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Original article

The Relationship between Sleep Disorders, Level of Psychological Stress and State-Trait Anxiety in Patients with Anxiety Disorders

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SUMMARY

Introduction/Aim. There is a cause-and-effect relationship between stress, sleep disorders and emotional brain function. Insufficient quality and duration of sleep can trigger or exacerbate anxiety in an individual. The study aims to assess the scores for sleep disorders and the level of stress depending on typological features of state and trait anxiety in patients with anxiety disorders and sleep disturbances, as well as to establish the relationships between them.

Methods. Ninety-one patients with anxiety disorders and sleep disturbances, aged between 21 and 59 years, were examined. The following methods were used to access the levels of psychological stress, state/trait anxiety and sleep disorders: the Integrative Anxiety Test, PSM-25 questionnaire, PSQI, ISI and ESS.

Results. The highest number of correlations between the state anxiety components and the level of stress ($p < 0.01$), severity of insomnia, global score, sleep latency and duration measured by the PSQI was established ($p < 0.05$). As for the trait anxiety, it correlated significantly with the level of stress ($p < 0.01$), PSQI global score, sleep duration, sleep efficiency, and sleep latency ($p < 0.05$).

Conclusion. A significant correlation was established between the state/trait anxiety and the level of stress, as well as the scores on the PSQI, ISI, ESS scales within the cohort of patients with anxiety disorders. The study on the relationship between the scores of the level of stress, sleep disorders, and state/trait anxiety emphasizes the importance of considering the findings in the implementation of comprehensive personalized therapy and psychotherapy for the abovementioned cohort of patients.

Keywords: state anxiety, trait anxiety, anxiety disorders, sleep disorders, psychological stress

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INTRODUCTION

Epidemiological studies confirm that anxiety is the most prevalent mental health issue. The systematic review of 87 studies conducted in 44 countries and meta-regression data revealed a variation in the prevalence of anxiety disorders worldwide, ranging from 4.8% to 10.9% (1, 2). Anxiety disorders differ from normative or stress-induced anxiety in that they do not correspond to a real threat and disrupt routine functioning. In most cases, the onset of the disease occurs during adolescence or early adulthood and is more commonly observed in females (3, 4).

Recent studies have shown that sleep disorders, especially insomnia, affect approximately 50% of individuals with anxiety, and insufficient sleep quality and duration can exacerbate it further. Sleep quality is defined as an individual's satisfaction with all aspects of sleep and has four main criteria: efficiency, latency, duration, and wake after sleep onset. Numerous factors, including physiological, psychological, familial, social and environmental, influence the sleep process. The loss or disruption of sleep quality has serious adverse effects on both mental and physical health, resulting in fatigue, irritability, daytime dysfunction, slowed reactions and increased consumption of caffeine or alcohol (5). A correlation between sleep quality and an individual's level of anxiety was established (6).

Anxiety is just one part of the arousal response to stress, regardless of whether the stress is real, implied or overestimated. When overcoming stress, a person undergoes adaptation from an endocrine and neurological perspective, known as the general adaptation syndrome (7). Disruption of the adaptive response can lead to the development of various illnesses, deteriorating the quality of life and a person's productivity in social, emotional, and professional spheres (8, 9). The impact of stress on sleep is increasingly becoming a focal point in scientific research. It is suggested that circadian dysregulation and sleep disorders may play a significant role in the pathophysiology of stress-related disorders (10, 11). The relationship between stress and sleep disorders is complex and often bidirectional, with both direct and indirect effects. Stress can induce insomnia and also be a result of it, thus explaining the frequently observed positive association between stress and insomnia (12).

The findings of the studies on human molecular visualization highlight the crucial role of specific neurotransmitter mechanisms in the brain, such as adenosinergic receptor system, in regulating anxiety, arousal and sleep (13). The existence of a cause-and-effect relationship between sleep and emotional brain function has been reported, which was supported by clinical observations demonstrating that anxiety and other affective disorders are accompanied by sleep disorders. It was demonstrated that sleep deprivation enhances the anticipatory response of the amygdala and anterior part of the insula in potentially unpleasant expectations. Respondents with excessive trait anxiety exhibit greater vulnerability to heightened anticipatory neural reactions while experiencing insomnia (14, 15). It was proven that an adequate amount of sleep and the duration of rapid eye movement sleep phase improve the consolidation of emotional memories and provide protection against anxiety (16). State anxiety is associated with an increase in sleep onset latency, which significantly affects the subjective evaluation of sleep quality (17).

