

## **Covid-Somnia: Specifics and Psychological Diagnostic**

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### **Abstract**

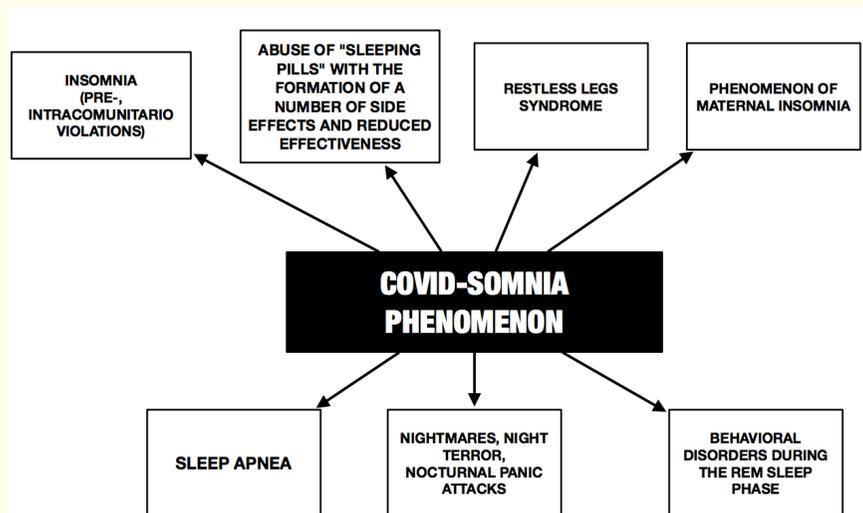
The article describes the phenomenon of COVID-somnia, which includes a specific spectrum of changes in sleep from insomnia to behavior disorder during the REM sleep phase. Different effects of COVID-19 on sleep disorders have been shown. Manifestations of covid-associated sleep disorders (chronic insomnia, restless legs syndrome) are described. A model of the relationship between covid-associated anxiety, insomnia, and suicidal thinking is presented. The psychological factors influencing the phenomenon of COVID-somnia are systematized. Predicted insomnia during the COVID-19 pandemic consists of the presence of intolerance to uncertainty, covid-associated anxiety, feelings of loneliness, the presence of symptoms of depression and anxiety. The algorithm of screening assessment of the patient's condition during the COVID-19 pandemic and the specifics of a complete psychological examination of the COVID-somnia phenomenon in the patient are described for the first time. The protocol of short-term remote cognitive-behavioral therapy of anxiety associated with the COVID-19 pandemic by E. M. Anderson to minimize chronic insomnia is presented.

**Keywords:** COVID-Somnia; Coronavirus; COVID-19; Chronic Insomnia; Restless Legs Syndrome; Cognitive Behavioral Therapy; Insomnia

Against the background of the global COVID-19 pandemic (SARS-CoV-2), there is a proliferation of sleep disorders among various age groups of the population, which is a serious challenge for mental health professionals [27].

The prevalence of sleep disorders varies widely from 2.3% to 76.6% [24]. To this day, the question of the relationship between coronavirus and sleep disorders is still open, since these relationships in clinical practice do not always fit into the logic of cause-and-effect relationships, but speak of the mechanism of aftereffect, when the consequence chooses the causes.

Sleep is a fundamental phenomenon of the central nervous system (CNS), which is regulated by complex interactions between neurotransmitters, immunologically active peptides, and hormones [6]. Sleep plays an important role in the regulation of cellular processes, as well as humoral immunity, and lack of sleep can reduce the immune response. In people with PCR-confirmed COVID-19 infection (Figure 1), sleep duration decreases during incubation, and increases during the symptomatic phase, which is called COVID-19-associated sleep disorders [2]. Upon receiving effective treatment, a rapid return to the original sleep duration is observed [10]. Different infections have different effects on a person's mental state and sleep - these are sleep disorders caused by a viral load (sleep disorders with potential viral association). For example, some of them enhance and others reduce sleep due to various effects on the immune system [15].



