulation and coping skills to reduce anxiety and depression. And open, understanding and supportive communication with the patient is important. The deficiencies of this study mainly include: ①Due to the limitations of region and manpower, there may be geographical differences and sample size limitations. The survey subjects were only patients with depression and their caregivers in the outpatient clinic of a tertiary hospital in Xi'an;②the general information table for family members did not differentiate the specific situation of patients' family members, and failed to analyze the family burden of caregivers with multiple roles;③ this study did not differentiate between first-time and follow-up patients. Therefore, in subsequent studies, the sample size and study scope can be increased to gain a more comprehensive understanding of the family burden of depressed patients and their families in general.

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