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Impact of COVID-19 Outbreak in Healthcare of People with Type 2 Diabetes: Evidence from a Cross-Sectional Study

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Abstract

AIM: The aim was to assess the impact of the COVID-19 outbreak on the healthcare of Type 2 Diabetes patients and identify the factors that correlated.

METHODS: A cross-sectional study was carried out from November 2020 to February 2021. The study enrolled 400 adults with Type 2 diabetes aged 40–65 years with at least one other chronic illness who received primary care health services in Vlore, Albania. A short questionnaire based on the literature, considering the situation of the COVID-19 pandemic, was used for data collection. The administration of the questionnaire was carried out by trained nurses. All participants give their written informed consent before administering the questionnaire. Pearson's two-tailed correlations and linear regression were used to test the correlations.

RESULTS: Among 400 patients with Type 2 Diabetes in the study, 53.0% were female and 47.0% were men. Most of the participants were married (n = 303) with a high level of edcation (54.3%). Treatment was mainly with oral medications (58.0%). Based on the body mass index (BMI), 63.0% of the participants were overweight. Employment status (p = 003), the type of treatment, oral medication versus insulin (p = 001), BMI (p = 001), and living alone (p = 008) were the most correlated factors.

CONCLUSIONS: The care of Type 2 Diabetic patients due to the COVID-19 pandemic is closely associated with social determinants of health and the resources of health-care settings. The need to address innovative approaches to care, including self-care, social support, and e-health, is recommended.

Introduction

On March 11, 2020, the World Health Organization (WHO) declared the COVID-19 pandemic [1]. In Albania, as in many other countries worldwide, prevention and control measures have been adopted to contain the spread of infection. Quarantine, social separation, restrictions on mass gatherings, and total or partial lockdowns are some of the most common measures taken [2], [3], [4], [5]. Even if physical distance from health care centers can be beneficial to cease the spread of infection, this can be associated with problems in accessing healthcare, especially for chronically ill patients, including patients with Type 2 Diabetes treated in primary care and insufficiency of remote health care [6]. Worldwide, the number of adults living with Type 2 Diabetes is growing. Type 2 Diabetes is one of the leading causes of disability, with almost half of all deaths occurring before the age of 70 attributed to high blood sugar levels. The prevalence of Type 2 Diabetes is also increasing rapidly in middle- and low-income countries [7]. Women throughout their life may be more affected by diabetes, especially during menopause [8]. According to the International Diabetes Federation, in Albania, the prevalence of diabetes in adults is 12.0%, with Type 2 diabetes being the most common type [9]. Type 2 diabetes increases the risk of many serious health problems, such as eye, skin, and foot complications; nerve damage; kidney disease, hypertension, and stroke; as well as increased disability and health and social costs [10]. Furthermore, studies have found that in people with Type 2 diabetes, COVID-19 is more severe and is associated with high mortality rates [11]. While COVID-19 in infected individuals can predispose them to hyperglycemia, leading to severe health situations [12]. To provide support to people with chronic conditions, many countries are exploring different approaches to redesigning delivery systems, and central to these approaches are self-management support, service delivery design, decision support strategies, financing, availability, and access [13]. Training and education by health professionals on improving lifestyle in patients with Type 2 diabetes are found to improve biochemical characteristics as a result of better control of blood glucose levels [14]. According to the Albanian Demographic and Health Survey, 2017–2018, the self-reported prevalence of

no communicable diseases is higher among women (20% compared to 8% among men) and increases with age, with higher vulnerability among the age group 50–59, and Type 2 diabetes is one of the chronic diseases reported more frequently for this age group (with 7% of women and 3% of men) [15]. Referring to the National Health Report, over the past two decades, the total mortality rate due to overweight and obesity has increased more than twice, while the death rate due to Type 2 diabetes has tripled [16]. The increase in the prevalence of Type 2 diabetes and other chronic diseases reflects rapid social, economic, and lifestyle changes and poor disease management [17]. Therefore, in Albania, there is no data on health indicators for the local population. Through this study, our objective is to fill this gap in the literature and draw the attention of patients with Type 2 diabetes among the local population, which in most cases is not the focus of research, especially in times of pandemics where the attention of the health-care system is focused on patients with COVID-19.

