AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 5. No 11. November ,2025

STUDY OF THE IMPACT OF CHRONIC SLEEP DISORDERS ON THE IMMUNE SYSTEM AND ITS DIAGNOSTIC CRITERIA

Professor **Yakubova Marhamat Mirakramovna,**

Rakhmatova Madina Fakhritdin kizi

Department of Neurology and Medical Psychology, Tashkent State Medical University

Abstract: Sleep is one of the most essential physiological processes ensuring the homeostatic stability of the human body. It plays a crucial role in the optimal functioning of the central nervous system, endocrine system, immune system, and metabolic pathways. Prolonged sleep deprivation acts as a significant stress factor on the body's major homeostatic systems. Insufficient sleep enhances systemic inflammation through activation of the hypothalamic–pituitary–adrenal (HPA) axis, continuous stimulation of the sympatho-adrenal system, and disruption of cytokine balance.

Keywords: sleep disturbance, systemic inflammation, immune-inflammatory index, neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio.

Relevance of the topic. In recent decades, chronic sleep disturbance (CSD) — that is, persistent impairment of sleep duration and quality — has been recognized as a serious global health problem [3]. Epidemiological and experimental studies have shown that CSD not only causes fatigue or mood disorders, but also activates inflammatory pathways at the organism level, increases cytokine levels (IL-6, TNF-α, CRP) and increases the risk of chronic diseases [4,5]. The complex relationship between sleep and the immune system is widely covered in a new scientific concept called "sleep-immune crosstalk". According to this concept, sleep quality and duration are directly related to the body's pro- and anti-inflammatory mechanisms, HPA-axis activity and circadian rhythms, and their imbalance leads to chronic inflammation [2,3]. Therefore, the study of SUB is an urgent scientific issue in understanding immunopathological processes, preventing chronic diseases and developing preventive strategies. In recent years, meta-analyses and experimental studies have shown that even short-term sleep restriction can cause significant increases in IL-6 and CRP levels [4]. At the same time, obstructive sleep apnea (OSA) and nocturnal sleep rhythm disorders have also been identified as important factors that increase the inflammatory burden [5,6].

Objective:

To study the relationship between sleep disorders and inflammatory diseases

Methods: 40 patients with sleep disorders were studied. (25 (62.5.5%) were women, 15 (37.5%) were men.) The average age of the patients was 36.9 ± 2.0 years. These patients were divided into 2 groups. Group 1 included patients with inflammatory diseases, and group 2 included patients with only sleep disorders. The patients were recruited from the Neurology Department of Shox Med International Hospital and TTA. The patients' sleep disorders were assessed using the ESS and PSQI scales, and systemic inflammation was assessed using the immune-inflammatory index (SII), neutrophil-lymphocyte ratio (NLR), and platelet-lymphocyte ratio (PLR).

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 11. November ,2025

Results: Sleep disorders of patients were determined by the Epworth Sleepiness Scale (ESS) as normal in 60% (24), moderate sleepiness in 27.5% (11), and pathological sleepiness in 12.5% (5). (Figure 1)

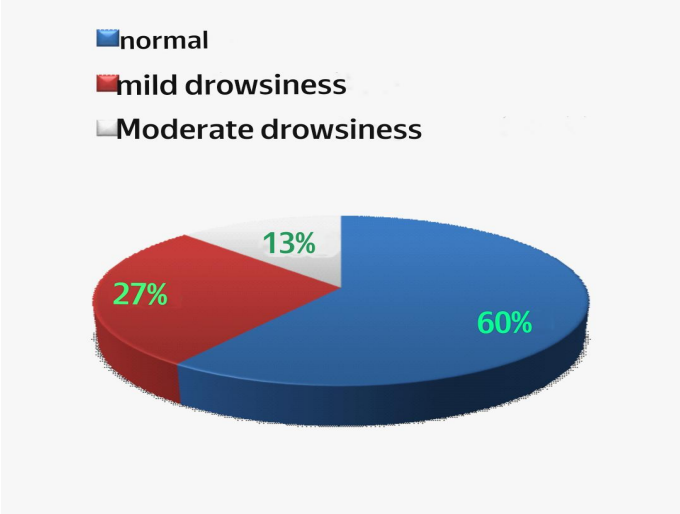

Figure 1. Results of sleep disturbance assessment in patients with sleep disorders using the Epworth Sleep Scale (ESS)

