Original Article

DOI: 10.56016/dahudermj.1146367

DAHUDER Medical Journal
e-ISSN: 2791-9250

Does The Frequency of Diabetes Increase in Covid-19 Patients? Cross-Sectional Study

İhsan Solmaz[1], Solgül Araç[2]

[1]Department of Internal Medicine, University of Health Sciences, Gazi Yasargil Training and Research Hospital, Diyarbakır, Turkey
[2]Department of Emergency Medicine, University of Health Sciences, Gazi Yasargil Training and Research Hospital, Diyarbakır, Turkey

ABSTRACT

Objectives: The aim of this study was to investigate frequency of diabetes mellitus (DM) in patients diagnosed with Covid-19 and whether Covid-19 had effect on high HbA1c.

Methods: Data of DM patients with Covid-19 were analyzed cross-sectionally. In Covid-19, the effect of DM patient frequency and mortality was investigated.

Results: 2057 patients diagnosed with Covid-19 were included in the study. Among these patients, total 192 patients (9.25%) were treated with the diagnosis of DM. 73 (41 males-32 females) were newly diagnosed with DM (38.02%). 119 patients (48 males and 71 females) were previously diagnosed with DM. Eight of DM patients died. Among all Covid-19 in patients followed up, 90 patients died. Mortality of DM patients was not statistically significant compared to mortality of all patients (p = 1.000 x = 0). Of the patients who were followed up with diagnosis of DM, whose HbA1c were observed in the last 3 months, 16 of 20 patients had increase in HbA1c, and 4 patients had decrease in HbA1c. The mean increase was 1.05.

Conclusion: The frequency of new diagnosis DM in patients with Covid-19 was found to be quite high. There was increase in HbA1c in Covid-19 patients, and Covid-19 was thought to affect the pancreas.

Keywords: Covid-19, Diabetes Mellitus, HbA1c, ARDS, PCR

"Coronavirus Disease 2019 (Covid-19)", which has a wide clinical spectrum from asymptomatic cases to cases that result in acute respiratory distress syndrome (ARDS) requiring intensive care, was declared as a pandemic by the World Health Organization (WHO) on March 11, 2020, and continues to spread rapidly across the globe. 1 According to the literature and clinical observations, age, being male and chronic diseases, especially hypertension and Diabetes Mellitus (DM), are seen as risk factors. [2]

The prevalence of DM seen to affect the course and mortality of Covid-19 was 5% in a study in China, 17% in a study in Italy and 25.2% in a study in New York. [3-5]

In a study conducted in England, it was shown that Covid-19 progressed more severely in people with diabetes and DM was an important risk factor for hospitalization in patients with Covid-19. [6]

It is stated that cytokines released in Covid-19 patients may affect the exocrine and endocrine pancreas, destroy immune-mediated β-cells, and cause type 1 DM and worsening of insulin resistance in patients with type 2 DM previously. [7, 8]

In our study, we aimed to investigate the frequency and prognosis of DM and whether Covid-19 had an effect on high HbA1c in patients hospitalized with the diagnosis of Covid-19 in our hospital.

Received: *July 21, 2022;* ***Accepted:*** *July 27, 2022;* ***Published Online:*** *July 29, 2022*

How to cite this article: *Solmaz İ, Araç S. Does The Frequency of Diabetes Increase in Covid-19 Patients? Cross-Sectional Study. DAHUDER M J 2022, 2(3):61-64*

Address for correspondence: *İhsan SOLMAZ, MD., Department of Internal Medicine, University of Health Sciences, Gazi Yasargil Training and Research Hospital, Diyarbakır, Turkey. E-mail: ihsan2157@gmail.com. Telephone: +90 533 654 21 32*

METHODS

The data of all Covid-19 patients who received inpatient treatment between March 16, 2020, in which Covid-19 started to appear in our country and the first case was detected in our province, and July 14, 2020 were analyzed retrospectively through the Hospital Information Management System. 2,057 patients were included in the study. Covid-19 was diagnosed if the PCR test was positive and/or in accordance with the Ministry of Health Covid-19 guidelines through clinical, laboratory and imaging findings. From these inpatients, 192 of those who received DM treatment were identified, and their HbA1c values during the time they were treated in hospital, whether they had HbA1c in the last 3 months (90 days) and their prognosis were recorded. Exclusion criteria were determined as being non-Covid-19 patients, patients with HbA1c < 6.5 and patients under 18 years of age.