The aim of the study is to assess the scores for sleep disorders and level of stress depending on typological features of state anxiety and trait anxiety, as well as to establish the relationships between the scores for sleep disorders, level of stress, and state anxiety and trait anxiety in patients with anxiety disorders and sleep disturbances.

PATIENTS AND METHODS

The study was based on the examination of patients with anxiety disorders and sleep disorders made at Municipal Enterprise "Regional Institution for Provision of Psychiatric Care, Poltava Regional Council" from September 2022 to March 2023. Inclusion criteria for participation were: informed consent for examination, age between 21 and 59 years, confirmed diagnosis of anxiety disorder and the Pittsburgh Sleep Quality Index (PSQI) score > 5. Patients with severe or decompensated somatic and neurological pathology, individuals with psychiatric and behavioral disorders caused by alcohol and psychoactive substances use, and patients with organic brain lesions were not included in the study. The patients were not taking any medication at the time of the examination.

The study was conducted in compliance with the Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects (1964 - 2013). At the outset of the study, participants were informed about the purpose of the study, data confidentiality and were asked for their consent to participate. All participants voluntarily agreed to take part in the study and provided written informed consent prior to its commencement, ensuring confidentiality and anonymity.

Consent for the study was obtained from 102 patients. Among them, 7 (6.8%) had missing values in at least one of the questionnaires, and 4 (3.9%) did not complete the questionnaires so they were not included in the respondent group. In total, 91 patients were examined, including 48 women (52.7%) and 43 men (47.3%). The respondents were distributed by age as follows: 16 patients (17.6%) aged between 21 and 30 years, 25 (27.5%) aged between 31 and 40 years, and 25 (27.5%) patients aged between 41 and 50 years, 25 (27.5%) patients aged between 50 and 59 years (mean age M = 42.18, SD = 10.74). According to the ICD-10, diagnoses included adjustment disorders (F43.22, F43.23), panic disorder (F41.0), generalized anxiety disorder (F41.1), mixed anxiety and depressive disorder (F41.2), and other mixed anxiety disorders (F41.3, F41.8). The duration of the disorders ranged from 4 months to 8 years.

The Integrative Anxiety Test (IAT) was used to assess the level of state and trait anxiety (18). It consisted of two scales of 15 items each for self-assessment of state anxiety (SA-S) and trait anxiety (SA-T). The test employs the traditional four-point Likert scale for response gradations, where state anxiety is rated from 0 (not at all) to 3 (severely), and trait anxiety is rated from 0 (almost never) to 3 (almost always). A score below 4 corresponds to a low level of anxiety, scores range from 4 to 6 indicate a normal level and scores of 7 and higher indicate a high level of anxiety and the presence of maladaptation. The test identifies five additional components in the structure of each of the two scales, revealing the meaningful nature of self-assessment of the affective state. Emotional discomfort (ED) is associated with the presence of emotional disorders, emotion reduction or dissatisfaction with life situation and emotional tension. The asthenic component of anxiety (AC) indicates a predominance of fatigue, sleep disorders, lethargy or passivity. The phobic component (PHC) reflects a sense of inexplicable threat and insecurity. Prospective anxiety (PA) indicates the projection of fears into the future, preoccupation with the future and heightened emotional sensitivity. Social avoidance (SAV) is related to manifestations of anxiety in social contacts and attempts to identify the social environment as the main cause of tension and insecurity.

The Psychological Stress Measure Scale (PSM-25) by Lemyre-Tessier-Fillion was used to assess the level of psychological stress and consists of 25 statements characterizing a person's mental state (19). The PSM-25 includes descriptors of emotional, cognitive, behavioral and somatic indicators. Respondents were asked to assess their state over the past 4 - 5 days on the 8-point Likert scale from 1 to 8, where 1 denote "not at all" and 8 mean "constantly (every day)". The result determines the level of stress, where the score lower than 100 indicates a low level of stress, the score 100 - 154 score indicates a moderate level, and the score greater 155 indicates a high level of stress.

