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"The Impact of Sleep Disorders on Immune System Function in Adults: A Survey-Based Study at Alexandria University Hospital"

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Abstract:

Background: Sleep plays a critical role in regulating immune function through neuroendocrine and inflammatory pathways. However, sleep disorders are frequently underdiagnosed in clinical settings, particularly in developing countries, despite their known impact on physical health and disease resistance. This study investigates the relationship between sleep quality and immune system function among adult patients at Alexandria University Hospital.

Objectives: The primary objective was to assess the prevalence of sleep disorders in a hospital-based adult population and examine their association with self-reported infection frequency, recovery duration, and selected immune markers.

Methods: A cross-sectional survey was conducted with 150 adult patients. Data were collected using the Pittsburgh Sleep Quality Index (PSQI) and a structured questionnaire assessing infection history and chronic illnesses. Where available, laboratory data including C-reactive protein (CRP) and white blood cell (WBC) counts were recorded. Data were analyzed using descriptive statistics, bivariate correlation, chi-square tests, and multiple linear regression.

Results: Poor sleep quality (PSQI > 5) was observed in 67.3% of participants. Significant positive correlations were found between sleep disturbance and infection frequency ($r = 0.42$, $p < .001$), as well as between PSQI scores and elevated CRP levels ($r = 0.36$, $p = .002$). Regression analysis showed that sleep quality significantly predicted infection frequency ($\beta = 0.31$, $p < .001$), even after adjusting for age, gender, and chronic illness.

Conclusion: Sleep disorders are prevalent and significantly associated with reduced immune function in adult patients. These findings support the integration of sleep assessment into routine clinical practice and highlight the need for targeted interventions to improve sleep health and immune resilience. Further longitudinal and interventional research is recommended to explore causal pathways and long-term outcomes.

Keywords: sleep disorders, immune system, PSQI, inflammation, infection, Egypt, C-reactive protein, cross-sectional study

1.Introduction:

Sleep is an essential biological process that supports a wide range of physiological functions, among which immune regulation is particularly critical. While often overlooked in clinical assessment, sleep serves as a foundational component of physical and psychological well-being, influencing hormone secretion, metabolic balance, and immune response. The interdependence between sleep and immunity is now well-documented, as evidence from neuroimmunology demonstrates that sleep not only enhances the efficiency of immune surveillance but also helps modulate the inflammatory response to pathogens (Besedovsky, Lange, & Born, 2012). However, when sleep is disrupted—either in duration, quality, or continuity—immune system performance may be significantly impaired.

Sleep disorders such as insomnia, obstructive sleep apnea (OSA), restless leg syndrome, and circadian rhythm disorders are highly prevalent among adults and are particularly common in hospital populations. These disorders may lead to altered levels of key immunological agents such as cytokines (e.g., interleukin-6, tumor necrosis factor-alpha), impair the activation of T-cells, and weaken the body's natural defense mechanisms against infection and inflammation (Irwin, 2019). Studies have shown that even partial sleep deprivation can reduce vaccine efficacy, increase vulnerability to respiratory tract infections, and accelerate the progression of chronic diseases including cardiovascular conditions, diabetes, and autoimmune syndromes (Bryant et al., 2004; Lange, Dimitrov, & Born, 2010).

Despite this growing body of international evidence, the specific relationship between sleep disorders and immune function in local clinical populations, such as those in Egyptian public hospitals, remains underexplored. Patients at Alexandria University Hospital represent a diverse demographic often affected by high stress, chronic illness, and limited access to sleep-focused interventions. These factors may further exacerbate the impact of sleep disturbances on health outcomes, particularly immunity. Given the integral role of the immune system in recovery and disease resistance, it is imperative to assess how sleep quality correlates with immune health in this population.

This study aims to fill a significant research gap by investigating the prevalence of sleep disorders and their association with indicators of immune system dysfunction among adult patients at Alexandria University Hospital. Through a structured survey and analysis of clinical patterns, this research seeks to provide evidence that can inform hospital screening procedures, patient education, and integrative care strategies targeting both sleep and immunity.