The main sleep disorders in people infected with coronavirus, is insomnia (Prasangika disorders) and restless legs syndrome. This may be directly related to infection, hypoxia, or mental state [2]. According to E. Ibarra-Coronado et al. changes in sleep during infection are a component of the acute phase response that promotes recovery during illness, through mechanisms involving cytokines and interleukins. The virus can reach the CNS via nasal as well as hematogenic routes. The subsequent secretion of these immunological mediators is accompanied by reactions from the nervous and endocrine systems [15].

The cytokine storm, which is an immune response in COVID-19, leads to inflammation and damage to the central nervous system. The SARS-CoV-2 virus mainly affects the prefrontal cortex, basal ganglia, and hypothalamus, i.e., those areas that are involved in sleep regulation [6].

Poor sleep quality longer sleep latency (difficulty falling asleep), restless, not deep sleep with abundant dreams and nightmares, are the central symptoms of insomnia, which are observed during acute respiratory infection are associated with immune processes that contribute to pathological forms of sleep disorders. It is possible that the high prevalence of sleep disorders observed during the pandemic can be attributed to asymptomatic infection with the virus, which requires further research [2].

During the rehabilitation period after the patient has suffered from coronavirus, symptoms of insomnia are also observed, which can be caused by anxiety of waiting for a relapse, tachycardial manifestations.

However, clinical experience has shown that despite the reduction in patients with systemic inflammation, hypoxemia, sleep remained disturbed even after recovery from the coronavirus. Note that there is no link between morbidity, mortality from coronavirus and insomnia, poor sleep quality [10,13,22,26].

It should be taken into account that the situation of the COVID-19 pandemic itself caused significant stress, coronaphobia and anxiety about health, social isolation, changes in employment, finances, as well as problems of combining work and family responsibilities, adapting to a new rhythm of life. Such a major stressful life event with certain psychological characteristics of a person (for example, high neuroticism) can lead to sleep disorders and circadian rhythms, which will prevent flexible adaptation to the crisis and increase uncertainty in the future [2]. While sleep suppresses the activity of the hypothalamic-pituitary-adrenal axis (the stress response axis), which mediates several aspects of responses to most stresses, some stressors, psychological factors suppress sleep and increase waking time

by creating cognitive (flow of thoughts “what if...”, “if...then”) and behavioral (reinsurance behavior, fussiness, search behavior to improve sleep) hyperexcitation [22].

It was shown that the combination therapy, including somatotropic therapy, psychopharmacotherapy (if necessary) and cognitive behavioral therapy for insomnia (CBT-I), restored normal sleep and improved the general condition in patients with COVID-19 PCR infection [2].

Despite the current prevalence of sleep disorders, a limited number of interventions have been identified to address this problem. Early diagnosis of sleep disorders and adequate treatment are critical to prevent further deterioration of the condition. Evidence-based pharmacological and psychological interventions are of paramount importance for the treatment of sleep disorders during the COVID-19 pandemic. In this regard, the purpose of this article is to introduce mental health professionals to the specifics of covid-associated sleep disorders, psychological risk factors, the specifics of the examination and the targets of psychotherapeutic care.

### COVID-somnia phenomenon

Sleep reactivity suggests that people respond differently to stressful, uncertain call situations, as well as to the course of the disease. For example, to this day there is a debate about why older people (65+) are more susceptible to contracting SARS-CoV-2 infection. A number of authors believe that the deterioration of sleep among the elderly is associated with changes in the circadian network, a reduction in the amplitude of the rhythm of melatonin, which has inflammatory, antioxidant and immunoregulatory properties, which can increase susceptibility to infections [7]. During the coronavirus pandemic, there was a high prevalence of anxiety spectrum disorders, irritability, somatoform disorders, depression, and sleep disorders (insomnia). Sleep disorders during the COVID-19 pandemic are commonly referred to as the COVID-somnia phenomenon [22] as a euphemism for easier understanding, which includes a whole range of changes in sleep.

