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The Effect of Chronic Diseases on Sleep Quality: A Single-Center Study from a Family Medicine Perspective

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ABSTRACT

Introduction: This cross-sectional study aimed to evaluate the prevalence of poor sleep quality and determine the specific impact of the number, type, and comorbidity (multimorbidity) of chronic diseases on sleep quality among individuals followed in primary care.

Methods: This descriptive study, conducted at a family health center in İstanbul, Türkiye, between June and August 2024, included 268 adult patients diagnosed with at least one chronic disease. Data were collected using a sociodemographic and clinical data form and the Pittsburgh Sleep Quality Index (PSQI). Statistical analyses were performed using descriptive statistics and the Mann-Whitney U, Kruskal-Wallis, and Spearman's correlation tests; the significance level was set at $p<0.05$.

Results: Participants' mean age was 54.29±17.1 years; 52.6% were female. The mean number of chronic diseases per person was 2.62. The most prevalent diseases were hypertension (36.57%), diabetes mellitus (22.01%), and vitamin D deficiency (17.91%). Poor sleep quality (PSQI ≥5) was identified in a high proportion of participants (59.3; n=159). A significant positive correlation was found between the number of chronic diseases (multimorbidity) and the total PSQI score (r: 0.227, $p<0.001$). Total PSQI scores were significantly higher in individuals with psychiatric diseases ($p=0.029$), COPD ($p=0.003$), migraine ($p=0.004$), and skin diseases ($p=0.002$). Furthermore, disease clusters, notably the comorbidity of hypertension and diabetes and the combination of vitamin D and B12 deficiencies, exerted a more detrimental effect on sleep quality and daytime functioning than isolated diseases.

Conclusion: Sleep disturbances are highly prevalent in primary care patients with chronic conditions. Multimorbidity has been confirmed as an independent risk factor for impaired sleep quality, particularly when it involves psychiatric, respiratory, neurological, and metabolic conditions. Family physicians should prioritize routine sleep quality screening in chronic disease management and integrate personalized, holistic interventions.

Keywords: Family practice, chronic disease, sleep quality, Pittsburgh Sleep Quality Index, multimorbidity

Introduction

Chronic diseases are leading causes of morbidity and mortality in modern societies and have a profound impact on individuals' quality of life. The management of chronic diseases accounts for a significant proportion of primary healthcare visits in Türkiye and globally (1). These diseases adversely affect physical functioning, psychological health, and social well-being.

Sleep is a fundamental process essential for physiological and psychological restoration. Optimal sleep quality is a crucial indicator of overall health and quality of life (2). A bidirectional, complex relationship exists between chronic diseases and sleep disorders. While symptoms such as pain, dyspnea (shortness of breath), and nocturia interrupt sleep, insufficient sleep can worsen the course of chronic diseases by lowering the pain threshold, increasing the inflammatory response, and disrupting metabolic balance (3).

Family physicians, given their role in providing long-term, comprehensive care that addresses individuals holistically, are ideally placed to diagnose sleep problems early and manage sleep problems in individuals with chronic diseases. The aim of this study is to assess sleep quality in individuals with one or more chronic diseases who present to a family medicine unit and to determine the relationship between sleep quality and specific chronic diseases and multimorbidity.

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Methods

Study Design and Setting

This cross-sectional descriptive study was conducted between June and August 2024 at a family health center in İstanbul, Türkiye.

Study Population and Sampling Strategy

The study population comprised 804 individuals registered at family medicine unit number: 89 who had been diagnosed with at least one chronic disease. A consecutive sampling method was employed to minimize selection bias. All patients presenting to the clinic during the study period who met the inclusion criteria were invited to participate. Among the target population, 280 individuals agreed to participate. Twelve participants were subsequently excluded due to incomplete data or withdrawal, resulting in a final sample size of 268. The participation rate was approximately 33.3% of the total registered population with chronic disease, thereby providing a representative sample for the unit. A post-hoc power analysis indicated that the sample size of 268 was sufficient to achieve >80% power and to estimate the primary outcome measures with 95% confidence intervals.

Inclusion and Exclusion Criteria

The inclusion criteria were being registered at the specific family medicine unit, being 18 years of age or older, having at least one diagnosed chronic disease, and voluntarily agreeing to participate. The exclusion criteria were defined as: not being registered at the center; the absence of any chronic disease; the presence of an acute severe illness requiring urgent intervention; or cognitive impairment preventing effective communication and data collection.

Rationale for Vitamin D Evaluation

In this study, vitamin D deficiency was evaluated within the category of chronic diseases. Although often classified as a nutritional deficiency, it was included in the chronic disease spectrum because of its high prevalence in primary care, the need for long-term monitoring and replacement therapy, and its established role in the etiology and progression of various chronic conditions, including metabolic and musculoskeletal disorders.

Data Collection Instruments

• Sociodemographic and clinical data form: This form, prepared by the researchers, was used to collect information on age, gender, education, income, body mass index (BMI), and current chronic disease diagnoses (based on patient self-report and/or medical records).