Ethical Approval

Since our study was retrospective, informed consent was not obtained from the patients. Ethics committee approval was obtained from our hospital for this study.

Statistical Analysis

Numerical data obtained in the study were expressed as arithmetic mean±standard deviation (SD), while categorical data were expressed as frequency (percentage). Statistical analyses were performed using the SPSS 22.0 software package. Pearson Correlation Analysis was used for the relationship between two numerical variables. $p < 0.05$ was considered statistically significant.

RESULTS

Of 2,057 patients included in the study, a total of 192 patients (9.25%), 89 males (mean age: 55.3) and 103 females (mean age: 57.4), were treated with the diagnosis of DM. The mean age of the patients diagnosed with DM was 56.5 years (min:26-max:83). The mean HbA1c level of patients with DM diagnosis was 9.5 (min:6.5-max:18) 73 (41 males and 32 females) of these patients were not previously diagnosed with DM, and they were accepted as newly diagnosed patients (38.02%). The mean HbA1c value of newly diagnosed patients was 8.62% (min:6.5-max:16.5). There were 119 patients (48 males, 71 females; mean HbA1c: 10.04 (min: 6.5-max: 18)) previously diagnosed with DM. 8 (8.88%) of DM patients died (mean HbA1c: 9.2 (min:6.9-max:10.9)) (Table1). Among all Covid-19 inpatients followed up, 90 (4.3%) patients died. The mortality of DM patients was not statistically significant compared to the mortality of all patients ($p = 1.000$ x = 0). Table-1

When the HbA1c values of DM patients followed up were examined in the last 3 months (90 days), 20 patients had their HbA1c checked in the last three months, and while 16 patients had an increase in HbA1c, 4 patients had a decrease in HbA1c. The mean increase was 1.05.

Table 1. DM data and statistical comparison of Covid-19 patients.

	DM patients			Total Covid-19 (%)	*P* X_2
	Newly diagnosed (%)	Previously diagnosed (%)	Total DM (%)		
Number of patients	73 (38)	119 (62)	192 (100)	2057 (100)	
Gender					
Male	41 (56.1)	48 (40.3)	89 (46.3)	1031 (50.1)	
Female	32 (43.9)	71 (59.7)	103 (53.7)	1026 (49.9)	
Age (mean)	53.7 Min:31 Max:83	58.1 Min:26 Max:82	56.5 Min:26 Max:83	48.7 Min:18 Max:98	
HbA1c	8.62 Min:6.5 Max:16.5	10.04 Min:6.5 Max:18	9.5 Min:6.5 Max:18		
Died		8 (8.88)		90 (4.3)	1.000 0

Min.: minimum | Max.: maximum, $p < 0.05$

DISCUSSION

Our study examined 2,057 patients and found that 9.25% of Covid-19 patients were treated with a DM diagnosis. Singh AK *et al*. detected DM in 5% of patients in a study in which 20,982 patients were investigated by the Centers for Disease Control and Prevention (CDC) in China, where the prevalence of DM was 10.9%. [3] In a study conducted by Grasselli G *et al*. in Italy, the number of DM patients in 1,591 patients with severe Covid-19 was recorded as 180 (17%). [4] In a retrospective case series with 393 patients in New York, Goyal P *et al*. found that Covid-19 was accompanied by DM in 25.2% of patients. [5] In our study, this ratio was also in line with the literature.

