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Research Article

Did the Anxiety Levels and Sleep Quality of Patients with Cardiovascular Diseases Affect Their Quality of Life During the Pandemic Period?: A Cross-Sectional Study

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Abstract

Objectives: There is an increasing number of studies showing that anxiety levels and sleep disorders should be considered as risk factors for cardiovascular diseases (CVD). Also, it is known that there is an increase in anxiety and sleep disorders during the pandemic period. In our study, we aimed to evaluate whether the anxiety levels and sleep quality deteriorations, which are thought to increase in patients with CVD, affect the patients' quality of life (QoL) and treatment compliance and response, and whether the deterioration in clinical parameters predicts the OoL.

Methods: A total of 150 patients were included in the study during the pandemic. Sleep quality was evaluated with the Pittsburg Sleep Quality Index (PSQI) scale, and anxiety levels were evaluated with the Beck Anxiety Inventory. QoL scores were also evaluated with the World Health Organization Quality of Life Scale-Short Form Turkish Version (WHO-QOL-BREF-TR). The blood pressure patterns of the individuals participating in the study were assessed with 24-hour ambulatory blood pressure measurement, and Ejection fraction (EF) was measured with an echocardiogram. After the evaluations, the patients were classified as those with hypertension (HT), those with coronary artery disease (CAD), and those with congestive heart failure (CHF).

Results: A negative correlation observed between Beck anxiety scores and total QoL scores, in patients with CVD (p=0.029, r=-.287). Regression analyzed showed that older age, higher average diastolic blood pressure, higher Beck anxiety scores, higher maximum heart rate were factors that could predict lower Physical health QoL scores in patients with CVD.

Conclusion: There is a need for new studies with large samples to be conducted in this area. During the pandemic period, not only increased anxiety levels, but also sleep level and many factors negatively affect the quality of life in patients with CVD. These factors, especially anxiety, should be taken into account in treatment and follow-up.

Keywords: Anxiety, CVD, CAD, CHF, HT, sleep quality, QoL

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The COVID-19 pandemic, which emerged as a result of the SARS-CoV-2 virus that emerged and spread in the city of Wuhan, Hubei province of China at the end of 2019, still continues to be a serious public health problem. The severity and mortality of the disease is associated with cardiovascular diseases (CVD), diabetes, hypertension (HT), chronic lung and kidney disease, and cancer.[1]

Anxiety and related disorders are the most common psychiatric findings and disorders in the community, which are known to be triggered by negative life events such as pandemic processes. Increasing anxiety levels affect the HPA axis, leading to many results, such as increased cortisol levels, sympathetic system discharge, suppression of the immune system, and an increase in proinflammatory

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cytokines.[2] Anxiety disorders are also a risk factor for the development of CVD and an important prognostic factor that worsens existing CVD through various mechanisms (especially with the activation of the sympathetic nervous system). Anxiety has been shown to worsen the risk of developing CVD, as well as the clinical process and prognosis.[3,4] Increased levels of anxiety can cause the onset or worsening of essential hypertension by increasing peripheral vascular resistance and blood pressure, decreasing heart rate variability, and causing arrhythmias in patients with heart disease.[3.5]

Sleep is a complex, physiological basic life requirement that is affected by pathophysiological, physical, psychological, and environmental factors. Cells of the immune system have the ability to reproduce, regenerate and heal during sleep. The best time when these cells are renewed is during night sleep.[6-8] It is known that sleep disorders, especially insomnia, cause deterioration in the body's temperature control, nutritional metabolism, immune system, and other regulatory systems, and that sleep provides an important advantage in the evolution of mammals.[6,7] An increase is observed in proinflammatory cytokines such as IL-6.[7-9] In the studies carried out, it has been shown that the immune response to the vaccine decreases with a short sleep period and the susceptibility to infections such as pneumonia, herpes zoster, and the common cold increases.[7,9] Anxiety and sleep disorders have long been known to be related to each other. The prevalence of sleep disorders in people with anxiety disorders is between 70% and 90%. Similarly, anxiety disorders are common in people with sleep disorders. The relationship here is two-way. Insomnia increases the risk of developing an anxiety disorder, and at the same time, anxiety disorders lead to sleep disorders in the future. Studies have shown that anxiety disorders develop before sleep disorders in 73% of those with anxiety and sleep disorders.[10] It is also known that sleep disorders increase the risk of CVD. It is stated that individuals who have difficulty falling asleep have a significantly increased risk of cardiovascular mortality compared to those without these symptoms.[11-13] Changes caused by short sleep duration may contribute to the development of HT. As the duration of short sleep increases, vascular and cardiac complications related to HT also increase.[11-13]