2.Preamble / Background:

Sleep and immune function are intricately connected through a bidirectional relationship in which each system influences the other. Healthy sleep supports effective immune defense, while immune activation during illness often alters sleep patterns. This relationship is mediated through neuroendocrine and cytokine signaling pathways that regulate inflammatory responses and circadian rhythms (Opp, 2009). Sleep is particularly important in regulating the production and release of pro-inflammatory and anti-inflammatory cytokines, including interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α), all of which play vital roles in host defense mechanisms (Besedovsky et al., 2012).

Sleep disorders, broadly defined as disturbances in the duration, quality, or architecture of sleep, are highly prevalent among adults worldwide. In hospital settings, sleep disruptions are especially common due to stress, underlying illnesses, environmental factors, and medication side effects. Studies have indicated that even short-term sleep restriction can impair immune responses, reduce the efficacy of vaccines, and increase susceptibility to viral and bacterial infections (Irwin, 2015). Chronic sleep disorders have been associated with long-term systemic inflammation, weakened cellular immunity, and dysregulated hormonal rhythms, all of which contribute to the development or progression of chronic diseases such as cardiovascular disorders, metabolic syndrome, and autoimmune conditions (Bryant et al., 2004; Medic, Wille, & Hemels, 2017).

In Egypt, sleep health remains a relatively under-researched area, particularly in public health institutions such as Alexandria University Hospital, where clinical attention is often focused on acute physical symptoms. However, a significant portion of patients presenting with immune-related or inflammatory conditions may also be suffering from undiagnosed or poorly managed sleep disorders. Sociodemographic factors such as age, stress, urban living, and comorbid chronic illnesses may further increase the likelihood of disrupted sleep in this population.

By investigating the intersection of sleep disorders and immune function in an Egyptian clinical context, this study aims to provide localized data that can inform hospital practices and improve patient outcomes. Understanding how sleep quality affects immune competence can lead to early interventions, better management of comorbidities, and the inclusion of sleep assessment tools in routine clinical screening.

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3.Definition and Classification of Sleep Disorders

The term "sleep disorder" refers to a wide range of conditions that impact one's ability to consistently achieve restful sleep. They may arise due to underlying health issues, lifestyle choices, neurologically, or because of psychological factors. They can also be classified as either primary (occurring in isolation) or secondary (arising as a consequence of a medical or psychiatric issue). As highlighted by the American Academy of Sleep Medicine, the International Classification of Sleep Disorders (ICSD-3) categorizes more than 80 types of sleep disorders, the most prevalent and clinically important being insomnia, obstructive sleep apnea (OSA), circadian rhythm disorders, restless leg syndrome (RLS), and parasomnias (American Academy of Sleep Medicine, 2014).

▪ Insomnia

This condition is defined by the ongoing problem of initiating or maintaining sleep, or of achieving restorative sleep, or sleeping without rest, along with resulting daytime impairment. Insomnia can be acute (lasting for a short duration, recovering following a stressor) or chronic (occurring more than three months and at least three nights weekly). Chronic insomnia involves sleep and daytime functioning disrupted by excessive somnolence, fatigue, and, diminished cognitive functioning, or a combination of these. Moreover, chronic insomnia has been found to correlate with high levels of inflammatory biomarkers like C-reactive protein (CRP), IL-6, and TNF-α signaling systemic immune activation (Baglioni et al., 2011).

Obstructive sleep apnea (OSA)

OSA is a sleep-related breathing disorder which involves the temporary blockage of the upper airway during sleep and leads to intermittent sleep and oxygen desaturation.

Obstructive sleep apnea (OSA) is considered the most prevalent sleep disorder, particularly in middle-aged and overweight individuals. The recurrent sleep disruption and hypoxia associated with OSA has been connected with immune dysregulation and upregulation of inflammatory cytokines and oxidative stress markers (Ryan et al., 2005).

● Circadian Rhythm Sleep-Wake Disorders

Such disorders result from a mismatch between one's biological clock and the external environment. As a result, the person may have difficulty sleeping or waking up at conventional times. Commonly, they include delay sleep phase disorder and shift work disorder. Circadian misalignment is known to influence immune function by altering cortisol and melatonin rhythms which are vital in maintaining homeostatic balance within the immune system (Boivin et al., 2007).

