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ORIGINAL ARTICLE

COVID-19 Fear and Anxiety in Patients with Diabetes Mellitus and their Effect on HbA1c

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Objective: To determine the severity of fear and anxiety of COVID-19 in diabetic patients and to evaluate their relationship with HbA1c.

Materials and methods: Between December 2020 and March 2021, a total of 249 patients were included in the study. Demographic characteristics, duration of diabetes, glycosylated hemoglobin A1c (HbA1c) values of the patients were recorded. Fear and anxiety related to COVID-19 were evaluated with the validated Turkish version of the Fear of COVID Scale (FCS) and Coronavirus Anxiety Scale (CAS). FCS and CAS were compared between the diabetic group and the control group. The relationship between FCS and CAS and HbA1c, diabetes year, age, gender, educational status, place of residence, and employment status was investigated.

Results: Median level of HbA1c and duration of diabetes mellitus were 7.65% (range 5.4-13.6) and 10 years (range 1-32) respectively. FCS was higher in the diabetic group compared to the control group (p=0.025). There was no significant difference between the diabetic and control groups regarding CAS. There was no relationship between HbA1c and FCS and CAS (p=0.919, r=0.008, p=0.725, r=0.027, respectively). Anxiety was higher in females than males in diabetic groups (p=0.009).

Conclusions: The fear of COVID-19 is higher in diabetic patients compared to the general population. There was no relationship between fear and anxiety of COVID-19 and HbA1c. However, to protect long-term mental health, there should be strategies to detect and reduce the anxiety and fear caused by the pandemic in the services for diabetic patients.

Keywords: COVID-19, diabetes mellitus, fear, anxiety, HbA1c.

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INTRODUCTION

All available data suggested that COVID-19 affects the patients with chronic comorbid diseases more than those without. Diabetes mellitus is one of the comorbid diseases that increase mortality in COVID-19 infection [1]. Being part of the high-risk group, COVID-19 has caused anxiety in diabetic patients [2].

COVID-19 pandemic and social isolation can affect mental health parameters in patients with diabetes mellitus [3]. Psychological distress can increase depressive symptoms in endocrinological comorbid diseases and cause the negative consequences of diabetes mellitus [4-6]. Fear of getting coronavirus infection and running out of diabetes medications, the inability to manage hypoglycemia or hyperglycemia, the fear of not reaching the doctor, the decrease in social support from family and friends due to quarantine caused high anxiety and depression symptoms among diabetic patients [2,7]. Glycemic control can be affected by changes in behavior patterns, daily life, exercise, and increased stress and anxiety [8-11].

In our study, the severity of fear and anxiety of COVID-19 in diabetic patients were determined, and its relationship with HbA1c was investigated. The primary endpoint of our study was to determine COVID-19 fear and anxiety in patients with diabetes mellitus. The secondary endpoint was to determine the effect of COVID-19 anxiety and fear on HbA1c.

MATERIALS AND METHODS

Local ethics committee approval Amasya University Ethical Commitee of Non-Invasive Clinical Research (Date: 12.11.2020, No: 119) was obtained. The study was conducted in accordance with the Declaration of Helsinki.

Between December 2020 and March 2021, adult patients with type 1 and type 2 diabetes were enrolled in the study. Patients under 18 years of age, history of antidepressant use, previous history of psychiatric disease, history of cerebrovascular disease, stage 3-4 heart failure, kidney and liver failure, chronic obstructive pulmonary disease, and malignancy were excluded from the study.

Verbal consent was obtained from the patients before the questionnaire was administered. Age,

gender, educational status ("uneducated/primary school" and "middle school or higher"), place of residence ("town/village" and "province/district"), employment status, duration of diabetes, and HbA1c values of the patients were recorded. COVID-19 related fear and anxiety were evaluated by the Turkish validated version of The Fear of COVID scale (FCS) and Coronavirus Anxiety Scale (CAS), respectively [12,13]. HbA1c was studied with high-performance liquid chromatography (Adams A1c HA-8180V). FCS and CAS scores were analyzed according to demographic characteristics and HbA1c values.

The Fear of COVID Scale (FCS): This scale was developed by Ahorsu et al., and adapted to the Turkish context by Satici et al. and Bakioglu et al. [12,14,15]. It is a unidimensional scale with seven items. It has a 5-point Likert-type rating system (ranging from 1: Strongly disagree to 5:Strongly agree). Each question was scored between 1-5. The total score calculated range between 7 and 35. The total score obtained from all scale items reflects the level of fear of coronavirus (COVID-19) experienced by the individual.