Research design and methods

Population and data sources

The study is cross-sectional and included 400 Types 2 diabetes patients from primary health centers in the City of Vlore, Albania. The study was carried out from November 2020 to February 2021. The study enrolled adults with Type 2 diabetes aged 40–65 years across five primary health care centers. Participants were selected from the family doctor's register where patients are treated. The selection was made starting from the first in the list and continuing until the 400 number of the sample was required for cross-sectional studies. If one participant refused to be part of the study, it passed to the next in line. The administration of the questionnaire was carried out by trained nurses on the day when patients came to receive treatment from the family doctor. The inclusion criteria included patients with Type 2 diabetes aged 40–65 years, having at least one other chronic disease, and eligibility to participate in the study. All participants give their informed written consent before administering the questionnaire. Participation was entirely voluntary and confidentiality and privacy were guaranteed. The study design was approved by the Ethics Scientific Board of the Faculty of Health of the University of Vlore.

Data collection

To collect data, a simple questionnaire that included two sections was used. One section was dedicated to sociodemographic data, and the second included eight questions that assessed different variables related to the care of patients with Type 2 diabetes. The selection of questions was made based on literature and taking into account the situation of the COVID-19 pandemic. A group of experts (nursing academic staff) who approved the final version of the questions decided that the questionnaire should be short and that the time to complete it should be minimal. This was done to provide patients with maximum security in the conditions of the pandemic.

Statistical analysis and modeling

The analyses included descriptive statistics to calculate frequencies, percentages, and 95% confidence intervals for sociodemographic data. A Pearson correlation and Sig. (two-tailed p) were used to test the correlation between variables. Furthermore, the linear regression - Model Summary 3 was used to confirm the statistical association between dependent and constant variables. Values of p 0.05 were accepted as statistically significant. The IBM SPSS Statistics 25 software was used for the data analysis.

Results

Study population characteristics

Among 400 patients with Type 2 diabetes, participants in the study were 53.0% women and 47.0% men. An approximately equal percentage belonged to age groups 50–59 years (37.50%) and 60–65 years (39.0%). Most of the participants were married (n = 303) and had a high level of education (54.3%). The highest percentage of participants worked (43.8%), while the number of unemployed (n = 114) and retired (n = 111) was almost the same. About 45.3% of the participants lived in their own homes and 42.8% lived with their children in the same house. About 22.0% of the patients in the study had been diagnosed with Type 2 diabetes 5 years ago. Treatment was mainly with oral medications (58.0%). Meanwhile, based on body mass index (BMI) calculated by height and weight referred to by the participants themselves, it turned out that the largest percentage of patients were overweight (63.0%), followed by the obese category, level I (27.0%). The categorization of BMI was made based on the BMI chart of the WHO [18].

Table 1 shows the statistical association of variables assessing difficulties due to the COVID-19 pandemic and socio-demographic data of study participants. About 27.5% of participants think that their nutritional status is not healthy as a result of the pandemic, and 32.0% report that they have eaten more than usual.

Table 1: Correlation of variables assessing difficulties due to COVID-19 pandemic and socio-demographic data