The mortality rate among Covid-19 inpatients followed up was 4.3%, and the rate of DM patients who died was 8.88%. Although the mortality of DM patients increased compared to the mortality of all patients, it was not statistically significant. A study by Docherty AB *et al*. in the UK, showed that 19% of 16,749 patients hospitalized with Covid-19 between February and April 2020 had underlying diabetes, and that this was an important risk factor for hospitalization in Covid-19 patients. [6] In our study, although DM did not have a statistically significant effect on mortality in patients with Covid-19, the fact that DM rates were high among inpatient and deceased patients showed that DM was an important comorbid condition that should be considered during both hospitalization and clinical follow-up. We think that the early decisions taken in pandemic management in our country have been effective in the fact that the prevalence of diabetes and the number of deceased people with diabetes are less than expected in our study. We believe that informing the community and restrictions on people with chronic diseases when the first case appeared in our country have caused people with DM to protect and therefore prevent themselves from becoming infected. Regardless of the risk factors, we are of the opinion that measures such as wearing masks, social distance and hand washing during the pandemic are valuable in fighting the pandemic.

In our study, we found that the HbA1c value increased by an average of 1.05% in 38.02% of newly diagnosed DM patients and 16 of the previously diagnosed DM patients. It has been reported that cytokines released in Covid-19 patients may affect the exocrine and endocrine pancreas, destroy immune-mediated β-cells, and therefore lead to newly diagnosed Type 1 DM or deplete insulin reserve and cause worsening of insulin resistance in patients with previously diagnosed type 2 DM. [7, 8] As a result of our study, we believe that Covid-19 affects DM regulation and raises HbA1c level.

Our study had some limitations. The most important of these was that most patients had no HbA1c levels recorded in the last 3 months. More definitive results can be obtained as a result of studies conducted with more case series where HbA1c levels of the last 3 months are available.

In conclusion, Covid-19 may develop newly diagnosed DM, particularly by affecting the pancreas, and may raise HbA1c levels in patients with existing DM. Therefore, we think that it would be appropriate to examine Covid-19 patients in terms of DM and to closely monitor patients with DM.

CONCLUSION

Authors' Contribution

Study Conception: İS, SA,; Study Design: İS, SA,; Supervision: İS, SA,; Materials: İS, SA,; Data Collection and/or Processing: İS, SA,; Statistical Analysis and/or Data Interpretation: İS, SA,; Literature Review: İS, SA,; Manuscript Preparation: İS, SA, and Critical Review: İS, SA.

REFERENCES

1. Covid-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) [Available from: https://coronavirus.jhu.edu/map.html.
2. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020 Feb 15;395(10223):507–13.
3. Singh AK, Gupta R, Ghosh A, Misra A. Diabetes in Covid-19: prevalence, pathophysiology, prognosis and practical considerations. Diabetes Metab Syndr 2020;14(4):303-10.
4. Grasselli G, Zangrillo A, Zanella A, Antonelli M, Cabrini L, Castelli A, et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy Region, Italy. JAMA 2020;323(16):1574-81.
5. Goyal P, Choi JJ, Pinheiro LC, Schenck EJ, Chen R, Jabri A, et al. Clinical characteristics of Covid-19 in New York city. N Engl J Med 2020)
6. Docherty AB, Harrison EM, Green CA, et al. Features of 16,749 hospitalised UK patients with Covid-19 using the ISARIC WHO Clinical Characterisation Protocol. medRxiv. 2020. https://www.medrxiv.org/content/10.1101/2020.04.23.20076042v1. Accessed 16 May 2020.
7. Jaeckel E, Manns M, Herrath M (2006) Viruses and diabetes. Ann N Y Acad Sci 958:7–25

8. Wan J, Sun W, Li X, Ying W, Dai J, Kuai X et al (2006) Infammation inhibitors were remarkably up-regulated in plasma of severe acute respiratory syndrome patients at progressive phase. Proteomics 6:2886–2894