The Pittsburgh Sleep Quality Index (PSQI) assesses sleep quality and disorders over the past month. It consists of 19 questions, with the first 4 being open-ended questions, and questions 5 to 19 are rated on a 4-point Likert scale from 0 to 3, where 3 indicates the highest degree of disturbance. Subscale scores indicate sleep problems on 7 components: Subjective Sleep Quality (SSQ), Sleep Latency (SL), Sleep Duration (SD), Sleep Efficiency (SE), Sleep Disorders (SDS), Use of Sleep Medication (USM) and Daytime Dysfunction (DD). By adding up the scores across the 7 components, a global score (GS) ranging from 0 to 21 is obtained. A total PSQI score > 5 indicates unsatisfactory sleep quality (20, 21).

The Insomnia Severity Index (ISI) is a self-assessment questionnaire consisting of 7 questions. It allows the evaluation of the nature, severity and impact of insomnia. Over the past month, respondents rated sleep parameters on a 5-point Likert scale from 0 - no problem to 4 - very severe problem. This produced a total score ranging from 0 to 28, where the score of 0 - 7 indicate no insomnia, the score of 8 - 14 suggests subthreshold insomnia, the score of 15 - 21 indicates moderate insomnia and the score of 22 - 28 represents severe insomnia (22).

The Epworth Sleepiness Scale (ESS) was used to assess daytime sleepiness. This is a self-administered questionnaire with 8 questions. The respondent rate, on a 4-point Likert scale (from 0 to 3), their usual chances of falling asleep or dozing off during

eight different activities varied widely in terms of level of sleepiness. The total ESS score (the sum on 8 questions) can range from 0 to 24, with the following interpretation of the results: 0 - 10 – normal daytime sleepiness; 11 - 12 – mild daytime sleepiness; 13 - 15 – moderate daytime sleepiness; 16-24 – severe daytime sleepiness (21, 23).

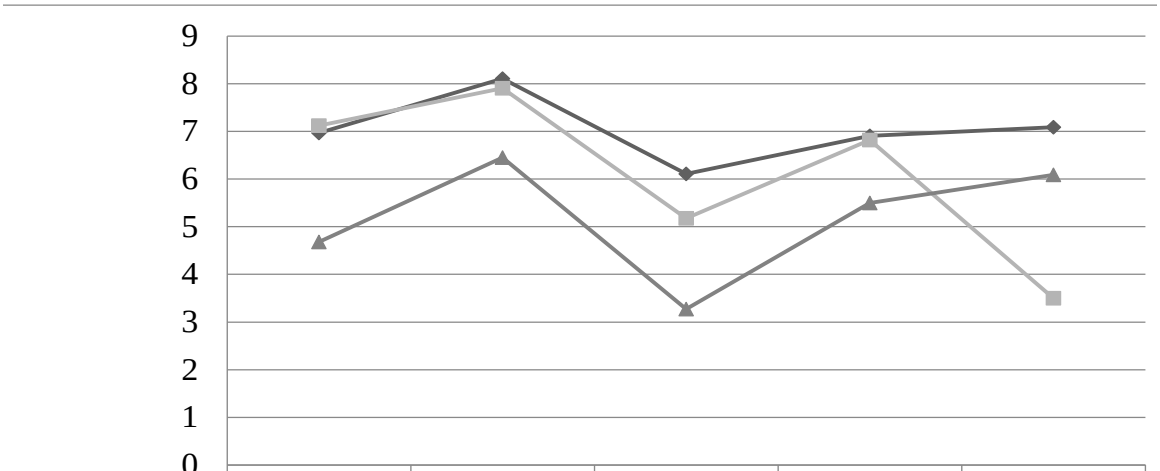
Data analysis

The hypothesis regarding the normal distribution of the sample was tested. The Shapiro-Wilk test (W) was chosen for testing with a confidence level of $p = 0.95$. Since $W < 1$, the investigated sample did not follow a normal distribution. Therefore, non-parametric tests were employed. Cluster analysis using k-means components was carried out to determine the typological features of state anxiety and trait anxiety in each of the two scales. The analysis of differences in the scores for sleep quality, insomnia, daytime sleepiness, and level of psychological stress among three groups of patients with different typological profiles of state/trait anxiety was performed using the non-parametric Kruskal-Wallis H-test. The Mann-Whitney U-test was used for pairwise comparisons of the scores. Spearman rank correlation analysis (r Spearman) was employed to explore the relationships between variables. The critical value for the level of statistical significance for all types of analysis was set at $p < 0.05$. Statistical data processing was performed using IBM SPSS Statistics V.27.0 software.

RESULTS

Using the k-means cluster analysis method within the structure of state anxiety and trait anxiety scales, three typological profiles were identified for the examined patients, as presented in Figures 1 and 2.