• The Pittsburgh Sleep Quality Index (PSQI), which has demonstrated high validity and reliability, was used to evaluate sleep quality. A global score of 5 or greater indicates poor sleep quality.

Ethical Approval

The study received ethical approval from the İstanbul Medipol University Non-Interventional Clinical Research Ethics Committee (decision number: 282, date: 14.03.2024). Written informed consent was obtained from all participants.

Statistical Analysis

Data were analyzed using SPSS 27.0 version (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, standard deviation, frequency) were calculated. Normality of the data distribution was assessed using the Kolmogorov-Smirnov test. Non-parametric tests (Mann-Whitney U, Kruskal-Wallis, Spearman correlation) were used for data that did not meet the assumption of normality. The level of statistical significance was set at $p<0.05$.

Results

The participants were predominantly female (52.6%), with a mean age of 54.3±17.1 years. The mean BMI was 26.5±4.8 kg/m², falling into the overweight range. The sociodemographic characteristics of the participants are summarized in Table 1.

The mean number of chronic diseases per person was 2.62. The prevalence of the identified chronic diseases is presented in Table 2. The most common conditions were hypertension, diabetes mellitus, and vitamin D deficiency.

The participants' mean global PSQI score was 6.09±3.61. A total of 159 participants (59.3%) were classified as having poor sleep quality (PSQI score ≥5). Total PSQI scores increased significantly with the number of chronic diseases (r: 0.227, $p<0.001$).

When sleep quality was compared according to sociodemographic variables (Table 3), women had significantly higher scores than men for specific sub-domains such as sleep latency ($p=0.006$) and use of sleep medication ($p=0.020$), although the difference in global PSQI was not statistically significant ($p=0.060$). Additionally, participants who

Table 1. Sociodemographic characteristics of the participants (n=268)

Variable	Category	n	%
Gender	Female	141	52.6
	Male	127	47.4
Marital status	Married	182	67.9
	Single/divorced/widowed	86	32.1
Education level	Primary school or below	101	37.6
	High school	78	29.1
	University/higher education	89	33.1
Employment status	Employed	108	40.3
	Unemployed/retired/housewife	160	59.7
Housing status	Homeowner	183	68.3
	Tenant (renting)	75	28.0
BMI category	Normal weight	105	39.2
	Overweight	97	36.2
	Obese	59	22.0
	Underweight	7	2.6
Quantitative data		Mean	SD
Age (years)		54.29	17.1
BMI (kg/m²)		26.5	4.8
Number of chronic diseases		2.62	-

BMI: Body mass index, SD: Standard deviation

were tenants had significantly higher sleep disturbance scores than homeowners (p=0.011).

Comparison of global PSQI scores across specific disease groups revealed that individuals with psychiatric disorders, COPD, migraine, and skin diseases had significantly poorer sleep quality than those without these conditions (Table 4).

The analysis of disease multimorbidity revealed that the coexistence of hypertension and diabetes was associated with a significantly worse total PSQI score, with a mean of 6.45±4.06, compared with those without this combination (p=0.017). Similarly, the combination of vitamin D and vitamin B12 deficiencies was associated with significantly higher sleep disturbance scores (p=0.027).

Discussion

This cross-sectional study revealed that sleep disturbances were highly prevalent (59.3%) among individuals with chronic diseases followed in primary care, and demonstrated that sleep quality was significantly associated with multimorbidity. Our findings support the necessity of addressing sleep health as a central component in chronic disease management.

Table 2. Prevalence of chronic diseases in the study population

Chronic disease	n	%
Hypertension	98	36.57
Diabetes mellitus	59	22.01
Vitamin D deficiency	48	17.91
Cardiovascular diseases	43	16.04
Hyperlipidemia	42	15.67
Vitamin B12 deficiency	41	15.30
Allergy	35	13.06
Thyroid disorders (hypothyroid)	26	9.70
Anemia	25	9.33
Gastroesophageal reflux disease	23	8.58
Migraine	18	6.72
Psychiatric disorders	17	6.34
Skin diseases	17	6.34
COPD	11	4.10

COPD: Chronic obstructive pulmonary disease

One of the most striking findings of our research is a linear deterioration in sleep quality with an increasing number of chronic diseases (multimorbidity) (r: 0.227, p<0.001). This suggests that various pathophysiological mechanisms (inflammation, pain, medication side effects, and psychosocial stress) converge synergistically to disrupt sleep architecture. The literature indicates that multiple chronic conditions impair sleep architecture through increased systemic inflammation, thereby creating a vicious cycle that promotes disease progression (4). Our study confirms this pronounced relationship within the primary care patient population.

The high PSQI scores observed in individuals with psychiatric disorders indicate that this group is particularly vulnerable to sleep disturbances. This finding is consistent with evidence that depression and anxiety profoundly affect the sleep-wake cycle through hyperarousal and circadian rhythm disturbances (5). Furthermore, the significantly higher use of sleep medications in this group reflects the need for pharmacological management of psychiatric symptoms and serves as a reminder to exercise caution regarding long-term use (6).