Correlations		Pearson Correlation Sig. (two-tailed)								
Variables	Frequency (%)	Gender	Age	Marital status	Educational level	Employment status	Place of living	Time diagnosed with diabetes (years)	Treatment of Type 2 diabetes	BMI (weight in kg)/ (height in m) 2
Do you think that you have had healthy		0.108*	0.227**	0.071	−0.043	0.137**	−0.002	0.118*	0.206**	0.163**
nutrition during the COVID-19 pandemic?		0.030	0.000	0.159	0.389	0.006	0.964	0.019	0.00	0.001
Yes	237 (59.3)									
No	110 (27.5)									
I do not know	53 (13.3)									
Due to Covid-19, you have eaten		−0.133**	0.047	0.038	−0.085	0.131**	−0.008	−0.026	−0.013	0.139**
Less	24 (6.0)	0.008	0.348	0.445	0.089	0.009	0.873	0.602	0.794	0.005
More	128 (32.0)									
Equally	209 (52.3)									
I do not know	37 (9.3)									
Are most at risk from coronavirus		−0.037	−0.016	−0.007	−0.138**	0.060	−0.014	0.048	0.064	0.133**
Underweight persons	17 (4.3)	0.458	0.753	0.882	0.006	0.234	0.783	0.334	0.199	0.008
Overweight people	180 (45.0)									
Weight does not Affect	107 (26.8)									
I do not know	96 (24.0)									
During this period, you have		−0.037	−0.033	0.003	−0.055	0.094	−0.047	−0.029	−0.075	−0.029
Put on weight	114 (28.5)	0.464	0.513	0.944	0.276	0.059	0.348	0.561	0.132	0.569
Put of weight	9 (2.3)									
Equally	171 (42.8)									
I do not know	106 (26.5)									
Do you try to eat healthily?		−0.034	−0.028	−0.051	0.004	−0.107*	−0.017	0.032	0.053	−0.062
Yes	343 (85.8)	0.504	0.578	0.306	0.933	0.032	0.742	0.522	0.290	0.218
No	57 (18.8)									
How much Covid-19 pandemic made it		0.053	0.007	−0.003	−0.009	−0.008	−0.132**	−0.015	0.025	0.027
difficult to obtain proper care by health		0.294	0.885	0.949	0.859	0.866	0.008	0.771	0.623	0.587
personnel?										
Not at all	30 (7.5)									
A little	45 (11.3)									
On the average	100 (25.0)									
A lot	86 (21.5)									
Completely	139 (34.8)									
How much Covid-19 pandemic made it		0.076	0.081	0.043	−0.055	0.029	−0.083	−0.058	−0.061	−0.030
difficult to obtain proper care from family		0.130	0.104	0.388	0.269	0.565	0.098	0.249	0.227	0.553
members?										
Not at all	53 (13.3)									
A little	73 (18.3)									
On the average	69 (17.3)									
A lot	91 (22.8)									
Completely	114 (28.5)									
How much Covid-19 pandemic made		0.082	0.075	0.000	−024	0.084	−0.071	0.026	0.056	0.083
difficult self-care?		0.103	0.136	0.994	0.630	0.092	0.155	0.610	0.267	0.096
Not at all	107 (26.8)									
A little	62 (15.5)									
On the average	65 (16.3)									
A lot	67 (16.8)									
Completely	99 (24.8)									

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

About 45.0% of the participants think that overweight people are more at risk of getting infected with COVID-19, while 26.8% of them report that weight does not affect others and report that they do not know the risk that weight can carry of being infected with coronavirus (24.0%). About 28.5% of the Type 2 diabetes patients in the study report that they have gained weight as a result of the pandemic. Although the COVID-19 pandemic has hampered 34.8% of the participant's ability to obtain necessary health-care services for their illness, health personnel difficulties in providing care from family members referred 28.5% of the participants, and for 24.0% of them, the COVID-19 pandemic has completely affected self-care.

A strong correlation was found between nutrition and gender, age, employment status, type of treatment, and BMI (p 0.05). The level of education (p = 006) and the BMI (p = 008) levels show a statistical association of knowledge of COVID-19 risk factors. A correlation was found between socio-demographic data and gaining weight due to the COVID-19 pandemic. Healthy eating was correlated with employment status (p = 032). The difficulty in accessing adequate healthcare was correlated with the place of residence, p = 008. People living alone face more difficulties in getting proper healthcare from health-care professionals during the pandemic. Care from family members and self-care were not correlated with any sociodemographic data in Table 1.

