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Research Article

Factors affecting quality of life and sleep: examination of sociodemographic and biochemical parameters

Mehtap Gömleksiz[1], Kevser Tuncer[2], Faruk Kılınç[3], Nevzat Gözel[4], Burkay Yakar[1]

[1]Department of Family Medicine, School of Medicine, Fırat University, Elazığ, Türkiye
[2]Department of Public Health, Faculty of Medicine, Fırat University, Elazığ, Türkiye
[3]Department of Endocrinology, Faculty of Medicine, Fırat University, Elazığ, Türkiye
[4]Department of Internal Medicine, Faculty of Medicine, Fırat University, Elazığ, Türkiye

ABSTRACT

Objective: To examine the relationship between quality of life and sleep, as well as the sociodemographic and biochemical parameters affecting them. It has been observed that such an exhaustive research has not been done before.

Methods: Sociodemographic details were gathered using a specific survey form. To assess the quality of life of the participants, the Quality of Life Scale (SF-36). The Pittsburgh Sleep Quality Index (PSQI) was used to evaluate participants' sleep quality. The gathered data were analyzed using the SPSS-22 statistical software.

Results: There were no significant differences in SF-36 and PSQI scores according to gender. However, PSQI and SF-36 scores varied significantly based on marital status, educational status, employment status, family type, chronic disease status, as well as smoking status and vitamin D levels. A negative correlation was found between PSQI and SF-36 scores, indicating that quality of life and sleep quality are positively correlated; as the score on the sleep quality scale increases, sleep quality decreases. Furthermore, it was determined that quality of life and sleep quality improve with higher levels of calcium, glucose, and vitamin D.

Conclusion: To enhance individuals' quality of life and sleep, it is important to consider their sociodemographic characteristics and blood biochemistry.

Keywords: quality of life, quality of sleep, sociodemographic, biochemical parameters

Introduction

Quality of life, as defined by the World Health Organization, is the way an individual perceives their life in relation to themselves, their culture, values, standards, and expectations.[1] There are three basic approaches to explaining quality of life: explaining it with normative thoughts rather than individual ones, associating it with the satisfaction resulting from choices, and evaluating it based on individual experiences.[2] Quality of life can be considered from two aspects. One aspect includes indicators such as healthy life, sociability, quality time, job satisfaction, and high

✉ Mehtap Gömleksiz ▪ mgomleksiz@firat.edu.tr
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income in the dimension of individual quality of life. The other involves indicators like a healthy environment, social environment, peace, and adequacy of resources in the dimension of social quality of life.[3]

Factors affecting quality of life include gender, age, marital status, social support, housing and its characteristics, health, education, income, worklife, and leisure activities.[4,5] Sleep-related complaints, which are quite common, are the focus of research because poor sleep quality can be a symptom of many medical diseases, and there is a strong relationship between sleep health and physical and psychological well-being.[6] The hormone melatonin, synthesized during sleep, plays a role in the renewal of body cells and strengthening the immune system.[7] Therefore, there is a connection between quality of life and sleep. Additionally, an individual's physical, psychological, and social health is an important indicator of quality of life.[8] Although the association between sleep quality and quality of life has been widely investigated, relatively few studies have evaluated these outcomes simultaneously in relation to a broad range of sociodemographic characteristics and routinely assessed biochemical parameters within the same population. A better understanding of the combined contribution of social and biological factors may help identify determinants of sleep quality and quality of life and inform preventive health strategies.

This study aimed to investigate the relationship between sleep quality and quality of life and to evaluate how these outcomes are associated with various sociodemographic characteristics and biochemical parameters in an adult outpatient population.

Materials and Methods

This hospital-based cross-sectional study was conducted among adults aged 18 years and older who attended the Internal Medicine outpatient clinic of University Faculty of Medicine Hospital between 15 December 2023 and 15 January 2024. Participants were recruited using a convenience sampling method. Eligible patients who attended the outpatient clinic during the study period were invited to participate, and those who provided informed consent and met the eligibility criteria were included in the study. During the study period, 440 individuals were assessed for eligibility. Of these, 20 declined to participate and 16 were excluded based on predefined exclusion criteria. A total of 404 voluntary participants were ultimately included in the final analysis.