Including 56.5% (13) of women, normal sleepiness was detected in 34.8% (8), and pathological sleepiness in 17.4% (4). Normal sleepiness was observed in 66.7% (10), moderate sleepiness in 33.3% (5), and pathological sleepiness was not detected among men. (Figure 2)

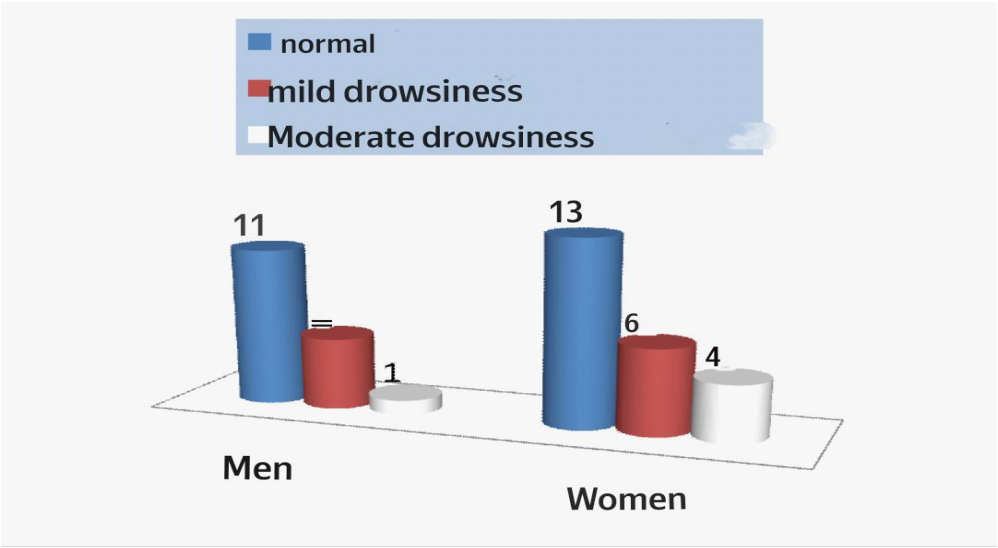

Figure 2. Results of the study of patients' sleep disorders using the Epworth Sleep Scale (ESS) by gender

When the patients' chronic sleep disorders were examined using the Pittsburgh Sleep Quality Index (PSQI) scale, the following were found: 40% (16) had good sleep quality, 55% (22) had

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 11. November ,2025

mild sleep disorders, 5% (2) had moderate sleep disorders, and no severe sleep disorders were observed. (Figure 3)