Considering all of this knowledge, it is obvious that the anxiety and sleep disturbances that are expected to rise in patients with CVD during the covid 19 pandemic era will have a negative impact on their clinical course and life quality. Therefore, we aim to evaluate the anxiety levels and sleep quality in patients with CVD who applied to the outpatient clinic during the Covid 19 pandemic. In addition, "Does anxiety and disturbed sleep affect the patient's clinical paramaters, treatment compliance and response to treatment? Does it cause an increase in the number of drugs used? "questions will be answered by evaluating physical life quality, focuses on the capability of performing daily activities, medicine and treatment compliance.

Methods

Participants and Design of the Study

A total of 150 patients, 95 male and 55 female, volunteering in the 35-65 age range who applied to Kayseri City Hospital Cardiology Clinic were included in the study during the pandemic. Patients with known sleep disorders or/and psychiatric disorders before the pandemic, and illiterate patients were excluded from the study. Patients with any other chronic disease, hyper-hypothyroidism, a BMI of more than 25 kg/m^2, and patients taking drugs known to impair sleep quality including diuretics, were also excluded. Standardized questionnaires were used for assessing medication use and lifestyle practices (diet, physical activity), weight, and height. Sleep quality and sleep disorders were evaluated with the Pittsburg Sleep Quality Index (PSQI) scale, and anxiety levels were evaluated with the Beck Anxiety Inventory. Physical health quality of life (QoL) scores and total QoL scores were also evaluated with the World Health Organization Quality of Life Scale-Short Form Turkish Version (WHOQOL-BREF-TR).

All patients underwent biochemical and clinical examinations. The blood pressure patterns of the individuals participating in the study were assessed with 24-hour ambulatory blood pressure measurement, and Ejection fraction (EF) was measured with an echocardiogram. After the evaluations, the patients were classified as those with HT, those with coronary artery disease (CAD), and those with congestive heart failure (CHF). The history of having covid was also evaluated.

This study was conducted in accordance with the principles of the Helsinki Declaration and approved by the local Institutional Review Board (51/30.04.2020). A written informed consent was obtained from each patient.

Tools and Scales

Beck Anxiety Inventory (BAI): It is a self-rating scale developed by Beck et al. (1988) to determine the frequency of anxiety symptoms experienced by individuals. It is a Likert-type scale consisting of 21 items and scored between 0-3. Its validity and reliability in Turkey was performed by Ulusoy et al. (1998).[14] Higher scores indicate high level of anxiety. It is considered as severe anxiety symptoms between 26 and 63 points.

Pittsburg Sleep Quality Index (PUKI): It was developed by Buysse et al. in 1989, and it is a self-report assessment tool

that helps to distinguish people with sleep disorders from healthy people, to detect sleep problems, and to determine sleep quality.[15] PUKI assesses sleep quality and disturbance over a one-month period.[15] PSQI > 5 indicate a poor sleep quality.

World Health Organization Quality of Life Brief FormTurkish (WHOQOL-BREF-TR): The WHOQOL-BREF-TR was developed by the WHO that assess the life of quality.[16] The validity and reliability of the WHOQOL-BREF-TR was performed in 1999 by Eser et al.[17] The WHOQOL-BREF-TR is including four domains; physical health, psychological health, and social and environmental relationships. The physical domain we used in the study focuses on the capability of performing daily activities, ***medicine and treatment compliance***, liveliness, pain, inconvenience, sleep, rest, and fatigue. Higher scores indicate a better quality of life.