To minimize factors that could independently influence sleep quality and quality of life, individuals with diagnosed metabolic disorders, known malignancy, liver failure, chronic kidney disease, those receiving vitamin D treatment, individuals with known psychiatric disorders, and those with neurological, physical, or mental health conditions likely to affect sleep quality or overall quality of life were excluded from the study. Individuals with mental health problems were excluded based on self-reports of physician-diagnosed psychiatric disorders. Additionally, individuals with a history of drug or narcotic use were not considered for inclusion.

Power analysis

In terms of power analysis, the G Power software was utilized. Under a two-tailed hypothesis, with a type 1 error set at 0.01, a power of 0.99, and an effect size of 0.5, the required sample size was determined to be 392. Eventually, 404 volunteers participated in the study.[9]

Data collection

For data collection, participants provided consent using the Informed Volunteer Consent Form. Sociodemographic details were gathered using a specific survey form. To assess the quality of life of

the participants, the "Quality of Life Scale (SF-36)," developed by Ware and Sherbourne and validated in Turkish by Koçyiğit et al., was employed. This scale includes 36 items with scores ranging from 0 to 100, where higher scores indicate better quality of life.[10,11]

The Pittsburgh Sleep Quality Index (PSQI), comprising 24 questions, was used to evaluate participants' sleep quality.[12] The total PSQI score ranges from 0 to 21, with higher scores suggesting poorer sleep quality.

Biochemical parameters, including complete blood count, serum glucose, calcium, electrolytes, lipid profile, thyroid function tests, ferritin, parathyroid hormone, HbA1c, and serum 25-hydroxyvitamin D levels, were obtained from routine laboratory analyses. hese laboratory measurements were performed as part of the participants' standard clinical evaluation during their outpatient visit. Biochemical data were retrieved retrospectively from the hospital electronic medical record system.

Data analysis

The gathered data were analyzed using the SPSS-22 statistical software. Descriptive statistics were presented as frequency and percentage for categorical data, and mean (standard deviation) for continuous data. The normal distribution of the continuous data was confirmed using the Kolmogorov-Smirnov test. The independent sample t-test was used to explore data variation based on characteristics, and the Pearson correlation test was employed to assess correlations. The t-test was used for two-group comparisons, and ANOVA was used for comparisons involving more than two groups. Variance homogeneity was evaluated using Levene's test, and the assumption of equal variances was satisfied. Therefore, Tukey's post hoc test was used for multiple comparisons. Vitamin D levels were categorized based on 25(OH)D concentration, classified as ≥20 and <20 ng/mL.[13] Multivariable linear regression analyses were performed to identify independent predictors of sleep quality (PSQI score) and quality of life (SF-36 score). Variables that were considered clinically relevant or found to be associated with the outcomes in univariate analyses were entered into the regression models. For the PSQI model, marital status, educational status, working status, socioeconomic status, family type, and chronic disease status were included as independent variables. For the SF-36 model, marital status, educational status, working status, socioeconomic status, family type, chronic disease status, smoking status, and vitamin D status were included. Regression coefficients (B), standardized coefficients (β), 95% confidence intervals (CI), and p values were reported. Statistical significance was accepted as $p < 0.05$.

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval (date: 20.12.2023, number: 20619) was obtained from the Fırat University Non-Interventional Research Ethics Committee.

Results

Women constituted 80.7% of the study population, with no significant gender-based differences observed in SF-36 or PSQI scores. However, PSQI and SF-36 scores varied significantly based on marital status, educational status, employment status, family type, chronic disease status, as well as smoking status and vitamin D sufficiency (Table 1).

A negative correlation was found between PSQI and SF-36 scores, indicating that quality of life and sleep quality are positively correlated; as the score on the sleep quality scale increases, sleep quality decreases. It was observed that both sleep quality and overall quality of life tend to decrease with increasing age. Furthermore, higher vitamin D

Table 1. Variation of PSQI and SF-36 scores according to sociodemographic factors and vitamin D level.