Table 2: Linear regression – model summary 3

Model summary table, ANOVA									
Dependent Variables[a]	R	R Square	Adjusted R Square	Std. The error in the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
Employment status	0.240[a]	0.058	0.038	0.817	0.058	20.975	8	389	0.003
Treatment of Type 2 diabetes	0.262[a]	0.069	0.050	0.789	0.069	30.598	8	389	0.001
BMI	0.270[a]	0.073	0.054	30.24197	0.073	30.822	8	389	0.001

Dependent Variable Predictors: (Constant): Do you think that you have had healthy nutrition during the COVID-19 pandemic?; Due to COVID-19, you have eaten; Are most at risk from coronavirus; During this period you have; Do you try to eat healthily?; How much COVID-19 pandemic has made it difficult to obtain proper care by health personnel?; How much COVID-19 pandemic made it difficult to obtain proper care from family members?; How much COVID-19 pandemic made difficult self-care? BMI: Body mass index; [a] Dependent Variable Predictors

Table 3: General characteristics of the study population

Variables	Frequency	Percent	Mean	SD	95% Confidence Interval [Lower Bound - Upper Bound]
Gender			147	0.500	[1.42–1.52]
Female	212	53.00			
Male	188	47.00			
Age (years)			2.15	0.776	[2.08–2.08]
40–49	94	23.50			
50–59	150	37.50			
60–65	156	39.00			
Marital status			1.44	0.817	[1.36–1.52]
Married	303	75.8			
Single	23	5.8			
Divorced	74	18.5			
Educational level			1.99	0.677	[1.93–2.06]
Elementary	93	23.3			
Secondary	217	54.3			
High	90	22.5			
Employment status			1.84	0.831	[1.76–1.92]
Employed	175	43.8			
An-employed	114	28.5			
Retired	111	27.8			
Place of living			1.98	0.939	[1.88–2.07]
In my house	181	45.3			
Rent	48	12.0			
With children	171	42.8			
Time diagnosed with diabetes (years)			4.38	1.783	[4.20–4.55]
1	23	5.8			
2	53	13.3			
3	58	14.5			
4	58	14.5			
5	88	22.0			
5–10	67	16.8			
>10	53	13.3			
Treatment of Type 2 diabetes			1.63	0.813	[1.55–1.70]
Oral medication	232	58.0			
Insulins	88	22.0			
Oral medication + insulins	80	20.0			
BMI (weight in kg)/(height in m) 2*			28.62	3.324	[28.30–28.95]
Underweight<18.5	1	0.3			
Normal 18.5–24.9	27	6.8			
Overweight 25.0–29.9	252	63.0			
Obese level I 30.0–34.9	108	27.0			
Obese level II 35.0–39.9	12	3.0			

In Table 2, linear regression analysis shows that some predictors correlate statistically significantly with the outcome variable. The model summary table shows the statistics results of each chosen model. The adjusted r-square column shows that it increased from 38 to 54 by adding a third predictor. The Sig. The change column F Change column confirms that the increase in r-square after adding a third predictor is statistically significant, p = 0.001. And the choice of model 3 is the right one to compare the dependent variables and predictors. Strong correlations were found for employment status, type of treatment (oral medication vs. insulin), BMI, and the selected predictors.

Conclusion

To the best of our best knowledge, this is the first study investigating the impact of the COVID-19 outbreak on the healthcare of people with Type 2 diabetes in a Western Balkan country. Our results about the socio-demographic profile of participants are consistent with other research studies. Being married (75.8%), having secondary education (54.3%), being employed (43.8%), living with children (42.8%), and age group 40–49 years (23.50%), Table 3 are characteristics that even in the absence of pandemics affect the health care and self-care of patients with Type 2 diabetes. The above characteristics have shown strong statistical correlations between healthcare and self-care by positively influencing this relationship [19], [20].

The study participants randomly had approximately equal participation in terms of women (n = 212) and men (n = 188). In this regard, this distribution ensures the overall consistency of the results of the representative sample of the study population.

The correlation among variables that assessed the impact of the COVID-19 outbreak on the health care of patients with Type 2 diabetes, participants in the study, and socio-demographic data, Table 1, shows a strong statistical correlation between healthy nutrition during the pandemic and age (p = 000), employment status (p = 006), type of treatment (p = 000), and BMI level (p = 001). Younger participants, employees, those treated with oral medications and those with low BMI values reported healthy nutrition; n = 237 (59.3%). In this regard, our results are consistent with other studies where Type 2 diabetes patients have reported improvement in health-care activities, including improvement in their nutritional status (healthy nutrition and regular meals) during the COVID-19 pandemic [21].

