RESEARCH LETTER

The coronavirus disease 2019 pandemic: telemedicine in elderly patients with type 2 diabetes

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Introduction On March 11, 2020, the World Health Organization declared the coronavirus disease 2019 (COVID-19) pandemic, based on more than 118 000 cases in over 110 countries and territories with sustained risk of further global spread.[1]

Elderly patients (aged 65 years and older) with comorbidities and people of all ages with serious underlying medical conditions are at higher risk of more severe complications from COVID-19.[2] At the same time, previous studies suggested a link among the occurrence of cardiovascular diseases, uncontrolled diabetes, and an increased risk of developing complications and very serious infections, including death.[2,3]

The pandemic has limited face-to-face visits in clinics, and telemedicine is a very helpful and necessary tool in healthcare. It allows patients and physicians to interact in a personalized way and is convenient for both interlocutors.[4] Telemedicine enables access to medication (e-prescriptions), diagnosis, prescribing treatment and leading prevention programs, and evaluating health education.[5] Moreover, previous studies on telephone-delivered therapy found no decline in effectiveness compared with face-to-face therapy.[6,7]

Here, we present a study on the use of telephone-based medical advice during the early outbreak of the COVID-19 pandemic in the Silesia region in elderly patients with type 2 diabetes. The advice was focused on glycemic control, emotional status, and behavioral change.

Patients and methods A cross-sectional study, which included 86 patients aged 60 years or older (52 women and 34 men) with type 2 diabetes, was conducted from March 16, 2020 to March 31, 2020 in the Diabetes Outpatient Clinic in the Silesia region (Poland). The exclusion criteria were as follows: microvascular diabetic complications, history of stroke, depression, or other psychiatric disorders, and alcohol abuse.

Telemedicine consultation A semi-structured telephone interview was used in all patients, and this was based on the 5 topic areas: current glycemic control, comorbidities, provision of medicines and food products, compliance with individual protection against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, and anxiety associated with the current pandemic. Patients answered specific questions related to currently used medications, fasting, and postprandial glucose levels self-measured on the day of the interview or the day before. Anxiety was examined based on questions about the patient's sense of threat associated with SARS-CoV-2 infection and assessed on a scale of 1 to 4 where 1 meant anxiety experienced all the time, and 4—no anxiety present. Severe acute respiratory syndrome coronavirus 2 infection was not diagnosed in the study group.

The study was performed in accordance with the guidelines of the 2013 Declaration of Helsinki on human experimentation. Data confidentiality and patient anonymity were maintained at all times. Patient-identifying information had been deleted before the database was analyzed. Individual patients cannot be identified either in this article or in the database. Due to the anonymous nature and mandatory collection of information included in the dataset, informed patient consent was not necessary.

Statistical analysis Statistical analysis was performed using the Statistica 13.3 software for

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Windows (StatSoft Polska, Kraków, Poland). The normality of data distribution was assessed using the Shapiro–Wilk test. The Mann–Whitney test was used to evaluate the significance of differences between groups. The χ^2 analysis was used to test categorical variables. The value distribution was non-Gaussian, and the results were presented as medians and interquartile ranges for continuous variables and as the number of cases and percentages for the total categorical variables. The Spearman rank correlation test was used to evaluate the strength of associations between the variables. A *P* value less than 0.05 was considered significant.

Results and discussion The median (interquartile range) age of patients was 72 (67–78) years (TABLE 1). They had been suffering from type 2 diabetes for 5 to 13 years. Most often, they were treated with metformin (58% of study patients) as monotherapy or with combination therapy (sulfonylureas or insulin). Comorbidities included hypertension (73%), ischemic heart disease (43%), and degenerative joint changes (21%).

The antidiabetic drug or its dose were modified using e-prescriptions in 22 seniors (26%) due to hyper- or hypoglycemia. None of the diabetics required urgent, additional contact with physicians due to comorbidities, particularly because of cardiovascular disease—the main cause of morbidity and mortality in diabetic patients.[8]

Most patients (63%) lived with their family members, who were taking care of them during the pandemic; 37% of patients lived alone—these were older than those who stayed with the family. A majority of study patients (68.6%) did not leave the house at all or went only to the nearest store.