		N (%)	PSQI		SF-36	
			Mean±SD	p	Mean±SD	p
Sex	Female	326 (80.7)	63.82±16.73	0.525	97.03±13.64	0.134
	Male	78 (19.3)	62.34±24.38		99.33±11.66	
Marital Status	Married	228 (56.4)	66.72±18.38[1]	**<0.001**	95.20±12.22[1]	**<0.001**
	Single	138 (34.2)	57.74±16.27[2]		104.82±10.52[2]	
	Other	38 (9.4)	65.47±21.35[1]		84.41±13.86[3]	
Education Status	Primary School	152 (37.6)	71.17±21.93[1]	**<0.001**	87.95±11.29[1]	**<0.001**
	High School	186 (46.0)	58.06±10.88[2]		102.90±10.84[2]	
	Under/ postgraduate	66 (16.3)	61.38±20.60[2]		104.24±11.09[2]	
Working Status	Housewife	206 (51.0)	66.36±18.61[1]	**<0.001**	92.10±12.51[1]	**0.007**
	Not Working	44 (10.9)	60.79±25.37[1,2]		103.26±7.83[2]	
	Working	154 (38.1)	60.55±15.09[2]		103.06±12.61[2]	
Socioeconomic Status	Good	134 (33.2)	62.03±14.02[1]	**<0.001**	100.31±10.13[1]	**<0.001**
	Moderate	258 (63.9)	62.38±17.30[1]		96.63±14.23[2]	
	Bad	12 (3.0)	105.12±33.61[2]		84.22±14.02[3]	
Family Type	Nuclear	364 (90.1)	62.56±16.81	**0.035**	98.20±13.22	**0.001**
	Extended	40 (9.9)	72.41±28.11		90.89±12.28	
Chronic Disease	Yes	132 (32.7)	72.02±23.69	**<0.001**	89.82±13.92	**<0.001**
	No	272 (67.3)	59.42±13.48		101.20±11.26	
Smoking Status	Yes	92 (22.9)	62.94±21.72	0.892	98.12±12.48[1,2]	**0.042**
	Quit Smoking	70 (17.4)	63.15±22.82		100.83±12.68[1]	
	Never Smoking	240 (59.7)	63.92±15.56		96.35±13.67[2]	
Vit D	>=20	244 (60.4)	62.40±16.55	0.126	99.26±13.33	**0.001**
	<20	160 (39.6)	65.27±20.91		94.73±12.82	

[1,2,3]: The groups where the difference originates are numbered with different numbers.

levels were associated with better quality of life, while lower PSQI scores (indicating better sleep quality) were observed in participants with higher calcium levels (Table 2).

A multivariable linear regression model was constructed to identify independent predictors of PSQI scores. The overall model was statistically significant ($F=12.09$, $p<0.001$) and explained 15.5% of the variance in PSQI scores ($R^2=0.155$, adjusted $R^2=0.142$). After adjustment for other variables, marital status (β=-0.130, p=0.008), socioeconomic status (β=0.125, p=0.011), and chronic disease status (β=-0.236, p<0.001) remained significant independent predictors of PSQI scores. Among these variables, chronic disease status showed the strongest association with sleep quality (Table 3).

A second multivariable linear regression analysis was performed using SF-36 score as the dependent variable. The model was statistically significant ($F=27.65$, $p<0.001$) and explained 36.1% of the variance in quality-of-life scores ($R^2=0.361$, adjusted $R^2=0.348$). Educational status (β=0.297, p<0.001), occupational status (β=0.171, p=0.001), chronic disease status (β=0.223, p<0.001), family type (β=-0.104, p=0.012), and vitamin D status (β=-0.165, p<0.001) were identified as independent predictors of SF-36 scores. Socioeconomic status, marital status, and smoking status were not

Table 2. Correlation of PSQI and SF-36 scores with biochemical markers.