● Restless Leg Syndrome (RLS)

RLS describes the disorder with an irresistible urge to move the legs. It is often accompanied by unpleasant sensations that worsen at rest or in the evening. The syndrome often leads to sleep deprivation and low-quality sleep, thereby indirectly impacting immune function.

● Parasomnias

Parasomnias are a group of sleep disorders characterized by unusual movements, behaviors, or experiences during sleep, including but not limited to night terrors, sleepwalking, and REM sleep behavior disorder. While less common, severe parasomnias can lead to sleep fragmentation and reduced restorative sleep over a considerable time, which may gradually impair immune responsiveness.

The understanding of various types and classifications of sleep disorders is necessary for connecting specific patterns of sleep disruption to the resultant immune outcomes in clinical populations.

This study evaluates the symptoms of insomnia and OSA due to their higher prevalence and stronger links to immune system issues.

4.Methodology

4.1 Study Design

This study used a cross-sectional descriptive-analytical design to assess the correlation of sleep disorders with the functioning of the immune system in adult patients. The cross-sectional method enabled capturing data at one particular time which was adequate to detect trends, associations, and prevalence within the population under study.

4.2 Study Setting and Population

The research was done at Alexandria University Hospital in Egypt, which is among the largest public tertiary healthcare facilities in the region. The study population incorporated adult patients (18 years and older) who visit outpatient or inpatient services, including wards for internal medicine, immunology, and respiratory medicine specialized clinics.

4.3 Inclusion and Exclusion Criteria

• Inclusion criteria:
o Adults aged ≥ 18 years
o Potential to comprehend and respond to the survey
o Capable of providing informed consent
• Exclusion criteria:
o Patients with diagnosed non-sleep-related psychiatric disorders
o Patients on immunosuppressive or chemotherapy treatment
o Women who are pregnant (because physiological changes may skew the results)

4.4 Sampling Method

This study applied a purposive non-random sampling approach to access optomic data from patients who were suspected to have symptoms of sleep-related or immune-related challenges. The participants were selected in a way that aimed to ensure balance in terms of age, sex, and other medically relevant characteristics to enhance representativeness in clinical settings.

4.5. Sample Size

The sample size was determined based on Cochran's formula for observational studies. A minimum of **150 patients** was targeted to ensure statistical validity, allowing for subgroup analysis and correlation testing.

4.6. Data Collection Tools

Data were collected using a **structured, interviewer-administered questionnaire** composed of three parts:

A. Sociodemographic and Medical Data

- Age, gender, marital status, occupation, and education level
- Medical history (chronic diseases, frequency of infections, use of medications)

B. Sleep Assessment

- The **Pittsburgh Sleep Quality Index (PSQI)** was used to measure subjective sleep quality over the past month. It assesses sleep duration, latency, disturbances, and overall sleep quality. A global PSQI score > 5 indicates poor sleep.

C. Immune Function Indicators

- Self-reported frequency of infections in the past 6 months (e.g., cold, flu, respiratory infections)
- Self-reported recovery time after illness
- History of diagnosed immune-related conditions (e.g., autoimmune diseases, allergies)
- If available, lab results (e.g., CRP, WBC count) were extracted from hospital records

4.7. Ethical Considerations

Approval for the study was obtained from the **Ethical Review Board of Alexandria University Faculty of Medicine**. Written informed consent was obtained from all participants. Data were anonymized and stored securely to ensure confidentiality and comply with ethical standards.

4.8. Data Analysis

Data were entered and analyzed using **IBM SPSS Statistics version 26**. The following analyses were conducted:

- **Descriptive statistics:** Frequencies, means, and standard deviations to summarize sample characteristics
- **Bivariate analysis:**
  - Pearson's correlation coefficient to assess the relationship between sleep quality (PSQI score) and immune indicators
  - Chi-square tests for associations between categorical variables (e.g., presence of sleep disorder vs. presence of immune-related conditions)
- **Multivariate regression analysis:** Used to control for potential confounders such as age, gender, and presence of chronic illness, assessing the independent effect of sleep quality on immune function markers.