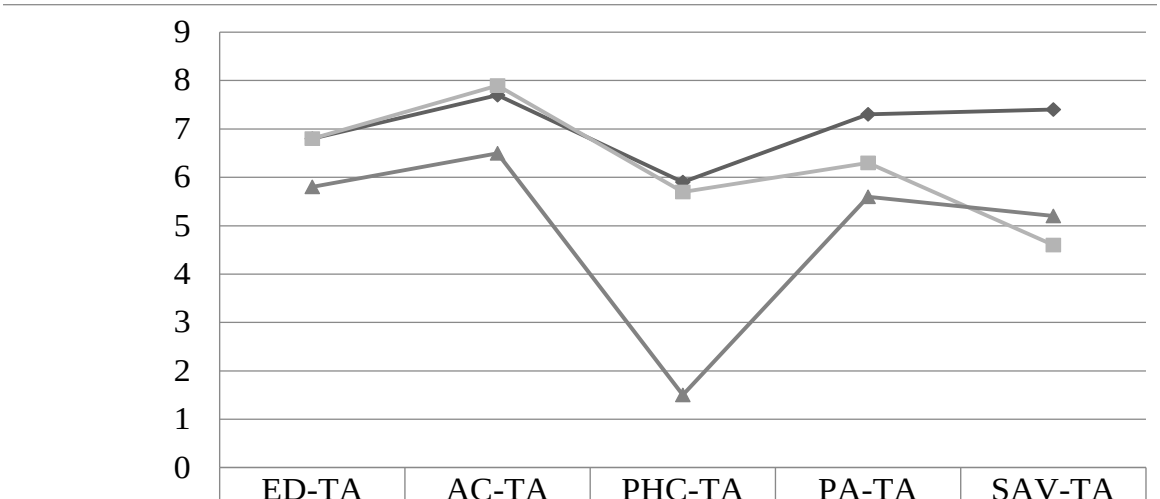
Three groups of cluster profiles of state anxiety were identified. Cluster 1 included 35 (38.4%) respondents who had high levels of asthenic component of anxiety, emotional discomfort, prospective anxiety, and social avoidance, while the score for phobic component was within the normal range. Cluster 2 included 34 (37.4%) individuals with high scores for asthenic component, emotional discomfort, prospective anxiety, and a normal level of the phobic component and social avoidance. Cluster 3



	ED-SA	AC-SA	PHC-SA	PA-SA	SAV-SA
Cluster 1	6.97	8.11	6.11	6.91	7.09
Cluster 2	7.12	7.91	5.18	6.82	3.5
Cluster 3	4.68	6.45	3.27	5.5	6.09

Figure 1. *Typological profiles of state anxiety in patients with anxiety disorders and sleep disturbances*

ED-SA – emotional discomfort state anxiety, AC-SA – asthenic component state anxiety, PHC-SA – phobic components state anxiety, PA-SA – prospective anxiety state anxiety, SAV-SA - social avoidance state anxiety



	ED-TA	AC-TA	PHC-TA	PA-TA	SAV-TA
Cluster 1	6.8	7.7	5.9	7.3	7.4
Cluster 2	6.8	7.9	5.7	6.3	4.6
Cluster 3	5.8	6.5	1.5	5.6	5.2

Figure 2. *Typological profiles of trait anxiety in patients with anxiety disorders and sleep disorders*

ED-TA – emotional discomfort trait anxiety, AC-TA – asthenic component trait anxiety, PHC-TA – phobic components trait anxiety, PA-TA prospective anxiety trait anxiety, SAV-TA social avoidance trait anxiety

involved 22 (24.2%) respondents with normative scores of all anxiety components, except for the phobic component, which had a low level.

According to the obtained cluster profiles of trait anxiety, three groups of respondents were identified. Cluster 1 included 40 (43.9%) individuals who had high scores for all components of trait anxiety, except for the phobic component, which was within the normal range. Cluster 2 included 38 (41.8%) respondents with a high level of asthenic component and emotional discomfort, and normative scores for phobic component, prospective anxiety and social avoidance. Cluster 3 involved 13 (14.3%) individuals with a high level of asthenic component, normative scores for emotional discomfort, prospective anxiety and social avoidance, and a low phobic component.

Table 1 presents the mean score for sleep quality, insomnia severity, daytime sleepiness, and the level of stress with different typological profiles of state anxiety.