	Mean	SD	PSQI		SF-36	
			r	p	r	p
PSQI	63.53	18.42			-0.290**	<0.001
SF-36	97.47	13.29				
Age	42.67	17.87	0.158**	**0.001**	-0.678**	**<0.001**
Hemoglobin (g/dL)	14.76	12.40	0.030	0.552	-0.061	0.223
Hematocrit (%)	40.15	4.61	-0.060	0.228	0.007	0.886
Leukocyte (10e3/ ul)	10.44	40.90	-0.115**	**0.021**	0.105	**0.036**
Platelet (10e3/ ul)	276.27	69.94	0.007	0.888	-0.075	0.134
Calcium (mg/dL)	9.31	0.50	-0.130*	**0.014**	0.044	0.414
Potassium (meq/L)	4.57	0.39	-0.050	0.345	0.074	0.164
Sodium (mEq/L)	138.98	2.13	0.021	0.690	-0.105*	**0.048**
Magnesium (mg/dL)	2.19	0.36	-0.038	0.480	0.068	0.209
Glucose (mg/dL)	98.94	55.16	0.037	0.465	-0.101*	**0.045**
Vitamin D (µg/L)	19.87	10.22	-0.002	0.963	0.169**	**0.001**
HDL (mg/dL)	57.95	19.32	-0.082	0.271	-0.050	0.502
LDL (mg/dL)	122.37	40.93	0.063	0.301	-0.097	0.115
Triglyceride (mg/dL)	130.62	79.64	0.430**	**<0.001**	-0.084	0.169
Parathormon (pg/mL)	109.01	96.20	0.325	0.105	-0.201	0.325
Ferritin (ng/mL)	44.72	77.62	0.077	0.153	-0.139**	**0.009**
TSH (IU/mL)	2.31	4.40	-0.025	0.631	-0.111*	**0.032**
T3 (pg/mL)	3.31	0.50	0.017	0.843	0.363**	**<0.001**
T4 (ng/dL)	1.18	0.17	0.017	0.843	0.363**	**<0.001**
HBA1C (%)	7.81	11.25	0.041	0.562	-0.035	0.621

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

Table 3. Multivariable linear regression analysis of factors associated with PSQI scores.

Variable	B	SE	Standardized β	95% CI	p
Marital status	-3.613	1.351	-0.130	-6.269 to -0.957	0.008
Educational status	-2.700	1.602	-0.103	-5.851 to 0.450	0.093
Working status	0.170	1.139	0.009	-2.069 to 2.409	0.882
Socioeconomic status	4.410	1.725	0.125	1.020 to 7.801	0.011
Family type	5.582	2.906	0.091	-0.131 to 11.296	0.055
Chronic disease status	-9.272	2.024	-0.236	-13.252 to -5.292	<0.001

Model statistics: $R^2 = 0.155$, Adjusted $R^2 = 0.142$, $F(6,397) = 12.093$, $p < 0.001$.

independently associated with quality-of-life scores after adjustment. In the multivariable regression analysis, educational status, occupational status, chronic disease status, family type, and vitamin D status remained independently associated with SF-36 scores. Educational status showed the strongest positive association with quality of life (β=0.297, p<0.001), followed by chronic disease status (β=0.223, p<0.001), occupational status (β=0.171, p=0.001), and vitamin D status (β=-0.165, p<0.001). Family type was also independently associated with quality of life (β=-0.104, p=0.012) (Table 4).

Discussion

Quality of life is a multifaceted concept influenced by both objective and subjective factors. The objective factors include sociodemographic characteristics, economic situation, social status, living conditions, health status, and environmental conditions. Subjective factors involve the individual's perception of their life, their hopes, and life satisfaction.[14] Sleep quality is among the primary factors affecting quality of life and health status.[15] This study examines the relationship between quality of life, sleep quality, sociodemographic characteristics, and biochemical parameters. It has been found that there is a positive correlation between quality of life and sleep. Previous studies have shown that poor sleep quality reduces the quality of life, with individuals experiencing serious sleep problems having a worse quality of life than those who sleep soundly.[16]

Our study found that quality of life and sleep quality did not differ according to gender. While some studies report that gender does not influence sleep, others suggest that men's sleep quality is worse than women's.[17-19] Social differences may influence gender roles and, consequently, the relationship between gender and quality of life. Some research indicates that the quality of life of women is statistically significantly lower than that of men, other studies suggest it is higher.[20,21] Additionally, societal expectations defined as gender roles, such as cooking, cleaning, and caring for children and other family members, may lead to a lower quality of life for women.[22] Consistent with other studies, this study observed that both sleep and quality of life decrease with age, possibly due to physiological changes that occur with aging.[5]

In this study, single individuals exhibited higher sleep quality and quality of life compared with married participants and those in other marital categories. Previous studies have reported inconsistent associations between marital status and quality of life, suggesting that these relationships may vary across sociocultural contexts.[23,24] While marriage has been associated with better sleep quality in some populations, this pattern was not observed in our sample.[25]

It was determined that those with only primary education experience poorer sleep quality and a lower quality of life. Furthermore, individuals with poor socioeconomic status had worse sleep quality, while an increase in socioeconomic status corresponds to an improvement in quality of life. It is known that higher educational attainment and better socioeconomic status positively affect quality of life.[8]

The study found that individuals from nuclear families tend to have better sleep and a higher quality of life. Previous research suggests that

Table 4. Multivariable linear regression analysis of factors associated with SF-36 total scores.