A p-value < 0.05 was considered statistically significant.

5.Results

5.1. Descriptive Statistics

A total of **150 adult patients** participated in the study, with a response rate of **93.7%**. The mean age was **41.2 years** (SD = 12.8), ranging from 18 to 72 years. Among the participants, **58%** were female and **42%** were male. **64%** of participants had at least one chronic illness, with hypertension (**30.7%**) and type 2 diabetes (**28.0%**) being the most common.

5.2. Sleep Quality Assessment

According to the Pittsburgh Sleep Quality Index (PSQI):

- **67.3%** (n = 101) of participants had poor sleep quality (global PSQI score > 5).
- The mean PSQI score was **8.4** (SD = 3.1).
- The most commonly reported sleep issues were difficulty falling asleep (**55.3%**), frequent nighttime awakenings (**48.7%**), and excessive daytime sleepiness (**36.0%**).

5.3. Immune System Function Indicators

Participants self-reported the number of infections they experienced over the past 6 months. Among them:

- **47.3%** reported two or more infections, mostly respiratory tract infections.
- **29.3%** reported prolonged recovery time (>7 days).
- **15.3%** reported having been diagnosed with autoimmune or immunodeficiency-related conditions.

Where available (n = 84), laboratory results showed that:

- **38.1%** had elevated CRP levels (>10 mg/L).
- **25.0%** had leukocytosis (WBC > 11,000/mm³).

5.4. Bivariate Analysis

Pearson's correlation coefficient showed a significant positive correlation between global PSQI scores and the number of infections reported in the last 6 months ($r = \mathbf{0.42}$, $p < .001$), suggesting that poorer sleep quality is associated with more frequent infections. A moderate correlation was also found between PSQI scores and CRP levels ($r = \mathbf{0.36}$, $p = .002$).

Chi-square tests revealed a statistically significant association between sleep quality category (good vs. poor sleepers) and infection frequency (χ^2 = **11.84**, df = 1, p = .001), as well as between sleep quality and delayed recovery (χ^2 = **7.29**, df = 1, p = .007).

5.5. Multivariate Regression Analysis

A multiple linear regression was conducted to predict infection frequency based on sleep quality while controlling for age, gender, and the presence of chronic disease.

- The model was statistically significant: F(4, 145) = **9.37**, p < .001, R^2 = **0.23**.
- Sleep quality (PSQI score) was a significant predictor of infection frequency (β = **0.31**, p < .001).
- Chronic illness also had a significant effect (β = **0.28**, p = .002).
- Age and gender were not statistically significant predictors in the model.

6.Discussion

This research focused on the association between sleep disorders and the immune system among adult patients in Alexandria University Hospital. Results clearly demonstrate that poor sleep quality is associated with compromised immune indicators, which include increased self-reported infection rates, prolonged recovery time, and increased inflammatory markers like C-reactive protein (CRP). These findings support existing literature in the international arena while also adding new perspectives into the Egyptian hospital population's sleep disturbances and degraded sleep quality.

The prevalence of poor sleep quality in this population (67.3%) was particularly alarming because similar findings exist across numerous clinical settings. Sleep disorders remain undiagnosed or untreated, despite their profound consequence on other bodily systems (Medic et al., 2017). Insomnia and borken sleep were The most commonly reported issues, supporting findings of several other studies which identified these disorders as primary disruptors of immune balance (Baglioni et al., 2011).

Perhaps the most notable finding was the moderate positive correlation between PSQI scores and self-reported infection frequency. This correlation suggests that sleep quality can be used as an indicator of immune vulnerability. This observation supports Irwin's (2015) framework in psychoneuroimmunology which stated that sleep has an effect on inflammatory processes and responses that are mediated by hormones and cytokines.

Elevated CRP and leukocyte levels in our sample of poor sleepers provide supporting physiological evidence for these mechanisms. These results align with the findings of Bryant, Trinder, and Curtis (2004), who noted both acute and chronic sleep disarray associates with enhanced inflammation and diminished immune function.

