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Psychosocial Factors And Anxiety Symptoms Associated With Sleep Disturbances In Adults With Type 2 Diabetes

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Abstract:
Goal: Adults with type 2 diabetes mellitus (T2DM) frequently experience sleep disturbances, although related psychosocial aspects may differ depending on the presence of anxiety symptoms. We looked at the frequency of sleep disturbances and related variables in persons with type 2 diabetes. Patients and Procedures: 1200 people with clinician-confirmed type 2 diabetes were recruited from the endocrinology departments of eight tertiary institutions for this multicenter cross-sectional study. Sleep disturbance was defined as an Athens Insomnia Scale score of at least six, and anxiety symptoms as a Generalized Anxiety Disorder-7 score of at least five.
Conclusion: Participants with anxiety symptoms were more likely to experience sleep disturbances. Several exploratory patterns of related components were found using anxiety-stratified analyzes. Although these cross-sectional results do not demonstrate causative linkages, validated clinical subtypes, or therapy recommendations, they may enable more focused sleep and psychosocial examination.

Keywords: Psychosocial Factors, Anxiety Symptoms, Sleep Disturbances, Adults, Type 2 Diabetes.

Introduction:

Globally, type 2 diabetes mellitus (T2DM) continues to be a significant clinical and public health burden. The International Diabetes Federation Diabetes Atlas estimates that 589 million adults had diabetes in 2024, and by 2050, that figure is expected to rise to 853 million. With T2DM prevalence and disease burden continuing to rise, China has one of the highest diabetes burdens in the world, according to recent national analyzes. The psychological and sleep-related burden that persons with type 2 diabetes face has received more attention than glucose control and vascular consequences. However, there is also regional variation in the evidence regarding these psychosocial aspects (Zhang et al., 2025).

Adults with type 2 diabetes frequently have psychological symptoms, which are becoming more widely acknowledged as crucial elements of person-centered diabetes management. While anxiety symptoms are frequently evaluated less methodically, especially when it comes to sleep, depression

has been thoroughly examined in diabetes. Anxiety symptoms were seen in over one-fifth of T2DM patients in Chinese hospital research. Through ongoing concern, perceived treatment load, symptom vigilance, and stress-related physiological reactions, anxiety symptoms may make managing diabetes more difficult. Their connection to sleep is therapeutically significant: although insufficient sleep can impair emotional control and exacerbate anxiety-related suffering, anxiety can sustain sleep disturbance through hyperarousal, recurrent negative thoughts, and increased sensitivity to physical sensations (Davies et al., 2022).

Another common but sometimes overlooked issue with type 2 diabetes is sleep disturbance. According to reviews, sleep problems are prevalent in individuals with type 2 diabetes and are linked to worse glycemic control, cardiometabolic risk, consequences from diabetes, and a lower quality of life. Sleep should be viewed as a component of managing type 2 diabetes rather than a secondary lifestyle concern, according to recent diabetes-focused literature. However, when T2DM patients are examined as a single, homogeneous group, their psychological correlates may be missed. In clinical practice, sleep complaints may be attributed to aging, nocturia, pain, treatment burden, or mood disorders (Chellappa, 2022).

The main question is not just whether sleep disturbance and anxiety symptoms coexist in type 2 diabetes. Instead, the question is whether the presence of anxiety symptoms is linked to various patterns of psychosocial factors associated with sleep disturbance. Instead of concentrating on anxiety-stratified patterns, prior diabetes-related sleep studies, including cross-sectional studies, frequently looked at anxiety as a single variable within overall-sample models. Clinically significant heterogeneity may be hidden by such general models (Maimaitituerxun et al., 2023).

For instance, while sleep disturbance in the absence of anxiety symptoms may be linked to other psychological or physical complaints, sleep disturbance in the presence of anxiety symptoms may coexist with a larger emotional and hyperarousal-related symptom burden. In areas where thorough psychosocial evaluation is not regularly accessible, analyzing these patterns may aid improving sleep and psychological assessment in endocrinology treatment (Ben Simon, 2020).

Considering this, we chose clinically reasonable psychosocial, somatic, and sociodemographic factors that might be connected to sleep disturbance in persons with type 2 diabetes. Pain intensity indicated physical discomfort, while depressive symptoms, hopelessness, trauma-related symptoms, and perceived cognitive impairments were included to capture important psychological aspects. Examining anxiety-stratified patterns of psychosocial and related factors associated with sleep disturbance, estimating the prevalence of sleep disturbance according to anxiety symptom status, and determining whether anxiety symptom status altered the relationships between important psychosocial variables and sleep disturbance were the objectives. We postulated that adults with anxiety symptoms would be more likely to experience sleep disturbances, and that the pattern of related factors would change depending on the presence or absence of anxiety symptoms.