A significant difference between the Clusters 1 and 2 SA were found in the scores for sleep duration ($Z = -2.425$, $p = 0.015$), sleep efficiency ($Z = -2.351$, $p = 0.019$), and total sleep quality score ($Z = -2.723$, $p = 0.006$). In the Clusters 1 and 3 SA, a significant difference was observed in the scores for sleep latency ($Z = -2.355$, $p = 0.019$), daytime dysfunction ($Z = -2.406$, $p = 0.016$), total sleep quality score ($Z = -2.306$, $p = 0.021$), insomnia ($Z = -3.610$, $p < 0.001$), daytime sleepiness ($Z = -2.126$, $p = 0.033$) and level of stress ($Z = -4.651$, $p < 0.001$). Significant differences between Clusters 2 and 3 were found in the scores for subjective sleep quality ($Z = -3.333$, $p = 0.001$), sleep latency ($Z = -2.592$, $p = 0.010$), sleep duration ($Z = -3.343$, $p = 0.001$), sleep efficiency ($Z = -2.532$, $p = 0.011$), use of sleep medication ($Z = -2.058$, $p = 0.040$), daytime dysfunction ($Z = 2.260$, $p = 0.024$), and PSQI global score ($Z = -4.074$, $p < 0.001$), as well as insomnia ($Z = -3.876$, $p < 0.001$), daytime sleepiness ($Z = -2.245$, $p = 0.025$) and level of stress ($Z = -4.365$, $p < 0.001$). No significant differences were found between the SA clusters in the score for sleep disturbances.

The analysis of differences in the scores for sleep quality, insomnia, daytime sleepiness and level of psychological stress among the groups with different typological profiles of trait anxiety showed a significant difference in the level of stress ($H = 14.51$, $p = 0.001$), as shown in Table 2.

Table 1. *The mean score for sleep quality, severity of insomnia, daytime sleepiness, and level of stress in patients with anxiety disorders and sleep disturbances with different typological profiles of state anxiety*

	SA Cluster 1	SA Cluster 2	SA Cluster 3	H	p
PSQI subjective sleep quality	2.14±0.69	**2.41±0.5**	**1.86±0.56**	**10.08**	**0.006**
PSQI sleep latency	*2.46±0.61*	*2.5±0.71*	*2.09±0.53*	*7.82*	*0.02*
PSQI sleep duration	**1.49±0.89**	**2.03±0.94**	**1.14±0.74**	**12.52**	**0.002**
PSQI sleep efficiency	*1.2±1.02*	*1.85±1.18*	*1.05±0.95*	*8.36*	*0.015*
PSQI sleep disorders	1.37±0.49	1.47±0.51	1.36±0.58	1.15	0.562
PSQI use of sleep medication	0.71±1.02	**1.09±1.08**	**0.55±1.01**	5.04	0.81
PSQI daytime dysfunction	*1.97±0.7*	*2.0±0.74*	*1.55±0.67*	*6.82*	*0.033*
PSQI global score	***11.34±3.23***	***13.32±2.8***	***9.59±3.14***	***19.15***	***< 0.001***
Insomnia Severity Index	***16.09±3.63***	***16.32±3.42***	***11.82±3.73***	***17.72***	***< 0.001***
Epworth Sleepiness Scale	**8.63±4.71**	**8.68±4.9**	**5.82±2.7**	5.97	0.051
Psychological Stress Measure	***137.23±25.14***	***135.94±26.36***	***98.91±18.99***	***24.46***	***< 0.001***

Mean score with $p < 0.05$ are italicized, $p < 0.01$ is in bold, and $p < 0.001$ is both italicized and in bold

Table 2. *The mean score for sleep quality, severity of insomnia, daytime sleepiness, and level of stress in patients with anxiety disorders and sleep disturbances with different typological profiles of trait anxiety*