Moreover, regression analysis results showed that after controlling for the confounding influences like age, gender, and chronic illness, sleep quality still significantly predicted the infection rate. This adds to the perception that sleep as a health determinant should not simply be regarded as a lifestyle factor; instead, it needs to be considered as a clinical risk factor for disease resilience and recuperation. The contribution of chronic illness as another predictor was anticipated. It merges with the understanding that these conditions frequently coexist with immune system compromise and poor sleep, potentially escalating the vulnerability triad (Lange et al., 2010).

These results are of great concern for clinical practice as well as for public health. They underline the necessity for incorporating sleep assessment as part of the standard evaluation in adult patients, particularly those suffering from recurrent infections or inflammatory diseases. Brief sleep evaluations like the PSQI could be included in the outpatient and inpatient care protocols to detect those who need further risk assessment.

Also, managing sleep disorders using behavioral changes, medications, or altering the hospital environment could improve immune functions along with enhancing the speed of recovery.

This study has some limitations. Its cross-sectional design is a limitation when drawing causal conclusions - while sleep issues correlate with some degree of immune dysfunction, the reasoning or cause determining whys does exist lacks strong backing. Furthermore, relying on self-reported data regarding personal medical history with infections is prone to memory inaccuracies. The same reasoning applies to CRP and WBC data but their absence of consistent clinical lab testing for all participants also adds a restriction in mas deeper biological exploration. Finally, broader generalizations may be limited since the research sample was drawn from a singular hospital which affects representation.

Regardless of the limitations, the study offers insights into the immune effects resulting from sleep disorders within a clinical setting in the Middle East region. Further research could focus on longitudinal studies using more than one objective monitoring method for sleep, such as actigraphy or polysomnography, and include more than one healthcare center for better external validity.

7.Conclusion and Recommendations

7.1.Conclusion

This study has highlighted a significant and clinically relevant relationship between sleep disorders and immune system dysfunction among adult patients at Alexandria University Hospital. The findings revealed that poor sleep quality, as measured by the Pittsburgh Sleep Quality Index (PSQI), is strongly associated with increased frequency of infections, prolonged recovery times, and elevated inflammatory markers such as C-reactive protein (CRP). These results align with global research in psychoneuroimmunology, confirming that disrupted sleep contributes to immune system dysregulation and compromises physical health.

Importantly, the association remained significant even after controlling for key confounding variables such as age, gender, and chronic disease status. This indicates that sleep quality itself may serve as an independent predictor of immune resilience. Given the high prevalence of sleep disturbances among the studied hospital population, the results underscore the urgency of integrating sleep assessment and management into routine clinical practice.

Moreover, the study adds new empirical data from the Egyptian healthcare context, where research on sleep and immunity remains scarce. By shedding light on this underexplored domain, the study provides a foundation for future investigations and opens new possibilities for holistic patient care models that incorporate sleep health as a critical component of immune support.

7.2.Recommendations

1. **Clinical Integration of Sleep Assessment Tools**
   Healthcare providers at Alexandria University Hospital and similar institutions are encouraged to incorporate brief, validated sleep questionnaires such as the PSQI during outpatient and inpatient assessments, particularly in departments handling immune-compromised or chronically ill patients.
2. **Patient Education and Awareness**
   Develop patient-facing educational materials (leaflets, posters, or short counseling sessions) to increase awareness about the importance of sleep-in strengthening immunity and overall health. These materials should be culturally adapted and simple to understand.
3. **Staff Training and Policy Development**
   Train physicians, nurses, and hospital staff on recognizing common signs of sleep disorders and initiating early non-pharmacological interventions (e.g., sleep hygiene counseling, CBT-I referrals, or relaxation techniques). Hospital management could also explore policies to minimize environmental sleep disruptors, especially in inpatient settings.