### Manifestations of the COVID-somnia phenomenon:

- The prevalence of insomnia has increased significantly (from 26.2% to 33.7);
- Significantly higher prevalence of both insomnia as a stress response and symptoms of chronic insomnia during a pandemic;
- 12 - 17% of people developed the first episode of insomnia (in a lifetime) and worsened the symptoms of insomnia present earlier;
- Length of stay in bed ( $485.5 \pm 72.6$  vs.  $531.5 \pm 94.2$  minutes);
- Sleep delay ( $25.6 \pm 66.3$  minutes);
- Total sleep time ( $432.8 \pm 65.6$  vs.  $466.9 \pm 95.6$  minutes) increased significantly;
- Sleep efficiency (88.5% vs. 86.8%) decreased significantly;
- Wake-up time ( $71.7 \pm 89.5$  minutes);
- Dream-like thinking. Rich “crazy dreams”, the destructive nightmares (primary, recurrent). Topics: “escaping from someone” (for example, a devouring ant), “collapsing at home”, “getting stuck in an elevator”, “explosions”, “chasing someone and killing them”;

- Cognitive hyperexcitation before going to bed and in bed due to information toxicity. Disturbing rumination: fear of bed, night, suffocating, “ what if there are consequences...”, “I will not be able to sleep”. Pronouncing problems. The inability to finish the day emotionally. Dissatisfaction with yourself;
- Increased daytime sleep. Excessive daytime sleepiness;
- Distorted bedtime eating habits, excessive use of electronic devices before bedtime;
- The phenomenon of abandoning time prompts, i.e. switching to a later time of going to sleep and waking.
- The phenomenon of maternal insomnia. 80% of mothers of children aged 3 - 6 months to 6 years report severe anxiety about the coronavirus 30 - 40% of mothers with moderate to severe insomnia reported poor sleep quality (shallow, difficulty falling asleep, waking up, disturbing dreams) in their children [29];
- The phenomenon of pharmacy treatment. Abuse of sleeping pills with a low response to their effectiveness. For example, taking up to 3 - 5 tablets of the drug before bedtime.

### Mental health and the COVID-somnia phenomenon

Whole clusters of symptoms were identified, which were named as pandemic - related stress disorder (pandemic-related stress disorder): an anxiety spectrum of disorders, depression, sleep disorders, eating disorders (emotional hunger), alcohol abuse [2]. The prevalence of this disorder is 25 - 40% in the period of COVID-19. Women had higher levels of pandemic-related anxiety, which is also consistent with a higher prevalence of anxiety disorders (and related vulnerability factors) in women. Middle-aged people (30 - 59 years old) More severe anxiety related to the COVID-19 pandemic has been reported, possibly because this age group faces greater family and work challenges (such as financial stress) [9]. Another problem is the anxiety of the return of the pandemic and the virus threat, which significantly affects insomnia. It has been shown that coronavirus-related anxiety is significantly associated with increased suicidal ideation and insomnia symptoms [17]. The severity of insomnia is independently associated with increased suicidality in people during the COVID-19 pandemic. The presence of suicidal thoughts with the development of ideas of suffering (“how much can you tolerate this...”) strongly predicts the severity of insomnia than the fears associated with the coronavirus. Related to the coronavirus pandemic, anxiety is associated with increased suicidal ideation, and this association is attributed to the involvement of sleep disorders. The presence of isolation, perception of the situation as stressful, specific phobias, economic uncertainty can lead to problems with sleep and mental health, which potentially increases the risks of suicidal ideation [20].