	TA Cluster 1	TA Cluster 2	TA Cluster 3	H	p
PSQI subjective sleep quality	2.08±0.66	2.34±0.53	2.0±0.7	4.313	0.116
PSQI sleep latency	2.43±0.59	2.45±0.69	2.08±0.64	3.75	0.153
PSQI sleep duration	1.6±0.98	**1.76±0.88**	**1.15±0.9**	3.94	0.139
PSQI sleep efficiency	1.38±1.1	1.55±1.18	1.08±0.95	1.656	0.437
PSQI sleep disorders	1.33±0.53	1.42±0.5	1.62±0.5	3.793	0.150
PSQI use of sleep medication	0.75±1.03	0.89±1.06	0.77±1.17	0.393	0.822
PSQI daytime dysfunction	1.93±0.73	1.92±0.75	1.62±0.65	2.181	0.336
PSQI global score	11.48±3.34	**12.34±3.3**	**10.23±3.3**	4.631	0.099
Insomnia Severity Index	14.6±4.2	16.26±3.5	13.54±4.2	4.380	0.112
Epworth Sleepiness Scale	7.8±4.56	8.66±4.78	6.46±3.23	1.652	0.438
Psychological Stress Measure	***128.6±27.49***	***136.13±26.84***	***98.77±22.34***	***14.509***	***0.001***

Mean score with $p < 0.05$ are in bold, $p \leq 0.001$ is both italicized and in bold

A difference was found between tClusters 1 and 3 ($Z = -3.032$, $p = 0.002$), as well as between the Clusters 2 and 3 TA for the level of stress ($Z = -3.568$, $p < 0.001$). Between the Clusters 2 and 3 TA, a difference was observed in the score for sleep duration ($Z = -2.027$, $p = 0.043$) and the PSQI global score ($Z = -2.032$, $p = 0.042$).

The correlation analysis of the score for sleep disturbances, level of stress, state anxiety, and trait anxiety in patients with anxiety disorders showed the presence of both positive and negative correlations, as shown in Table 3.

The strongest positive correlations were observed between: the SA total score and the level of stress ($r = 0.49$; $p < 0.01$); the SA emotional discomfort, severity of insomnia ($r = 0.42$; $p < 0.01$), and global PSQI score ($r = 0.39$; $p < 0.01$); between the SA asthenic component and level of stress ($r = 0.45$; $p < 0.01$), ISI ($r = 0.36$; $p < 0.01$); SA phobic component and level of stress ($r = 0.42$; $p < 0.01$), SA prospective

Table 3. *Correlation between the scores for sleep quality, insomnia, daytime sleepiness, level of psychological stress, and state/trait anxiety in patients with anxiety disorders and sleep disturbances*

	GS-TA	ED-TA	AC-TA	PHC-TA	PA-TA	SAV-TA	GS-SA	ED-SA	AC-SA	PHC-SA	PA-SA	SAV-SA
PSQI, SSQ	0.07	0.18	0.08	0.09	0.06	-0.11	0.21	**0.26***	0.19	0.11	**0.30****	-0.16
PSQI, SL	**0.21***	0.16	**0.21***	0.13	0.13	0.01	**0.26***	**0.24***	**0.35****	**0.24***	0.05	-0.13
PSQI, SD	0.18	**0.36****	**0.26***	0.20	0.04	0.05	**0.23***	**0.36****	**0.27***	0.17	0.14	-0.16
PSQI, SE	0.16	**0.31****	**0.25***	0.05	0.04	-0.02	0.16	**0.26***	0.17	0.07	0.10	-0.18
PSQI, SDS	-0.09	0.08	0.01	-0.11	-0.03	**-0.22***	-0.01	0.04	-0.14	-0.05	0.16	-0.12
PSQI,USM	0.09	0.19	0.12	0.02	0.10	-0.01	0.04	0.16	0.16	0.08	0.09	-0.16
PSQI, DD	0.09	0.15	0.18	-0.01	0.01	0.07	**0.35****	0.20	**0.33****	0.09	0.10	0.08
PSQI, GS	0.19	**0.38****	**0.30****	0.09	0.09	-0.04	**0.30****	**0.39****	**0.33****	0.17	0.21*	**-0.22***
ISI	0.07	0.05	0.124	0.08	0.12	-0.13	**0.32****	**0.42****	**0.36****	**0.26***	**0.36****	-0.16
ESS	0.03	0.03	0.**21***	-0.06	-0.04	-0.08	**0.23***	0.19	**0.35****	0.05	0.05	-0.12
PSM 25	**0.34****	**0.28****	**0.44****	**0.28****	0.14	-0.05	**0.49****	**0.49****	**0.45****	**0.42****	**0.26***	-0.04