4. **Multidisciplinary Collaboration**
   Encourage collaboration between sleep specialists, immunologists, and internal medicine practitioners to design integrative treatment pathways for patients at higher risk of immune complications due to poor sleep.
5. **Further Research**
   Future studies should adopt longitudinal designs to explore causality and include objective sleep measurements (e.g., actigraphy or polysomnography). Expanding the sample to include diverse hospitals and regions in Egypt would also enhance generalizability and deepen understanding of contextual factors.
6. **National Health Policy Consideration**
   Policymakers should consider sleep disorders within the framework of national non-communicable disease strategies, especially in light of their link to inflammation, infection risk, and chronic disease progression.

References:

American Academy of Sleep Medicine. (2014). International classification of sleep disorders (3rd ed.). Darien, IL: American Academy of Sleep Medicine.
Baglioni, C., Battagliese, G., Feige, B., Spiegelhalder, K., Nissen, C., Voderholzer, U., ... & Riemann, D. (2011). Insomnia as a predictor of depression: A meta-analytic evaluation of longitudinal epidemiological studies. Journal of Affective Disorders, 135(1–3), 10–19. https://doi.org/10.1016/j.jad.2011.01.011
Besedovsky, L., Lange, T., & Born, J. (2012). Sleep and immune function. Pflügers Archiv - European Journal of Physiology, 463(1), 121–137. https://doi.org/10.1007/s00424-011-1044-0
Boivin, D. B., James, F. O., Wu, A., Cho-Park, P. F., Xiong, H., & Sun, Z. S. (2007). Circadian clock genes oscillate in human peripheral blood mononuclear cells. Blood, 109(11), 4967–4970. https://doi.org/10.1182/blood-2006-07-035287
Bryant, P. A., Trinder, J., & Curtis, N. (2004). Sick and tired: Does sleep have a vital role in the immune system? Nature Reviews Immunology, 4(6), 457–467. https://doi.org/10.1038/nri1369
Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Research, 28(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4
Cochran, W. G. (1977). Sampling techniques (3rd ed.). New York: John Wiley & Sons.
Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). Sage Publications.
Irwin, M. R. (2015). Why sleep is important for health: A psychoneuroimmunology perspective. Annual Review of Psychology, 66, 143–172. https://doi.org/10.1146/annurev-psych-010213-115205
Irwin, M. R. (2019). Sleep and inflammation: Partners in sickness and in health. Nature Reviews Immunology, 19(11), 702–715. https://doi.org/10.1038/s41577-019-0190-z
Lange, T., Dimitrov, S., & Born, J. (2010). Effects of sleep and circadian rhythm on the human immune system. Annals of the New York Academy of Sciences, 1193(1), 48–59. https://doi.org/10.1111/j.1749-6632.2009.05300.x
Medic, G., Wille, M., & Hemels, M. E. H. (2017). Short- and long-term health consequences of sleep disruption. Nature and Science of Sleep, 9, 151–161. https://doi.org/10.2147/NSS.S134864
Opp, M. R. (2009). Sleeping to fuel the immune system: Mammalian sleep and resistance to parasites. BMC Evolutionary Biology, 9, 8. https://doi.org/10.1186/1471-2148-9-8

Ryan, S., Taylor, C. T., & McNicholas, W. T. (2005). Selective activation of inflammatory pathways by intermittent hypoxia in obstructive sleep apnea syndrome. Circulation, 112(17), 2660–2667. https://doi.org/10.1161/CIRCULATIONAHA.105.556746

"تأثير اضطرابات النوم على وظيفة الجهاز المناعي لدى البالغين: دراسة مبنية على الاستبيانات في مستشفى جامعة الإسكندرية"

إعداد الباحث
د. نجدت القواس
طبيب عام

الملخص
يلعب النوم دورًا حيويًا في تنظيم وظيفة الجهاز المناعي من خلال المسارات العصبية الصماوية والالتهابية. ومع ذلك، غالبًا ما يتم التقليل من تشخيص اضطرابات النوم في البيئات السريرية، خاصة في الدول النامية، على الرغم من تأثيرها المعروف على الصحة الجسدية ومقاومة الأمراض. تهدف هذه الدراسة إلى استكشاف العلاقة بين جودة النوم ووظيفة الجهاز المناعي لدى المرضى البالغين في مستشفى جامعة الإسكندرية.