Coronavirus Anxiety Scale (CAS): This scale was developed by Lee et al. and adapted to the Turkish context by Evren et al. (13, 16). 5 questions reflecting the frequency of symptoms during the previous two weeks were graded from 0 (never) to 4 (almost every day). This scaling format is consistent with the intersecting symptom scale of DSM-5. If CAS > 9, with 90% sensitivity and 85% specificity, it can distinguish individuals with and without dysfunctional anxiety. A CAS score of 9 and above indicates dysfunctional anxiety associated with the coronavirus. Clinical consideration should also be given when interpreting CAS results.

Statistical Analysis

SPSS 18 (Statistical Package for Social Sciences) software was used for data analysis. The distribution of continuous parameters was evaluated by Kolmogorov-Smirnov and Shapiro-Wilks tests. For normally distributed continuous parameters, groups were compared with independent samples t-test, whereas Mann-Whitney U Test was used to compare non-normally distributed continuous parameters. Nominal parameters were analyzed by the chi-square test and Fisher's exact test.

Spearman's Rho correlation analysis was used to evaluate the relationship between age, HbA1c, duration of diabetes, and FCS score and CAS score in the diabetic group and was used to evaluate the relationship between FCS score and CAS score and age in all patients (diabetic group and control group). Statistical significance was accepted at p<0.05.

RESULTS

Two hundred forty-nine patients (168 diabetic patients and 81 control groups) were included in the study. The demographic data of the diabetic and control group were shown in Table 1. The median pandemic HbA1c and duration of diabetes were 7.65% (range 5.4-13.6) and ten years (range 1-32), respectively. The pre-pandemic HbA1c (median 7.95% (5.2-12.5)) levels were significantly different from pandemic HbA1c (7.65% (5.4-13.6) levels in the diabetic group (p=0.001).

FCS score was higher in the diabetic group than the control group (p=0.02). Since the two groups differed regarding age, education and employment status, a post-hoc ANCOVA test was performed to analyze possible effects of these parameters. Though age was found to affect FCS score (p=0.04), DM and control groups still showed significant difference in FCS scores when age was adjusted (adjusted p=0.01).

There was no significant difference between diabetic and control groups regarding CAS score p=0.37). We also performed a post-hoc ANCOVA test to evaluate differing factors between groups. Post-hoc analysis showed no association between these covariates and CAS scores. CAS scores of 7 patients were nine and above (six patients in the diabetic group and one in the control group). In the diabetic group, pre-pandemic HbA1c, pandemic HbA1c, and disease duration didn't differ between patients with CAS score ≥9 and those with CAS score <9 (p=0.13, p=0.07, and p=0.52, respectively). HbA1c, disease duration, place of residence, employment status, and education status had no effect on FCS and CAS in the diabetic group (all p>0.05). In the diabetic group, anxiety was higher in females than males (p=0.009), however gender showed no effect on FCS (p>0.05).

When the whole population (both diabetic and control groups) is considered, age, place of residence, employment status, and education status showed no association with either FCS or CAS (all p>0.05).

When all patients were evaluated, anxiety was more severe in women (p=0.001), however FCS was not affected by gender (p>0.05).

In the correlation analysis, a positive linear relationship was found between FCS and CAS in the diabetic group (p=0.02, r=0.199). However, HbA1c, diabetes duration, and age had no significant correlation with neither FCS, nor CAS. A positive linear relationship was found between FCS and CAS among all patients (p<0.001, r=0.247).

DISCUSSION

In our study, fear of COVID -19 was higher in diabetic patients than healthy individuals, but the severity of anxiety was similar. There was no relationship between fear and anxiety of COVID-19 and HbA1c. Neither FCS, nor CAS was affected by age, HbA1c, duration of diabetes, place of residence,

Table 1. Comparison of demographic characteristics and test scores of the groups

	Diabetic group (n=168)	Control group (n=81)	p
Age (years)	55 (23-76)	43 (19-76)	<0.001
Gender (female)	120 (71.4%)	66 (81.5%)	0.120
Place of residence			0.253
town/village	136 (81%)	71 (87.7%)	
province/district	32 (19%)	10 (12.3%)	
Employment status			<0.001
employed	40 (23.8%)	40 (49.4%)	
unemployed	128 (76.2)	41 (50.6%)	
Education status			0.003
uneducated/ primary school level	90 (53.6%)	27 (33.3%)	
middle school/upper level	78 (46.4%)	54 (66.7%)	
FCS	19.2 ±7.3	16.9±7,4	0.025
CAS	0 (0-11)	0 (0-17)	0.369

CAS: Coronavirus Anxiety Scale, FCS: The Fear of COVID-19 Scale.