Material and Methods:

Study Design and Participants:

Data from a psychosocial database of patients collected from endocrinology departments, including both inpatient and outpatient settings, were used in this multicenter cross-sectional study.

Patients with schizophrenia, bipolar disorder, or other severe mental disorders; significant life stressors during the previous three months; end-stage disease with a predicted survival of less than six months; organic brain disease, active infection, immunosuppressive therapy, or any other severe physical illness that could prevent them from participating in the study; pregnancy; or substance or

alcohol abuse or dependence were excluded. The database contained all eligible people with type 2 diabetes.

Symptoms of Anxiety and Sleep Disruption:

The 7-item Generalized Anxiety Disorder Scale (GAD-7) in Chinese was used to measure anxiety symptoms.14,15 Seven items on the GAD-7 are rated from 0 to 3, and the overall score can range from 0 to 21. For stratified analysis, the existence of anxiety symptoms was indicated by a score of 5 or higher. We selected this threshold since it was meant to provide a sensitive symptom-based stratification rather than a clinical diagnosis of an anxiety condition, and it correlates to at least mild anxiety symptom burden. We also conducted a sensitivity analysis using GAD-7 ≥10 to identify moderate-or greater anxiety symptom burden to evaluate the robustness of this symptom-based threshold (Palagini et al., 2024).

The Athens Insomnia Scale (AIS) was used to measure sleep disruption. Higher scores on the 8-item AIS self-report scale, which was created in accordance with ICD-10 insomnia criteria, indicate a higher burden of insomnia symptoms. Sleep disruption was defined as an AIS total score of 6 or higher. Participants were categorized as having no sleep disruption if their AIS was less than 6, and as having sleep disturbance if their AIS was greater than 6 (Schipper et al., 2021).

Clinical, psychological, and sociodemographic factors:

Age, sex, educational attainment, and monthly income were sociodemographic factors. The educational levels were divided into three categories: college or higher, high school/technical secondary school, and junior high school or lower.

Diabetes duration, body mass index (BMI), waist-to-hip ratio (WHR), and pain score were among the clinical factors. BMI was computed by dividing height in meters squared by weight in kilos. Standardized hip and waist circumference measurements were used to compute WHR. A numerical rating system was used to assess the degree of pain (Henson et al., 2024).

Medical records and standardized case-report forms provided clinical and demographic data, while structured questionnaire assessments were used to gather psychological data.

Anxiety-Stratified Patterns of Factors Associated with Sleep Disturbance:

This study's primary contribution is the identification of various exploratory patterns of components linked to AIS-defined sleep disturbance through analyzes stratified by anxiety symptom level. In the primary model, sleep disturbance was linked to anxiety symptoms, depressive symptom burden, hopelessness, and trauma-related symptoms. Sleep disturbance was linked to depressed symptom burden, reported cognitive impairments, and higher educational attainment among individuals without anxiety symptoms. Rather than being evidence of unique causative processes or confirmed clinical categories, these results should be considered as exploratory statistical patterns. Odds ratios should be viewed as measures of association rather than estimates of risk ratios because sleep disruption was prevalent in this population (Zhang et al., 2025).

Depressive Symptoms and Sleep Disturbance: Sensitivity Analysis and Interpretation:

In line with the known link between diabetes, depressive symptoms, and insufficient sleep, depressive symptom burden was linked to AIS-defined sleep disturbance in both anxiety strata in the primary PHQ-9 models and with a higher continuous AIS score in the secondary analyses. Nevertheless, this interpretation was improved by sensitivity analysis that did not include PHQ-9 item 3. For individuals without anxiety symptoms, the reduced PHQ-9 score that excluded the sleep item was still linked to sleep disturbance; however, it was no longer significant for those who had anxiety symptoms. This attenuation implies that the association seen in the anxiety-symptom subgroup may have been influenced by a partial overlap between the PHQ-9 sleep item and the AIS outcome. Therefore, rather than being proof that depressed symptoms alone account for sleep

disturbance, the primary PHQ-9 results should be seen as relationships between overall depression symptom burden and sleep disturbance. Rumination, exhaustion, decreased activity, irregular daily routines, and physiological dysregulation brought on by stress can all co-occur with depressive symptoms and sleep problems. However, temporal orientation cannot be established from the current cross-sectional data (von et al., 2007).