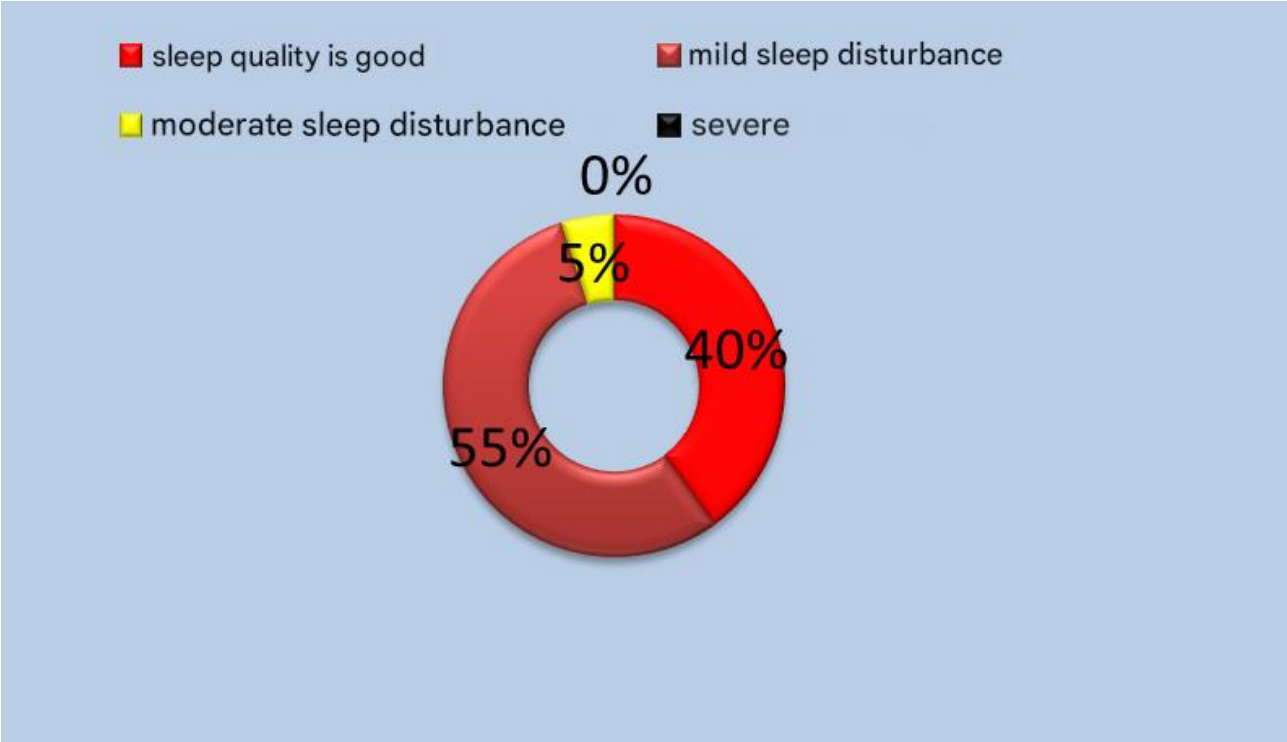

Figure 3. Sleep disorders in patients were assessed using the Pittsburgh Sleep Quality Index (PSQI).

When sleep disorders were assessed in these patients, the results showed that 36% (9) of women had good sleep quality, 56% (14) had mild sleep disorders, and 8% (2) had moderate sleep disorders. In men, 46.7% (7) had good sleep quality, 53.3% (8) had mild sleep disorders, and no moderate or severe sleep disorders were observed. (Figure 4)

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 11. November ,2025

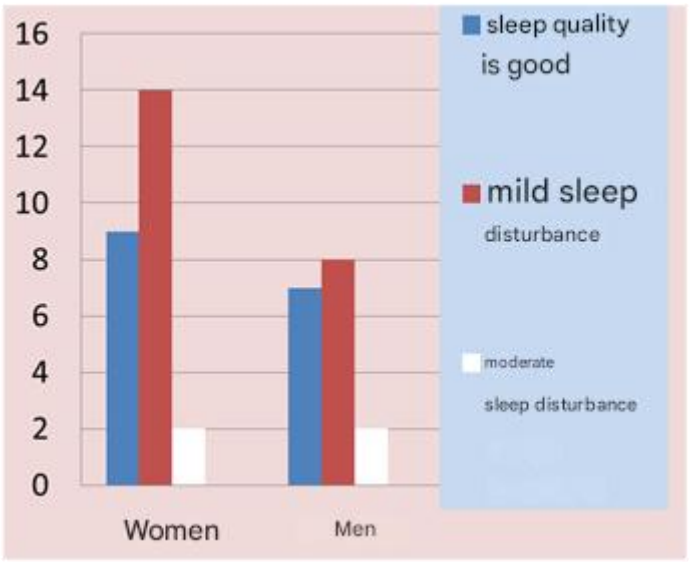

Figure 4. Examination of sleep disorders in patients with Pittsburgh Sleep Quality Index (PSQI) by gender.