Statistical Analysis

The Statistical Package for Social Sciences software program (SPSS, version 21.0 for Windows) was used for statistical analysis. Continuous variables were given as means SD; categorical variables were defined as percentages. The Shapiro-Wilk or Kolmogorov-Smirnov tests were used to test the normality of the distribution of continuous variables. Continuous variables were compared between groups using the Student's t test or Mann-Whitney U test as appropriate. Categorical variables were compared using the Chi-square test. Pearson's or Spearman's correlation analyses were used considering the distribution of variables, and logistic regression analyses were performed for proper variables. A probability value of p 0.05 was considered significant.

Results

Of the 150 patients included in the study, 55 were diagnosed with HT, 55 with CAD, and 40 with CHF. As expected, the mean age of patients with CHF was found to be higher than the other two groups (Mean±ss; 58.7±5.56, p=0.035). 76% of all participants stated that there was an increase in the dose or number of drugs they used in the last 1 year. The drugs used by the patients participating in the study are given in Table 1. Angiotensin-converting-enzyme inhibitors (ACEi) are the most commonly used drugs, also ACEi users were higher in patients with CAD compared to the other two groups. As an interesting result, sT4 levels were found to be statistically significantly lower in patients with CAD (Table 1).

The frequency of poor sleep quality was observed more frequently in patients with CHF and HT than in patients with CAD (p=0.023) (Table 1). Anxiety scores were consistent with severe anxiety levels in all three groups, and anxiety scores were higher in hypertensive patients compared to the other two groups (p=0.024) (Table 2). Higher anxiety was correlated with the use of high-dose ACEi and the number of drugs used in patients with CAD and CHF (respectively p<0.05, r=.387;p=0.042; r=312). Also, both higher anxiety scores and higher PSQI scores were correlated with the use of high-dose ACEi as well as the number of drugs used in patients with HT (respectively p=0.033, r=.427; p<0.05, r=.372; p=0.043, r=.407; p=0.041 r=.392).

The mean systolic and diastolic hypertension values and heart rate of the patients are given in Table 2. Physical health QoL scores and total QoL scores were found to be statistically significantly lower in patients with CHF (Table 2). Also, total QoL scores was found to be statistically signifi-

Table 1. Comparison of clinical data of patients with CVD

	Hypertension N=55	Coronary artery disease N=55	Congestive heart failure N=40	p
Age (Mean±ss)	49.05±11.03	52.59±10.05	58.7±5.56**	p=0.035
Sex (Female/Male)	20/35	20/35	15/25	p=0.184
Statins n(%)	15 (27.27%)	40 (72.72%)**	25 (62.5%)	p=0.003
Angiotensin-converting-enzyme inhibitors n(%)	33 (60.0%)	41 (74.54%)**	30 (75.0%)	P=0.023
Angiotensin II receptor blocker n(%)	22 (40.0%)**	14 (25.56%)	10 (25.0%)	P=0.041
Beta blocking agents n(%)	21 (38.18%)**	48 (87.27%)	38 (95.0%)	p=0.014
Calcium channel blockers n(%)	20 (36.36%)	22 (40.0%)	15 (37.5%)	P=0.142
Antiagregant/Anticoagulants treatment n(%)	10 (18.18%)	55 (100%)**	35 (87.5%)	p<0.001
FT3 (pg/ml) (Mean±ss)	3.08±0.21	2.95±0.31	3.07±0.33	p=0.184
FT4 (ng/dl) (Mean±ss)	1.38±0.32	0.94±0.23**	1.13±0.36	p=0.023
TSH (uU/ml) (Mean±ss)	2.98±1.17	3.07±1.03	3.06±1.21	P=0.203
PSQI scores (>5) n(%)	33 (60.0%)	22 (40.0%)**	30 (75.0%)	p=0.023

Bonferroni correction done* Statistically significant (p<0.05); ** Differ from others.