Sleep Disturbance in Adults with Type 2 Diabetes:

Sleep is crucial for both mental and physical well-being, supporting emotional stability, cognitive performance, metabolic control, and general quality of life. Sleep disturbance refers to difficulties in initiating or maintaining sleep, early morning awakening, or unhappiness with sleep quality and its daytime repercussions. Several metabolic, physical, behavioral, and psychological factors may contribute to sleep issues in individuals with type 2 diabetes mellitus (Tong et al., 2016).

Diabetes and sleep have a complicated and possibly reciprocal interaction. Sleep may be disrupted by symptoms of diabetes, such as nocturia, pain, and discomfort connected to complications. Furthermore, sleep disorders such obstructive sleep apnea and insomnia are often linked to diabetes and cardiometabolic health. These disruptions may interfere with day-to-day activities and make managing diabetes more difficult. Therefore, the American Diabetes Association advises evaluating sleep health in individuals with diabetes, including sleep disorders, diabetes-related sleep disturbances, and sleep-related issues (Shinalieva et al., 2023).

A recent systematic review identified several categories of factors associated with sleep quality among adults with T2DM. These included sociodemographic characteristics, diabetes-related factors, psychological symptoms, physical health behaviors, environmental conditions, and social support. Depressive symptoms, anxiety symptoms, and diabetes distress were among the psychological factors reported in the reviewed literature, highlighting the importance of considering sleep within a broader biopsychosocial context (Soldatos, 2003).

Psychosocial Factors in Type 2 Diabetes:

Psychosocial factors encompass emotional, cognitive, behavioral, interpersonal, and social conditions that may influence how individuals experience and manage chronic illness. Living with T2DM often requires continuous self-management, including medication use, dietary regulation, physical activity, and glucose monitoring. These ongoing demands may contribute to emotional burden and may interact with other life circumstances, such as financial challenges, social support, and health-related concerns (Palagini et al., 2024).

It is acknowledged that psychological health is a crucial part of all-encompassing diabetes management. The American Diabetes Association stresses that psychosocial issues, such as anxiety, depression, and diabetes distress, should be addressed as part of person-centered treatment and advises screening individuals with diabetes for these issues. Diabetes, self-management and health-related quality of life may also be hampered by psychological and social issues. In relation to sleep, psychosocial difficulties may be associated with increased cognitive and emotional arousal, repetitive thinking, and challenges in maintaining regular daily routines. These experiences may coincide with difficulties initiating or maintaining sleep. However, the relationship should not be interpreted as necessarily causal, particularly when psychological symptoms and sleep are assessed at the same time (Henson et al., 2024).

Recommendations:

There are a few restrictions to be aware of:

First, cross-sectional design makes it impossible to draw conclusions about causality and obscures the temporal links between symptoms of anxiety, depression, despair, trauma-related symptoms, perceived cognitive impairments, pain, and sleep disturbance.

Second, this study recorded self-reported sleep disruption rather than objectively verified sleep disorders since sleep disturbance was measured using the AIS rather than polysomnography or actigraphy.
Third, a clinical diagnosis of anxiety disorder is not indicated by the definition of anxiety symptoms, which shows at least modest anxiety symptom burden.
Fourth, due to partial item overlap, the sleep-related items may have exaggerated the relationships between trauma-related symptoms, depression symptoms, and AIS-defined sleep disturbance. Although shared self-report bias might still exist, sensitivity analyzes that excluding certain sleep-related questions lessened this worry and shown reduction of the depressive-symptom connection in the anxiety-symptom subgroup. Consequently, results pertaining to symptoms of depression and trauma should be evaluated with caution.
Fifth, residual confounding by unmeasured sleep-related factors cannot be ruled out because a few sleep-relevant variables, such as the risk of obstructive sleep apnea, caffeine consumption, shift employment, and hypnotic or antidepressant therapy, were not available.
Sixth, odds ratios should be viewed as indicators of association rather than risk ratios because sleep disruption was prevalent. Lastly, participants were drawn from both inpatient and outpatient tertiary institutions in Hainan Province, which may have limited generalizability and introduced residual confounding due to care setting.
Future research should look at whether the psychosocial factors found here are associated with incident, ongoing, or worsening sleep disruption in persons with type 2 diabetes. Temporal correlations would be clarified by longitudinal studies that include objective sleep measures, frequent psychological evaluations, diabetic problems, neuropathic pain assessment, and pharmaceutical data. To ascertain if treating co-occurring psychological and sleep disorders enhances sleep, psychological health, diabetes self-management, or metabolic outcomes, intervention studies are also required.