Over 14 days, the subjects declared no symptoms typical of COVID-19 (fever, cough, and dyspnea), but everyone was following the individual rules of protection against SARS-CoV-2 infection, including wearing disposable gloves (100%). Most of them (88.4%) felt anxiety because of the current situation and the risk of being infected with SARS-CoV-2.

The next stage of the study aimed to investigate the impact of living alone on the analyzed factors in the context of anxiety associated with the possibility of developing SARS-CoV-2 infection. Those who lived alone and reported anxiety almost at all times were also older than those who stayed with their families and reported the same level of anxiety (median age, 76 vs 67; $P = 0.01$).

Positive correlations were calculated for fasting glycemia and diabetes duration ($R = 0.39$; $P < 0.05$) and postprandial glycemia ($R = 0.66$; $P < 0.01$) in patients with a high anxiety score (almost at all times). After including those living alone, the correlation of fasting glycemia and postprandial glycemia increased to $R = 0.89$ ($P < 0.01$). A positive correlation for fasting glycemia and diabetes duration was also found in those elderly who reported frequent anxiety ($R = 0.42$; $P < 0.01$).

There was no significant correlation with any parameter studied in the subjects who reported occasional anxiety or its absence with regard to the possibility of developing SARS-CoV-2 infection. However, fasting glycemia positively correlated with postprandial glycemia in patients with type 2 diabetes who lived alone and occasionally reported anxiety ($R = 0.91$; $P < 0.01$). The correlation between fasting and postprandial glycemia increased to $R = 0.97$ in those who occasionally reported anxiety associated with the possibility of developing SARS-CoV-2 infection and declared hypoglycemia ($P < 0.01$).

This study emphasizes the importance of considering the role of the COVID-19 pandemic and the overlapping biochemical (glycemic) and psychological aspects in patient management. Fear and anxiety about a disease can be overwhelming and may cause strong emotions, particularly in the elderly. Although anxiety is a normal and expected reaction to the pandemic, too much anxiety can be harmful.[9]

We used regression analysis to demonstrate that the personal control of diabetes and anxiety related to the COVID-19 pandemic were significant indicators. These findings coincide with the results obtained by Martinez et al,[10] who showed that stress was associated with hyperglycemia. Diabetes and hyperglycemia may lead to higher infection risk and mortality.[11] However, we did not observe any significant correlation in those who reported no anxiety associated with the possibility of developing SARS-CoV-2 infection.

In our study, diabetes duration was associated with elevated fasting glucose levels in patients with the highest anxiety related to the COVID-19 pandemic. At the same time, the lonely represented a psychologically vulnerable population with poor glycemic outcomes. Moreover, in the study patients who reported hypoglycemia and only occasionally anxiety related to the COVID-19 pandemic, a strong association with poor glycemic control was noted. This is in contrast to Liu et al,[12] who claimed that the effectiveness of glycemic control increases with age and is better in those who receive education and live alone.

Admittedly, our study had some limitations. First, the study population was relatively small. Furthermore, it cannot be unequivocally determined whether anxiety is only related to the pandemic. In most European countries, a majority of diabetics suffer from and die of atherosclerosis.[8] For this reason, anxiety, for instance, is likely to be more pronounced in those with a history of cardiovascular disease. Additionally, hypoglycemic episodes also often cause anxiety or fear. Study patients reported hypoglycemic events during teleconsultations, but the symptoms may be nonspecific and undiagnosed in the elderly. In this context, the correlation found only in those who reported hypoglycemia and occasionally experienced anxiety must be critically evaluated.

In summary, our findings offer a number of clinical implications and streamline practice. Identifying factors that influence glycemic control in elderly patients with type 2 diabetes during