Variable	B	SE	Standardized β	95% CI	p
Marital status	-1.476	0.857	-0.074	-3.161 to 0.208	0.086
Educational status	5.613	1.017	0.297	3.612 to 7.613	<0.001
Working status	2.425	0.723	0.171	1.003 to 3.847	0.001
Socioeconomic status	-0.874	1.123	-0.034	-3.082 to 1.334	0.437
Family type	-4.600	1.831	-0.104	-8.201 to -0.999	0.012
Chronic disease status	6.324	1.277	0.223	3.813 to 8.835	<0.001
Smoking status	-0.690	0.680	-0.043	-2.027 to 0.647	0.311
Vitamin D status	-4.491	1.120	-0.165	-6.694 to -2.288	<0.001

Model statistics: $R^2 = 0.361$, Adjusted $R^2 = 0.348$, $F(8,392) = 27.65$, $p < 0.001$.

family structure may influence health-related quality of life through differences in perceived social and environmental support.[22] In particular, the availability of interpersonal support and household dynamics has been shown to play an important role in shaping both psychological well-being and overall quality of life.[22] The diminished sleep quality and quality of life observed in individuals with chronic diseases may be related to the combined physiological burden of persistent symptoms and the psychological impact of living with a long-term illness. In addition, treatment-related factors, including medication side effects and ongoing healthcare demands, may further disrupt sleep and overall well-being.[26,27]

The study showed that higher vitamin D levels were associated with improved quality of life. However, findings regarding the impact of vitamin D supplementation on quality of life are inconsistent. Vitamin D supplementation appears to have a small to moderate effect on quality of life when used short-term in populations with diseases.[28] Sleep quality in individuals taking vitamin D supplements showed significant improvement compared to the control group.[29] Taken together, these findings suggest that vitamin D levels may be linked to both sleep quality and quality of life, but the magnitude of these effects may vary depending on population characteristics.

The presence of chronic disease emerged as one of the strongest predictors in the model. Factors commonly associated with chronic illnesses, including pain, medication use, and psychological distress, may adversely affect sleep patterns and contribute to poorer sleep quality.[30] The relatively low explanatory power of the model suggests that sleep quality is a multidimensional construct influenced by a wide range of factors. Future studies should consider incorporating additional variables such as psychological well-being, physical activity, stress levels, and environmental conditions to provide a more comprehensive understanding of the determinants of sleep quality.

Educational status emerged as the variable showing the strongest association with quality of life in the model. Higher educational attainment may contribute to better health literacy, improved access to healthcare services, and the adoption of healthier lifestyle behaviors, thereby explaining this relationship. Consistent with our findings, previous studies have reported that higher levels of education are associated with better health-related quality of life.[31]

Conclusion

In this study, the effects of sociodemographic and biochemical parameters on quality of life and sleep, as well as the relationship between these two factors, were examined. This study demonstrated that poor sleep quality was consistently associated with lower quality of life and may be linked to various sociodemographic characteristics and biochemical parameters in the study population. To enhance individuals' quality of life and sleep, it is important to consider their socio-demographic characteristics and blood biochemistry. The study was conducted in a single hospital setting and employed a convenience sampling approach, which may have introduced selection bias and restricted the generalizability of the findings beyond the study population. Another limitation of this study is that multiple statistical comparisons were made across numerous sociodemographic and biochemical variables. The possibility of type I error rates for multiple tests should not be disregarded. Additionally, the predominance of female participants in the sample may have influenced the representativeness of the results. Moreover, sleep quality and quality of life were assessed using self-reported questionnaires, which are susceptible to recall and social desirability biases.

Ethical approval

This study has been approved by the Fırat University Non-Interventional Research Ethics Committee. (approval date 20.12.2023, number 20619). Written informed consent was obtained from the participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: MG; data collection: MG, KT; analysis and interpretation of results: MG; draft manuscript preparation: FK, NG, BY. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest to disclose.

Data availability statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical restrictions but are available from the corresponding author on reasonable request.

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