Conclusion:

Sleep issues and anxiety symptoms are common in patients with type 2 diabetes. We investigated whether patients with and without anxiety symptoms had different characteristics linked to sleep disturbance. We examined 1,200 patients from eight hospitals who had type 2 diabetes. Questionnaires concerning sleep, anxiety, depressive symptoms, hopelessness, symptoms associated with trauma, and perceived cognitive impairments were filled out by participants. Additionally, we gathered clinical and demographic data. Participants who experienced anxious symptoms were more likely to experience sleep disturbances. Sleep disturbance was linked to depressed symptoms, despair, and trauma-related symptoms in those with anxiety symptoms. Hopelessness and trauma-related symptoms continued to be linked to sleep disturbance even after we removed sleep-related items from the psychological surveys. Sleep disturbance was mostly linked to depressed symptoms, reported cognitive impairments, and higher educational attainment in individuals without anxiety symptoms. When patients with type 2 diabetes report having trouble sleeping, these findings may help clinicians ask for more targeted inquiries. Clinicians may need to conduct more thorough assessments of mood, hopelessness, trauma-related distress, and cognitive problems depending on the presence of anxiety symptoms. This study is unable to establish cause and effect because it evaluated subjects just once. To determine if these factors precede ongoing or worsening sleep issues, longitudinal investigations are required. Given the observational cross-sectional design, the findings should be considered exploratory and hypothesis-generating; longitudinal and interventional studies are needed to determine their temporal and clinical significance.

References:

1. International Diabetes Federation. IDF Diabetes Atlas: Global Estimates of Diabetes Prevalence for 2024 and Projections for 2050. Brussels, Belgium: International Diabetes Federation; 2025.

2. Zhang H, Jia Q, Song P, et al. Incidence, prevalence, and burden of type 2 diabetes in China: trend and projection from 1990 to 2050. Chin Med J. 2025;138(12):1447–13.
3. Davies MJ, Aroda VR, Collins BS, et al. Management of hyperglycemia in type 2 diabetes, 2022: a consensus report by the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care. 2022;45(11):2753–2786.
4. Maimaitituerxun R, Chen W, Xiang J, et al. Prevalence of anxiety and associated factors among inpatients with type 2 diabetes mellitus in China: a cross-sectional study. Psychiatr Q. 2023;94(3):371–383.
5. Chellappa SL, Aeschbach D. Sleep and anxiety: from mechanisms to interventions. Sleep Med Rev. 2022;61:101583.
6. Ben Simon E, Rossi A, Harvey AG, Walker MP. Overanxious and underslept. Nat Hum Behav. 2020;4(1):100–110.
7. Palagini L, Miniati M, Caruso V, et al. Insomnia, anxiety and related disorders: a systematic review on clinical and therapeutic perspective with potential mechanisms underlying their complex link. Neurosci Appl. 2024;3:103936.
8. Schipper SBJ, Van Veen MM, Elders PJM, et al. Sleep disorders in people with type 2 diabetes and associated health outcomes: a review of the literature. Diabetologia. 2021;64(11):2367–2377.
9. Henson J, Covenant A, Hall AP, et al. Waking up to the importance of sleep in type 2 diabetes management: a narrative review. Diabetes Care. 2024;47(3):331–343.
10. Shinalieva K, Kasenova A, Akhmetzhanova Z, Alzhanova D, Eszhanova L, Bekenova A. Association of insomnia with anxiety and depression in type 2 diabetic patients: a cross-sectional study. Iran J Med Sci. 2023;48(5):448–455.
11. von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology statement: guidelines for reporting observational studies. PLoS Med. 2007;4(10):e296.
12. Tong X, An D, McGonigal A, Park SP, Zhou D. Validation of the Generalized Anxiety Disorder-7 among Chinese people with epilepsy. Epilepsy Res. 2016;120:31–36.
13. Soldatos CR, Dikeos DG, Paparrigopoulos TJ. The diagnostic validity of the Athens Insomnia Scale. J Psychosom Res. 2003;55(3):263–267.