GS-TA – global score trait anxiety, ED-TA – emotional discomfort trait anxiety, AC-TA – asthenic component trait anxiety, PHC-TA – phobic components trait anxiety, PA-TA – prospective anxiety trait anxiety, SAV-TA – social avoidance trait anxiety; GS-SA – global score state anxiety, ED-SA – emotional discomfort state anxiety, AC-SA – asthenic component state anxiety, PHC-SA – phobic components state anxiety, PA-SA – prospective anxiety state anxiety, SAV-SA social avoidance state anxiety.
PSQI, SSQ – subjective sleep quality, PSQI, SL – sleep latency, PSQI, SD – sleep duration, PSQI, SE – sleep efficiency, PSQI, SDS – sleep disturbance, PSQI, USM – use of sleep medication, PSQI, DD – daytime dysfunction, PSQI, GS – global score, ISI - Insomnia Severity Index, ESS – Epworth Sleepiness Scale, PSM – Psychological Stress Measure.
The rank correlations highlighted in bold are significant at * - $p < 0.05$, ** - $p < 0.01$

anxiety and ISI ($r = 0.36$; $p < 0.01$); between the TA emotional discomfort and global PSQI score ($r = 0.38$; $p < 0.01$), and sleep duration ($r = 0.36$; $p < 0.01$).

On the SA scale, the highest level of correlation was established between the SA total score and the level of stress ($p < 0.01$), global PSQI score ($p < 0.01$), daytime sleepiness ($p < 0.01$), sleep latency and PSQI sleep duration, ESS ($p < 0.05$), ISI ($p < 0.01$). The score for emotional discomfort and the level of psychological stress ($p < 0.01$), the global PSQI score ($p < 0.01$), PSQI sleep duration, ISI ($p < 0.01$) and subjective sleep quality, sleep latency and sleep efficiency ($p < 0.05$) also showed strong positive correlations. The lowest positive correlation was found between the score for SA emotional discomfort and sleep efficiency. On the TA scale, a significant number of correlations were found, particularly between the score for asthenic component and the level of stress ($p < 0.01$), PSQI global score ($p < 0.01$), sleep latency, sleep duration, PSQI sleep efficiency, and ESS score ($p < 0.05$). The lowest negative correlation was found between the score for TA social avoidance and sleep disturbance. No correlations were found between the scores for state/trait anxiety and the use of sleep medication.

DISCUSSION

In our study, the highest number of correlations was established between the score for sleep latency and the global score, and the asthenic component of both state anxiety and trait anxiety, as well as emotional discomfort and the phobic component of state anxiety. This is confirmed by objective methods of examination. Investigation, conducted by Hungarian and Belgian researchers on the influence of trait and state anxiety on sleep characteristics assessed by polysomnography demonstrated that when comparing groups with high and low trait/situational anxiety and groups with high state anxiety and low trait anxiety and low trait/state anxiety, a significant difference was found in the score for sleep latency. However, no significant difference was found between the group with high trait an-

xiety/low state anxiety and the group with low trait/state anxiety, indicating a correlation of sleep onset latency specifically with the score for state anxiety (24).

A study, investigating the relationship between state and trait anxiety and sleep quality components among a cohort of medical university students, conducted by Iranian researchers, revealed that the highest level of correlation between state and trait anxiety was observed with the sleep latency. The lowest correlation was found between trait anxiety and the use of sleep medication. It was established that state and trait anxiety are stronger predictors of subjective sleep quality, and to a lesser extent, of sleep duration (25).

In the study conducted by Australian researchers, the impact of trait and state anxiety on sleeping difficulties was analyzed in 292 older adults. It was found that trait anxiety is a moderate predictor of getting to sleep, quality of sleep, awake following sleep and behavior following waking, whereas state anxiety was a weaker predictor of difficulties with getting to sleep and behavior following waking. The authors conclude that it is the trait anxiety that has a negative impact on sleeping difficulties in a healthy older adult cohort (26). In our study, the relationship between sleep latency, sleep duration and state anxiety in patients with anxiety disorders was established.

In our study, a significant correlation between both state anxiety and trait anxiety with the level of stress was established. This is consistent with the results of another research, which studied the neurocognitive model of the influence of long-term stress and trait anxiety on the performance of cognitive tasks. Researchers have demonstrated that the interaction of stress and anxiety modulated the latent dynamics of decision making, with high trait anxiety leading to higher psychological distress (27). Another study analyzed the stress, anxiety and sleep quality among 1,200 university graduates during the COVID-19 pandemic. The findings of the correlation analysis showed no significant correlation between state anxiety and perceived stress, unlike the trait anxiety, which showed a positive correlation with the score for perceived stress. The sleep quality among the respondents had a significant correlation with both trait and state anxiety according to all PSQI scores. At the same time, no correlation between sleep quality and perceived stress was noted (28).