TABLE 1 Characteristics of the study group

Parameter		All patients (n = 86)	Living alone (n = 32 [37.2%])	Living with the family (n = 54 [62.8%])	*P* value
Age, y		72 (67–78)	75 (69–79.5)	69.5 (64–76)	0.01
Weight, kg		81.5 (71–90)	83.5 (70–89)	80.5 (71–90)	0.87
Height, m		1.64 (1.58–1.7)	1.62 (1.56–1.68)	1.66 (1.58–1.74)	0.06
BMI, kg/m^2		29.4 (26.2–32.9)	29.5 (26.1–35.2)	29 (26.4–31.9)	0.47
Time elapsed from the last office visit, d		63 (45–115)	90 (55–116)	61.5 (30–115)	0.15
Type 2 diabetes duration, y		8.5 (5–13)	8 (3.5–12)	10 (5–14)	0.47
Hypoglycemia, n (%)		13 (15.1)	4 (12.5)	9 (16.7)	0.6
Comorbidities		2 (2–3)	2 (2–3)	2 (2–3)	0.99
Fasting glycemia, mg/dl		122 (110–137)	120 (110–138)	125 (110–137)	0.86
Postprandial glycemia, mg/dl		130 (112–156)	130 (109–155)	128.5 (112–156)	0.99
Drugs used for diabetes		1 (1–2)	1 (1–2)	1 (1–2)	0.99
Diet, n (%)		71 (82.6)	25 (78.1)	46 (85.2)	0.4
Fluid intake, l		1.8 (1–3)	1.5 (1.5–2)	2 (1.5–2)	0.02
Metformin, n (%)		50 (58.1)	19 (59.4)	31 (57.4)	0.86
Sulfonylurea, n (%)		31 (36)	14 (43.8)	17 (31.5)	0.25
Insulin, n (%)		32 (37.2)	9 (28.1)	23 (42.6)	0.18
Other drugs (SGLT2 inhibitors, acarbose), n (%)		6 (7)	4 (12.5)	2 (3.7)	0.12
Physical activity, n (%)		27 (31.4)	10 (31.2)	17 (31.5)	0.98
Individual protection against COVID-19, %	Frequent hand washing	100	100	100	1
	Wearing gloves	45	43.8	46.3	0.82
	Using disinfectant liquid	80.2	75	83.3	0.35
	Social distancing	94.2	87.5	98.1	0.04
Anxiety, %	Almost all the time	31.4	40.6	25.9	0.16
	Often	31.4	25	35.2	0.32
	Occasionally	25.6	25	25.9	0.92
	Never	11.6	9.4	13	0.62

Data are presented as median (interquartile range) unless otherwise indicated.

Abbreviations: BMI, body mass index; COVID-19, coronavirus disease 2019; SGLT2, sodium-glucose cotransporter 2

the COVID-19 pandemic helps to develop targeted psychological interventions. Knowledge of predictors of psychological outcomes can form the basis for clinical assessment, therapy, and decision-making. Telemedicine can improve glycemic control and reduce anxiety in patients with type 2 diabetes during the COVID-19 outbreak. Further studies are needed to develop appropriate management strategies in this population of patients.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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REFERENCES

1 World Health Organization Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19--11-march-2020. Accessed March 31, 2020.

2 Yang J, Zheng Y, Gou X, et al. Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: a systematic review and meta-analysis. Int J Infect Dis. 2020; 94: 91-95.

3 Fang L, Karakiulakis G, Roth M. Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? Lancet Respir Med. 2020; 8: e21.

4 Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020; 382: 1708-1720.

5 Hollander JE, Carr BG. Virtually perfect? Telemedicine for COVID-19. N Engl J Med. 2020; 382: 1679-1681.

6 Kirsh S, Su GL, Sales A, Jain R. Access to outpatient specialty care: solutions from an integrated health care system. Am J Med Qual. 2015; 30: 88-90.

7 So CF, Chung JW. Telehealth for diabetes self-management in primary healthcare: a systematic review and meta-analysis. J Telemed Telecare. 2018; 24: 356-364.

8 Gajos G. Diabetes and cardiovascular disease: from new mechanisms to new therapies. Pol Arch Intern Med. 2018; 128: 178-186.

9 Canadian Mental Health Association, BC Division. COVID-19 and anxiety. https://www.heretohelp.bc.ca/infosheet/covid-19-and-anxiety. Accessed March 31, 2020.

10 Martinez K, Lockhart S, Davies M, et al. Diabetes distress, illness perceptions and glycemic control in adults with type 2 diabetes. Psychol Health Med. 2018; 23: 171-177.

11 Zhou J, Tan J. Diabetes patients with COVID-19 need better glucose management in Wuhan, China. Metabolism. 2020; 107: 154216.

12 Liu YT, Lin LY, Tuan CW, et al. Analyzing the association HbA1c control by depression, social participation and utilizing self-management questionnaire. Diabetes Res Clin Pract. 2019; 153: 103-110.