### Psychological factors influencing the phenomenon of COVID-somnia

We conducted a study in which 920 participants of the social network instagram, 75.3% of women and 24.8% of men, in the age range of 18-37 years, were asked to fill out diagnostic scales (via online) after 10 days of national isolation in Moscow and St. Petersburg. The following methods were used: the Patient Health Questionnaire (PHQ-2), the Budner’s Scale of Tolerance (Tolerance of Ambiguity), the Revised UCLA Loneliness Scale (R-UCLA - LS), the Insomnia Severity Index (ISI), and the Coronavirus Anxiety Scale (CORONA). Coronavirus Anxiety Scale, CAS; Lee, 2020), which allows you to evaluate vegetative crises, sleep disorders, loss of appetite, abdominal disorders (gastrointestinal specific anxiety).

Up to 9 points are optimal values, the presence of dysfunctional anxiety is higher. Increased indicators on this scale are associated with the diagnosis of coronavirus, the presence of an anxiety spectrum of disorders, depression (feelings of hopelessness, suicidal ideas),

alcohol abuse.

Additionally, in the form of a questionnaire, the study participants were asked questions about their negative attitude to the coronavirus, as well as questions to find out whether they or someone close to them had been infected. It was shown that 55% of the participants had severe sleep disorders in the form of presomnic disorders. Insomnia symptoms were significantly higher in women (14.8, SD = 4.28) than in men (10.18, SD = 3.11),  $t(2319) = -729, p < 0.001$ . Residents of Moscow (14.27, SD = 4.26) scored more points for the severity of insomnia than St. Petersburg (12.1, SD = 3.23). Those who answered "I do not know" when asked if they had contracted the coronavirus scored significantly higher on insomnia (14.25, SD = 4.11),  $F(2,28111.27, p < 0.001)$  than those who answered "yes" or "no". The same thing was observed when answering the question whether someone close to you was infected with the coronavirus (14.10, SD 4.23,  $F(2,213) = 11.21, p < 0.001$ ). To predict the severity of insomnia, multiple linear regression was performed based on the significance of the positive correlation of independent variables  $F(4,2192) = 310.72, p < 0.001, R^2 = 0.383$ .

Women have been shown to be more prone to sleep changes during the pandemic, and this finding is consistent with evidence that they are more prone to stress-related disorders, such as PTSD and anxiety spectrum disorders [3,20]. Disturbing ruminations that cause cognitive arousal, unpleasant physical reactions also affect presomnic disorders. This corresponds to the data of M Lariola, *et al.* [18] and may also explain the high scores on the insomnia rating scale in those who answered "I do not know" whether they or someone close to them had contracted the virus, since this answer implies uncertainty. Anxiety about coronavirus infection has also been shown to be associated with insomnia. The presence of waiting anxiety causes cognitive arousal and therefore affects the ability to sleep. Subjective feelings of loneliness are also associated with insomnia symptoms. There is evidence of a bidirectional relationship between loneliness and insomnia [18]. Loneliness can cause increased feelings of vulnerability, hence cognitive and behavioral hyperexcitation, anxious, shallow sleep. On the contrary, poor sleep increases the frustration associated with feelings of isolation and can interfere with contact with other people, for example, due to a disturbed sleep-wake schedule [12].

Our study showed a link between depression symptoms and sleep. This is a well-documented phenomenon in a number of studies, as insomnia is considered an important precedent for depression, as well as a predictor of the recurrence of a depressive episode. Monoamines, inflammatory markers, genetic factors, and circadian rhythm dysregulation may be implicated in sleep pathophysiology [27].

A number of studies have shown that educational attainment was also associated with sleep disorders, but the specific educational status was unclear. Both higher education and high school education have been found to affect sleep quality. This may be due to the fact that educated people or students may have academic and professional stress factors that may have affected their mental health and sleep conditions [8,9]. In addition, social support has been found to play a crucial role in sleep status and related disorders. Lack of social support, family support, loneliness, and isolation were associated with a higher risk of sleep disorders.