Table 2. Comparison of clinical data and scales scores of patients with CVD

	Hypertension Mean±SD N=55	Coronary artery disease Mean±SD N=55	Congestive heart failure Mean±SD N=40	p
Beck anxiety scores	47.56±13.56**	35.32±14.12	39.49±12.13	p=0.024
Maximum Heart Rate (beats/min)	153.2±11.5**	141.4±16.6	135±17.8	p<0.001
Minimum Heart Rate (beats/min)	64.5±11.5	62.8±11.1	52.4±13.2**	p=0.043
Average Heart rate (24 Hours)	84.9 ± 14.5	79 ± 13.3	67.3 ± 23.8**	P=0.022
Average Heart Rate Night (beats/min)	72.4±12.5	66.5 ±15.2	51.9±13.12**	P=0.017
Average Diastolic Blood pressure (24 Hours)	92.86 ± 10.59**	84.32 ± 15.25	77.84 ± 14.35	P=0.039
Average Systolic Blood pressure (24 Hours)	144.14±22.85**	137.38 ± 18.57	131.27 ± 25.57	P<0.05
Physical health QL scores	12.36±1.77	11.35±1.56	9.58±1.27**	p=0.041
Total QL scores	52.59±10.77	47.16±11.77***	42.07±12.73**	P<0.001

Bonferroni correction done* Statistically significant (p<0.05); ** Differ from others ***Lower than HT.

cantly lower in patients with CAD compared to HT (Table 2).

There was a negative correlation between Beck anxiety scores and total QoL scores, also a negative correlation found between Beck anxiety scores and Physical health QoL scores in patients with CVD (respectively p=0.029, r=-.287, p=0.038, r=-.0.367). The logistic regression model was statistically significant (p < 0005) and regression analyzed showed that older age, higher average diastolic blood pressure, higher Beck anxiety scores, higher maximum heart rate were factors that could predict lower Physical health QoL scores in patients with CVD (Table 3). Also, diagnosed with covid-19 was a factor that could predict lower Physical health QoL scores (Table 3) and lower total QoL scores in patients with CVD (p=0.026). In another binary regression model *(Method=BSTEP(WALD)*, higher sT4 levels and higher Beck anxiety scores were related diagnosed with covid-19 (respectively p=0.008, B=0.48; p=0.006 B=0.098).

Discussion

Anxiety is a major comorbidity in CVD patients that is underrecognized and undertreated despite clear evidence of its prevalence and harmful effects. Anxiety has been shown to have a broader impact on cardiac function than simply raising blood pressure. Anxious people have lower heart rate variability, which is linked to an increased risk of CHD.[18] Anxiety causes an increase in circulating catecholamines by

Table 3. Logistic Regression of Physical health QL scores in patient with CVD

	B	p	Odds ratio (95% CI)
Age	-1.18	0.043	.646
Sex	1.950	0.48	1.089
BMI	0.54	0.44	.934
Average Blood pressure (24 Hours)	4.26	0.26	3.008
Average Diastolic Blood pressure (24 Hours)	-2.38	0.012	.456
Average Systolic Blood pressure (24 Hours)	6.04	0.36	1.610
Ejection fraction	0.95	0.56	.385
Beck anxiety scores	-2.33	0.021	.347
PSQI scores (>5)	-0.91	0.005	.059
Maximum Heart Rate (beats/min)	-1.98	<0.001	.172
Minimum Heart Rate (beats/min)	.053	0.58	.186
Average Heart rate (24 Hours)	-.038	0.53	.178
Average Heart Rate Night (beats/min)	-2.03	0.63	.193
Diagnosed with covid-19	-1.08	0.036	.569

* Statistically significant (p<0.05).

increasing autonomic arousal via the hypothalamic-pituitary axis. This increased arousal is linked to an increased risk of HT, a pro-inflammatory state, and, as a result, the development of coronary heart disease.[19] Also, ,in both patients with and without heart disease, anxiety is associated with impaired endothelial function as measured by flow-mediated dilation.[20,21] Anxiety was linked to a 41% higher risk of cardiovascular mortality and CAD, a 71% higher risk of stroke, and a 35% higher risk of CHF in a meta-analysis of 46 studies.[22]