The higher sleep latency and use of sleep medication among women align with established gender-specific sleep differences in the literature. Jaussent et al. (7) reported increased use of hypnotic medication in women during the menopausal transition, suggesting a link to hormonal fluctuations. Additionally, social roles and the higher prevalence of anxiety among women may contribute to difficulties initiating sleep (8). Conversely, the shorter sleep latency observed in individuals with very high income (p=0.048) may indicate that economic security reduces the physiological stress response, thereby facilitating sleep onset (9).

The negative impact of metabolic disease clustering (hypertension, diabetes, hyperlipidemia) on sleep quality was clearly evident in our study. Specifically, the coexistence of hypertension and diabetes significantly worsened the total PSQI score, sleep disturbance, and daytime dysfunction. This can be explained by insulin resistance and hyperglycemia disrupting the circadian rhythm (10), and hypertension is strongly associated with sleep apnea and fragmented sleep (11). These effects appear to be exacerbated when combined.

The high sleep latency and impaired sleep quality observed in individuals with COPD are consistent with sleep fragmentation caused by dyspnea and hypoxemia (5). Similarly, severe sleep disturbances in

Table 3. Global PSQI scores and significant sub-domain findings by sociodemographic variables

Variable	Category	Global PSQI (mean ± SD)	p	Significant sub-domain findings
Gender	Female	6.49±3.78	0.060	Sleep latency: Higher in females (p=0.006*) Medication use: Higher in females (p=0.020*)
	Male	5.65±3.37		
Housing status	Homeowner	5.90±3.45	0.193	Sleep disturbance: Higher in tenants (p=0.011*)
	Tenant	6.67±3.97		
Employment status	Employed	5.84±2.98	0.830	Sleep efficiency: Better in employed (p=0.044*)
	Unemployed/ retired/housewife	6.26±3.97		

Mann-Whitney U test. p<0.05 is considered significant.*
PSQI: Pittsburgh Sleep Quality Index, SD: Standard deviation

Table 4. Comparison of Global PSQI scores between patients with and without specific chronic diseases

Disease	Status	n	Global PSQI (mean ± SD)	p
Psychiatric illness	Present	17	8.71±5.50	0.029*
	Absent	251	5.92±3.39	
COPD	Present	11	8.62±4.42	0.003*
	Absent	257	6.90±2.48	
Migraine	Present	18	8.72±4.32	0.004*
	Absent	250	5.90±3.48	
Skin diseases	Present	17	8.82±4.30	0.002*
	Absent	251	5.91±3.49	
Diabetes mellitus	Present	59	7.35±3.85	0.031*
	Absent	209	5.93±3.55	
Hypertension	Present	98	6.15±3.93	0.810
	Absent	170	6.06±3.42	

*Mann-Whitney U test. Statistically significant ($p<0.05$). COPD: Chronic obstructive pulmonary disease, PSQI: Pittsburgh Sleep Quality Index, SD: Standard deviation

individuals with migraine and in those with skin disease are linked to the sleep-disrupting nature of pain (12) and of intractable pruritus (13), respectively.

The strong negative effect of the coexistence of vitamin D and B12 deficiencies on sleep quality is noteworthy. Vitamin B12 contributes to methionine synthesis, which is involved in melatonin synthesis; its deficiency is associated with neuropathic pain and restless legs syndrome (14,15). The co-occurrence of these deficiencies is likely to contribute to impaired sleep through overlapping neurobiological and metabolic pathways; however, this hypothesis requires confirmation in mechanistic studies.

The impact of socioeconomic factors on sleep was further confirmed by higher sleep disturbance scores in tenants ($p=0.011$). Balaban et al. (16) reported that housing insecurity and financial stress are associated with increased sleep fragmentation and latency.

Study Limitations

The results of this study do not permit causal inference because of its cross-sectional design. The reliance on self-reported data introduces the risk of recall bias. Being conducted at a single center may limit the generalizability of the findings.

Conclusion

Sleep disturbances are highly prevalent among individuals with chronic diseases, and multimorbidity further exacerbates this risk. Psychiatric, respiratory and neurological diseases, as well as components of metabolic syndrome, have a pronounced negative impact on sleep quality. It is of paramount importance to integrate personalized interventions aimed at assessing and improving sleep health into chronic disease management within primary healthcare services.

Ethics

Ethics Committee Approval: The study received ethical approval from the İstanbul Medipol University Non-Interventional Clinical Research Ethics Committee (decision number: 282, date: 14.03.2024).

Informed Consent: Written informed consent was obtained from all participants.

Footnotes

Authorship Contributions: Concept - M.K., M.A.; Design - M.K., M.A.; Data Collection or Processing - M.K.; Analysis or Interpretation - M.K., M.A.; Literature Search - M.K.; Writing - M.K.

Conflict of Interest: No conflict of interest was declared by the authors.

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