Health care workers, especially those serving the frontline, are at high risk of insomnia during the COVID-19 pandemic. Increased workload, shift work, and fear of contracting the virus were significant risk factors among health workers. This could lead to higher psychosocial stress and emotional burnout, which may be associated with sleep disorders [14].

#### **Sleep disorders in COVID-19 can be caused by [21,26]:**

- Fear of contracting the virus (koreaphobia);
- Anxiety about illness (distorted perception of illness and health);
- Lack of confidence in treatment and preventive measures and negative attitude to control measures;

- Self-stigmatization. Covid-associated victimization;
- Sensory exhaustion syndrome;
- Economic (financial) stress;
- Restriction of social distance, lack of opportunities for physical activity, staying at home without work;
- A tendency to perceive situations as stressful (catastrophization),
- Sleep reactivity;
- Dysfunctional beliefs about sleep.

### Tactics of psychological diagnostic of COVID-SOMNIA

In the current environment, we recommend that mental health professionals regularly check for changes in mental health in patients who have had the coronavirus, as well as those who are treated with fear of infection.

When examining the patient, it is important to take into account the presence of previously experienced changes in mental health (anxiety spectrum disorders, depression), because the background of vulnerability factors, including poor general health, contributes significantly to the risks of developing sleep disorders, anxiety and depression. Pre-existing health anxiety in the patient may be a predisposing risk factor for increased anxiety during pandemics and insomnia [5] in this regard, when examining the patient's mental state, it is recommended to use the Short Health Anxiety Inventory (SHAI). You should also pay attention to the patient's cyber-hypochondriacal manifestations and examine them using the Cyberchondria Severity Scale (CSS-15). When health anxiety and high cyber-hypochondria are combined, viral anxiety is pronounced, which significantly affects the patient's quality of life. It is shown that the stronger the cyber-hypochondria, the higher the health anxiety, and the symptoms of insomnia.

### Conclusion

- To this day, the question of the connection between the coronavirus and sleep disorders is still open. If a person becomes ill, recovers from COVID-19, then covid-associated sleep disorders (chronic insomnia, restless legs syndrome) may be observed. The transferred coronavirus can cause an alarming spectrum of disorders, anxiety of waiting for re-infection, which leads to chronic insomnia. Also, the COVID-19 pandemic itself, with certain psychological characteristics of a person (for example, high neuroticism, a tendency to a catastrophizing style of thinking), can also lead to sleep disorders and circadian rhythms, which will prevent a person from flexibly adapting to a crisis and increase uncertainty in the future.
- The phenomenon of COVID-Somnia includes a whole range of changes in sleep: insomnia (pre-, intrasomnic disorders), restless legs syndrome, sleep apnea, nightmares, night terror, night panic attacks, maternal insomnia and behavior disorders during the REM sleep phase.
- Factors affecting sleep disorders during the COVID-19 pandemic include: changes in tolerance to uncertainty, covid-associated anxiety, subjective feelings of loneliness, symptoms of anxiety, depression. Women have been shown to be more likely to change their sleep patterns during a pandemic.
- Psychological assessment of sleep disorders includes assessment of insomnia symptoms (ISI) and daytime sleepiness (ESS), dysfunctional beliefs about sleep (DBAS-16). Attention should be paid to the assessment of general health anxiety, covid-associated

anxiety, symptoms of depression, taking into account the risk of suicidality, cyber-hypochondriacal manifestations, tolerance to uncertainty, and changes in emotional regulation. Additionally, the specifics of the perception of patients' situations as stressful, the presence of a problem-oriented personality type and covid-associated victimization are examined.

- For covid-associated sleep disorders (chronic insomnia, restless legs syndrome), coronaphobia accompanied by episodes of insomnia, it is recommended to use the protocol of short-term remote cognitive behavioral therapy for anxiety associated with the COVID-19 pandemic by E. M. Anderson. Pay attention to the patient's cyber-hypochondriacal manifestations while minimizing excessive negative information retrieval.

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