Spanish researchers assessed the sleep quality of 61 patients with obsessive-compulsive disorder and 100 healthy controls, taking into account the severity of depression, trait anxiety and obsessive-compulsive symptoms. In both groups, a significant correlation between the overall sleep quality and trait anxiety was found (29). In our study, a significant correlation between the overall sleep quality and both state and trait anxiety was established. This is also supported by research among a sample of college students regarding the mediating role of anxiety in the interaction of competitive attitudes and interpersonal relationships. It showed that in conditions of competition and interpersonal insecurity, respondents had higher indicators of state anxiety. In turn, the feeling of worry and uneasiness caused by a high level of state anxiety had a negative effect on the quality of sleep (30).

CONCLUSION

Thus, a significant correlation between the state/trait anxiety and level of stress, PSQI global score and sleep latency was established in the cohort of patients with anxiety disorders.

The highest number of correlations between the SA components and the level of stress, insomnia severity, global score, sleep latency and sleep duration on the PSQI were established. As for the TA, it showed the most correlations with the level of stress, global score, sleep duration, sleep efficiency and sleep latency on the PSQI.

On the SA scale, the highest number of correlations was found between the overall score for SA, emotional discomfort, and asthenic component with the level of stress, ISI, global PSQI score ($p < 0.01$), scores on the PSQI and ESS scales ($p < 0.05$). On the TA scale, the highest number of correlations was observed between the asthenic component and the level of stress ($p < 0.01$), global PSQI score ($p < 0.01$), PSQI sleep latency, sleep duration, sleep efficiency, and ESS score ($p < 0.05$).

This study on the relationship between the level of stress, sleep disorders and state/trait anxiety highlights the importance of considering the obtained data when conducting comprehensive personalized therapy and psychotherapy for this cohort of patients.

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Odnos poremećaja spavanja, nivoa psihološkog stresa i stanja anksioznosti / anksiozne crte ličnosti kod bolesnika sa anksioznim poremećajima

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SAŽETAK

Uvod/Cilj. Između stresa, poremećaja spavanja i emocionalne funkcije mozga postoji uzročno-posledični odnos. Nedovoljan kvalitet i nedovoljno trajanje spavanja mogu da pokrenu ili pogoršaju anksioznost kod pojedinca. Cilj ove studije bila je procena skorova za poremećaj spavanja i nivoa stresa u zavisnosti od tipoloških karakteristika stanja anksioznosti i anksiozne crte ličnosti kod bolesnika sa anksioznim poremećajima i poremećajima spavanja. Takođe, cilj je bilo i utvrđivanje odnosa između navedenih pojmova.

Metode. Pregledan je 91 bolesnik, starosti između 21 godine i 59 godina, sa anksioznim poremećajem i poremećajem spavanja. Za procenu nivoa psihološkog stresa, stanja anksioznosti / anksiozne crte ličnosti, kao i poremećaja spavanja korišćene su sledeće metode: integrativni test anksioznosti, PSM-25 i PSQI upitnici, kao i ISI indeks i ESS skala.

Rezultati. Najveći broj korelacija, utvrđen primenom PSQI upitnika, uočen je između komponenti stanja anksioznosti i nivoa stresa ($p < 0,01$), ozbiljnosti insomnije, globalnog skora, trajanja uspavljivanja, kao i trajanja spavanja ($p < 0,05$). Što se tiče anksiozne crte ličnosti, utvrđena je značajna korelacija sa nivoom stresa ($p < 0,01$), PSQI globalnim skorom, trajanjem spavanja, efikasnošću spavanja, kao i sa trajanjem uspavljivanja ($p < 0,05$).

Zaključak. Utvrđena je značajna korelacija između stanja anksioznosti / karakterne crte anksioznosti i nivoa stresa, kao i skorova dobijenih pomoću PSQI, ISI, ESS skala u okviru kohorta bolesnika sa anksioznim poremećajima. Studija o odnosu skorova nivoa stresa, poremećaja spavanja i stanja anksioznosti / anksiozne crte ličnosti naglašava značaj razmatranja ovih rezultata u primeni sveobuhvatne personalizovane terapije i psihoterapije u pomenutoj grupi bolesnika.

Ključne reči: **stanje anksioznosti, anksiozna crta ličnosti, anksiozni poremećaji, poremećaj spavanja, psihološki stres**