In terms of the amount of food consumed, 32.0% of study participants report that they have increased food consumption. A strong statistical correlation was found between gender (p = 008), employment status (p = 009), and BMI level (p = 005), Table 1. Women, the unemployed, and people with high BMI levels were related to higher food intake during the pandemic. These results are consistent with other studies which found that during the pandemic, patients with Type 2 diabetes had an increase in the consumption of sugary foods and the amount of food consumed in general [22]. Studies have shown that having comorbidities, including obesity, affects the chances of survival of Type 2 diabetes patients if they are affected by COVID-19 while those who survive also have long-term complications [23].

Meanwhile, it should be noted that having at least one other chronic illness, except Type 2 diabetes, was an inclusion criterion for participating in the study. Therefore, both obesity and diabetes have been considered high-risk factors for severe COVID-19 disease [24].

In addition, a study found that due to total or partial lockdowns in Type 2 diabetic patients, as well as in healthy individuals, a gain in body weight was observed [25]. In our study, 28.5% of participants report a gain in body weight, while 24.0% of them do not know if they gained weight or not. No correlation was found between this variable and the sociodemographic data in Table 1. A statistical association was found between employment status and trying to eat healthily.

p = 032. The correlation of Type 2 diabetes with other social determinants of health before and during the COVID-19 pandemic has been shown to have a great impact on disease management, stressing the importance of adopting new innovative methods of management [26]. As the results of our study suggest, 34.8% of the participants report that COVID-19 has a complete impact on obtaining proper health care from health care professionals, while 21.5% have responded a lot regarding the impact of COVID-19 on obtaining proper healthcare, Table 1. Patients living alone (p = 008) have a more difficult time accessing adequate healthcare due to the COVID-19 pandemic. For the other sociodemographic data and this variable, no statistical association was found. As a study suggests, Type 2 diabetic patients in developing countries due to the COVID-19 pandemic face many challenges in disease management, such as the inadequate number of visits, the lack of electronic health services, and the loss of traditional communication between the patient and the health-care provider [27].

As shown in Table 1, significant percentages of participants reported a partial impact on their level of self-care as a result of the pandemic. As the literature suggests, diabetes self-care activities include five domains, such as diet, exercise, blood sugar testing, foot care, and smoking [28]. While 24.8% of study participants report that the situation of a pandemic has impacted their level of self-care completely, including all the five domains mentioned above. Our results are consistent with other study findings in resource-limited settings where limited or insufficient levels of self-care were found among Type 2 diabetic patients due to the COVID-19 pandemic [29]. In addition, the current pandemic situation has affected the health access of diabetic patients by influencing not only the taking of medications but also health education, which is very important for disease management [30]. Therefore, management is getting more difficult for older Type 2 diabetes patients and those who live alone [31]. Table 1 shows that 28.5% of patients report that the COVID-19 pandemic has created huge difficulties in getting proper healthcare from family members. According to linear regression - Model Summary 3, Table 2, the variables that were more affected by the COVID-19 pandemic and influenced the health care of Type 2 diabetic patients in the study were employment status (p = 003), treatment (oral medication vs. insulin) (p = 001), and BMI (p = 001). Our findings are consistent with the literature that better control of sugar in the blood is associated with better adherence to diabetes medications [32]. This fact is also supported by social distance measures as a result of the pandemic, in particular in health-care settings, leading to a reduction in visits to the family doctor and delays or lack of medication.

In summary, the impact of the COVID-19 outbreak on the healthcare of Type 2 diabetic patients is closely associated with social determinants of health and the resources of health care settings.

The need to address innovative approaches to care is recommended, including self-care, social support, and electronic health.

Acknowledgments

Author Contributions

F.K. and V.N. contributed to the design and protocol of the study, contributed to discussion, and wrote, reviewed, and edited the manuscript. E.S. contributed to data analysis and discussion and reviewed and edited the manuscript. J.J. and I.Z. researched data, contributed to discussion, and reviewed and edited the manuscript. V.N. contributed to the discussion, reviewed, and edited the manuscript. F.K. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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