Also, short sleep duration was recognized as a risk factor for CVD e and related health risk behaviors.[23] Like severe anxiety, subthreshold anxiety levels have an impact on self-reported sleep quality.[24] Anxiety and sleep deficits have been shown to co-occur in adults with CVD. Furthermore, in CVD, anxiety sensitivity was linked to an increased risk of short sleep duration.[25] Sleep problems are common in CHF patients, and the PSQI score appears to have a significant correlation with anxiety.[26] For many people, on the other hand, the covid 19 pandemic has caused stress and anxiety about their health, income, and the difficulty of managing work and family duties Sleep and circadian rhythms are likely to be disrupted as a result of pandemic. During the COVID-19 lockdown, anxiety levels were reported higher than usual in patients with HT compared to healthy controls.[27] However, a study evaluating whether the increased anxiety levels and sleep problems in the pandemic have an effect on the symptoms and the drugs used has not been found. In our study all patients with CVD had severe anxiety levels and anxiety scores were higher in hypertensive patients compared to the patients with CAD and CHF. The frequency of poor sleep quality was observed more frequently in patients with CHF and HT than in patients with CAD. Angiotensin-converting-enzyme inhibitors (ACEi) are the most commonly used drugs and 76% of all participants stated that there was an increase in the dose or number of drugs they used in the last 1 year. Higher anxiety was correlated with the use of high-dose ACEi and the number of drugs used in patients with CVD higher PSQI scores were correlated with the use of high-dose ACEi and the number of drugs used in patients with HT.

CVD has been shown to have a negative impact on QoL in terms of physical activity and psychological well-being.[28] It was also noted that HT seems to have a negative impact on QoL, in both physically and psychologically.[29] Moreover, in patients with CVD, the COVID-19 pandemic has been linked to impairments in the psychological health components of QoL.[30] To our knowledge, this is one of the first studies evaluating the impact of anxiety, sleep quality and clinical paramaters during COVID-19 pandemic on the QoL of patients with HT, CHF and CAD together. Physical health QL scores and total QL scores were found lower in patients with CHF. Also, total QL scores was found lower in patients with CAD compared to HT. There was a negative correlation observed between Beck anxiety scores and total QL scores, also a negative correlation found between Beck anxiety scores and Physical health QL scores in patients with CVD. Regression analyzed showed that older age, higher average diastolic blood pressure, higher Beck anxiety scores, higher maximum heart rate were factors that could predict lower Physical health QL scores in patients with CVD. Also, diagnosed with covid-19 was a factor that could predict lower Physical health QL scores and lower total QL scores in patients with CVD.

Most patients with COVID-19 present with euthyroidism, however, it was observed mild reductions in TSH and FT4 in keeping with a nonthyroidal illness syndrome and thyroid function tests at follow-up returned to baseline.[31] Moreover, low FT4 and TSH concentrations were associated with mortality in patients with COVID-19 presenting with non-thyroidal illness.[32] In our study, as an interesting result, higher FT4 levels and Beck anxiety scores were related diagnosed with covid-19 In a regression model. Also, FT4 levels were found to be statistically significantly lower in patients with CAD compared to HT and CHF. In a study, it was reported lower FT4 and FT3 levels in CAD patients compared to patients without coronary stenosis.[33] On the contrary, no correlation was found between serum TSH or FT4 levels, although a negative correlation was observed only with serum FT3 levels and CAD.[34]

During the pandemic period, not only increased anxiety levels, but also sleep level and many factors negatively affect the quality of life in patients with CVD. These factors, especially anxiety, should be taken into account in treatment and follow-up. There are some limitations of our study, such as the psychiatric résumés of the patients are based on their own statements, the scales used are self-report scales, and the limited number of patients. There is a need for new studies with large samples to be conducted in this area.

Disclosures

Ethics Committee Approval: This study was conducted in accordance with the principles of the Helsinki Declaration and approved by the local Institutional Review Board (51/30.04.2020).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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