When studying the systemic inflammation of patients with sleep disorders using the immune-inflammatory index (SII), 62.5% (25) had low inflammation, 30% (12) had moderate inflammation, and 7.5% (3) had high systemic inflammation, i.e., immune imbalance. (Figure 5)

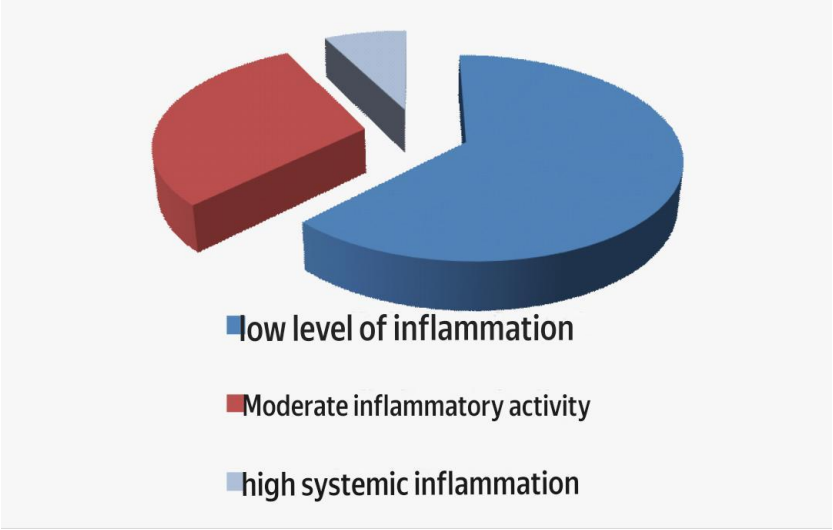

Figure 5. Systemic inflammation in patients with sleep disorders using the immune-inflammatory index (SII)

When the neutrophil-lymphocyte ratio (NLR) of these patients was studied, 87.5% (35) of them had normal inflammatory activity, 12.5% (5) had moderate inflammatory activity, and no high inflammatory activity was detected. (Figure 6)

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5. No 11. November ,2025

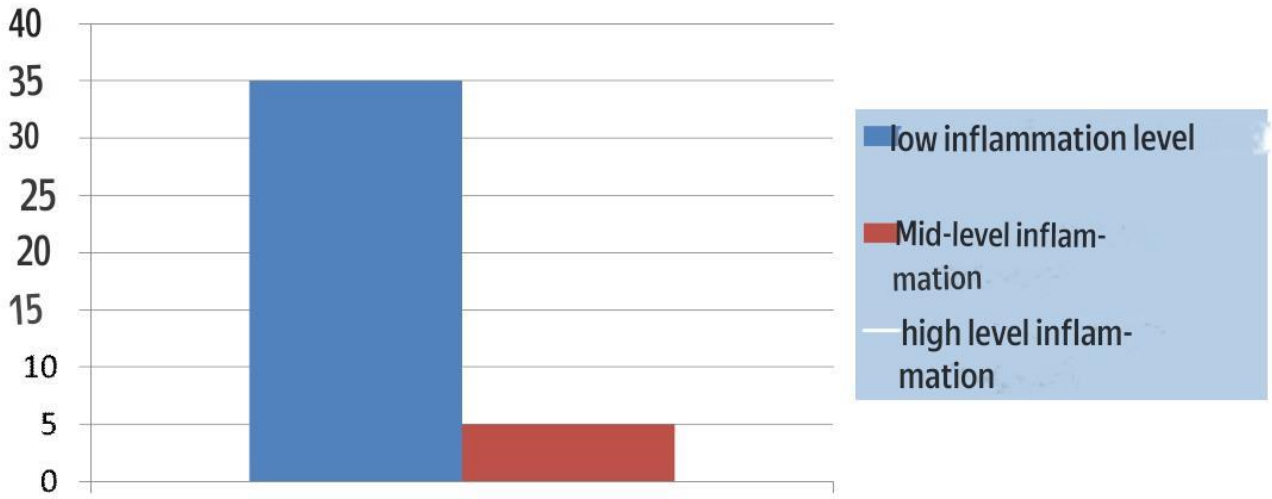

Figure 6. Results of the neutrophil-lymphocyte ratio (NLR) index in patients with sleep disorders.