Descriptive data were shown as mean ± SD, median (interquartile range) or number (percentage); p< 0.05 were considered statistically significant

employment status, and education status in the diabetic patients. COVID-19 anxiety was found higher in women, however COVID-19 fear was similar in both genders.

In a large survey study in Danish diabetic patients, an increase in health anxiety such as fear of being infected and inability to manage diabetes during infection was found [2]. In our study, fear of COVID-19 was higher in diabetic patients compared to the general population, but it was found that fear associated with COVID-19 does not affect HbA1c. However, Ahorsu et al. showed a positive relationship between fear of COVID-19 and hospital anxiety and depression [15]. With increased anxiety and depressive symptoms, glucose regulation may be disrupted, and Hb1Ac levels may be impaired [17]. This has been attributed to the deterioration of patients' compliance with treatment in depression. Although the fear of COVID-19 does not affect HbA1c levels, we think that with the long duration of the pandemic, the fear may cause anxiety and depressive state in the future, increasing stress and disrupting glucose regulation.

Ruissen et al. found that anxiety increased during the pandemic in diabetic patients in their study [8]. In our study, the anxiety level was similar between the diabetic and control groups. However, the anxiety level was higher in women compared to men. The literature shows that the COVID-19 pandemic causes more depression and anxiety symptoms, post-traumatic stress disorder, loneliness, and consequently more psychological effects in women [2,18,19]. Women may have culturally expressed their illnesses, complaints, and fears more easily. On the other hand, because the male gender role culturally symbolizes courage and fearlessness, male patients may have avoided seeking help and hid their anxiety until their illness became severe.

In literature, conflicting results were obtained from the studies on HbA1c levels and anxiety during the COVID-19 pandemic. In a study, higher depression and anxiety symptoms were shown in women diabetic patients with HbA1c ≥10% (7). On the other hand, no correlation was found between COVID-19 anxiety and HbA1c in another study [8]. It was also observed that anxiety symptoms did not cause impairment in HbA1c values in diabetic patients, even when there is no pandemic [20]. In our study, we could not find any relationship between HbA1c

and COVID-19 anxiety. In addition, it was observed that the HbA1c values of diabetic patients with poor glycemic control improved during the pandemic [8]. This is explained by the fact that people with poor glycemic control emphasize their glycemic control to cope with increased stress levels. The fact that the mortality of COVID-19 infection was higher in patients with impaired blood glucose regulation may also have caused patients to pay more attention to their blood glucose levels.

Our study has some limitations. Short and rapid assessment scales that can be used for screening purposes were used for the pandemic. In addition, the scales used in this study are self-report scales and are evaluated according to the person's statement. The pre-pandemic mental health of patients can affect data. The age, education, and employment status of the people included in the control group were not equated with the diabetic group. The strength of our study is that the patients were interviewed face to face. In addition, it has been shown that short and rapid manner with self-report scales that allow the individual to evaluate themself in non-psychiatric outpatient clinics can be used for screening fear and anxiety. Thus, patients with high fear and anxiety can be referred to an advanced center.

As a result, the fear of COVID-19 is higher in diabetic patients compared to the average population. However, this situation did not have a negative effect on HbA1c values. However, the mental health of diabetic patients may deteriorate with the prolongation of the pandemic period, the fear of getting the infection, the long isolation process, and the high anxiety caused by the quarantine. In the long run, rates of depression may increase. During the COVID-19 pandemic, protecting mental health and increasing psychological resilience are as important as physical health. For this reason, further studies are required to determine and reduce the anxiety and fear caused by the pandemic in diabetic population.

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Author contribution

ÇTB and SÖE; draft manuscript preparation: ÇTB and SÖE. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Amasya University Ethical Commitee of Non-Invasive Clinical Research (Protocol no: 119 / 12.11.2020).

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Conflict of interest

The authors declare that there is no conflict of interest.

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