Also, when their platelet-lymphocyte ratio (PLR) index was examined, 87.5% (35) had a high PLR, and 12.5(5)% had a low PLR. (Figure 7)

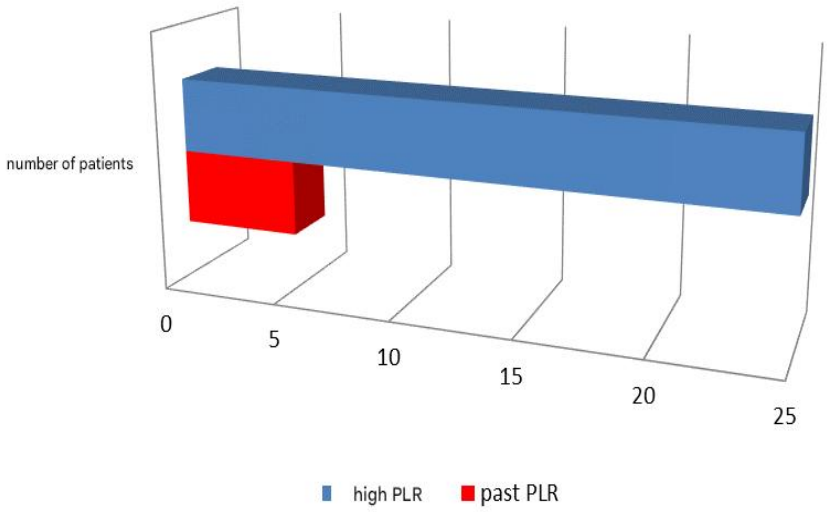

Figure 7. Results of the platelet-lymphocyte ratio (PLR) index of patients

Conclusion: When examining patients with sleep disorders, we can see that sleep disorders are more common in women than in men, and that the activity of systemic inflammatory indicators is increased in patients with mild, moderate, and severe sleep disorders. Prolonged insomnia leads to the development of systemic inflammation. As a result, indicators such as SII (Systemic Immune Inflammation Index), NLR (Neutrophil/Lymphocyte Ratio), and PLR (Platelet/Lymphocyte Ratio) increase.

AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 5. No 11. November ,2025

References:

1. Irwin M. Sleep and inflammation: partners in sickness and in health. Nature Reviews Immunology. 2019;19:702–715. DOI: 10.1038/s41577-019-0190-z

2. Besedovsky L, Lange T, Haack M. The Sleep-Immune Crosstalk in Health and Disease. Physiol Rev. 2019;99:1325–1380. DOI: 10.1152/physrev.00010.2018

3. Medic G, Wille M, Hemels MEH. Short- and long-term health consequences of sleep disruption. Sleep Med Rev. 2017;31:63–74. DOI: 10.1016/j.smrv.2015.12.001

4. Irwin MR, Olmstead R, Carroll JE. Sleep disturbance, sleep duration, and inflammation: a systematic review and meta-analysis of cohort studies and experimental sleep deprivation. Biol Psychiatry. 2016;80:40–52. DOI: 10.1016/j.biopsych.2015.05.014

5. Bryant PA, Trinder J, Curtis N. Sleep and immune function. Brain Behav Immun. 2020;87:1–10. DOI: 10.1016/j.bbi.2020.02.006

6. McHill AW, Wright KP. Role of sleep and circadian disruption on energy expenditure and in metabolic predisposition to human obesity. Sleep Med Clin. 2020;15:167–182. DOI: 10.1016/j.jsmc.2020.01.002