Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Metabolism Clinical and Experimental 108 (2020) 154255

Contents lists available at ScienceDirect

Metabolism Clinical and Experimental

journal homepage: www.metabolismjournal.com

Letter to the Editor: Fasting plasma glucose associated with mortality rate in T2DM patients with COVID-19 infection

Dear Sir,

Since December 2019, a novel coronavirus outbreak occurred in Wuhan and quickly spread to other parts of China as well as all over the world. It was reported that diabetes might be associated with higher risk of mortality among severe COVID-19 cases [1,2].

To investigate the clinical course and outcomes of patients with type 2 diabetes (T2DM) and COVID-19, we collected data from five designated hospitals between January 3th, 2020 and February 3th, 2020, in Wuhan, China. A total of 47 patients were included in the analysis.

The median age of these patients was 61.00 years (range, 38–95 years), and 23 (48.94%) were male. Slightly more than half ($n = 25$; 53.19%) had at least another chronic comorbidity, besides diabetes. For the primary outcome, among these patients, 9 (19.15%) patients had died, due to the development of organs dysfunction. Seven of these nine (77.78%) patients were male. The median duration from admission to death was 7.00 (range, 2–19 days) days in the non-survivors. Compared with survivors, non-survivors were older (80.00[range, 49–95 years] vs. 60.50[range, 38–91 years]), and were more likely to have chronic medical illnesses (66.67% vs. 50.00%). Palpitation (44.44% vs 2.63%) were more likely to be reported by non-survivors. Moreover, our data showed lymphocytopenia occurred in 30 (63.83%) patients, with a significant decrease (0.60 [0.57,0.72] vs.0.96[0.63,1.25]) in non-survivors. Both total bilirubin (12.70[8.90,24.00] vs. 9.03[6.40,11.55]) and direct bilirubin (8.46 [3.65,13.85] vs. 3.00[2.43,4.25]) were significantly increased in non-survivors. These were accompanied by significantly prolonged prothrombin time (14.00[13.60,16.20] vs. 12.80[11.85,14.05]) and increased D-dimer concentration (1.54[1.23,4.83] vs. 0.56[0.31,0.92]). On the other hand, elevated blood urea nitrogen (6.51[5.10,8.71] vs. 4.67[3.75,6.42]), serum creatinine (Cr) (96.50[80.00,101.00] vs. 71.00[54.00,81.00]), and decreased eGFR (65.20[53.38,75.72] vs. 91.60[72.19,106.89]) were observed in non-survivors compared to survivors. These observations were associated with increased serum potassium concentration (4.17 [3.78,4.57] vs. 3.82[3.54,3.99]) in non-survivors. No statistical differences in the four parameters relating to blood lipids were found between survivors and non-survivors. Medications for treatment of T2DM or COVID-19 were not different between survivors and non-survivors. Additionally, a Cox regression model was applied to evaluate the time-dependent hazards of developing death, finding that age, FPG, and total bilirubin concentration represented the highest risk factors for non-survival in diabetic patients with COVID-19. (See Table 1)

Our study has several limitations. First, the sample size is limited. Second, this is a retrospective study, and some specific information related to diabetic state was not collected on admission, such as HbA1C, and duration of diabetes. However, the data in this study permit a preliminary assessment of the clinical course and outcomes of diabetic patients with COVID-19. Most importantly, this study indicated that older T2DM patients with poor control of fasting plasma glucose and elevated total bilirubin are at increased risk of death.

Further efforts are still needed to collect more data on both patients with diabetes and those without diabetes to better characterize the clinical features of patients with diabetes and COVID-19, and inform the best treatment strategy to reduce the possibility of becoming critical cases and improve the prognosis [3].

Table 1
Cox regression model for identifying risk factors for death in diabetic patients with confirmed COVID-19.

Variables	Univariate			*P* value	Multivariate			*P* value
	OR	LL	UL		OR	LL	UL	
Age	1.06	1.01	0.11	0.02	1.36	1.06	1.75	0.02
Gender (male)	0.28	0.06	1.33	0.11				
CKD	0.16	0.02	1.33	0.09				
Respiratory diseases	4.17	0.85	20.48	0.08				
Fasting plasma glucose	1.10	1.03	1.18	0.01	1.52	1.06	2.17	0.02
Leucocytes	1.22	0.96	1.56	0.11				
Hemoglobin	1.00	0.96	1.03	0.77				
Neutrophils	1.23	0.99	1.53	0.06				
Lymphocytes	0.15	0.18	1.25	0.08				
Total bilirubin	1.09	1.03	1.15	0.01	1.65	0.95	1.20	0.01
eGFR	0.97	0.94	1.00	0.02	1.07	0.98	1.16	0.14
K^+	3.05	0.94	9.87	0.06				
Ca^{2+}	0.03	0.00	2.34	0.11				
C-reative protein	1.01	0.99	1.02	0.52				
D-dimer	1.07	1.02	1.13	0.01	1.07	0.95	1.20	0.30
Fibrinogen	0.82	0.50	1.36	0.45				

Declaration of competing interest

None.

References

[1] Liang W, Guan W, Chen R, Wang W, Li J, Xu K, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. Lancet Oncol. 2020;21:335–7. https://doi.org/10.1016/S1470-2045(20)30096-6.

[2] Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. Lancet Respir Med. 2020. https://doi.org/10.1016/S2213-2600(20)30079-5.

[3] Zhou J, Tan J. Diabetes patients with COVID-19 need better blood glucose management in Wuhan. China Metabolism. 2020. https://doi.org/10.1016/j.metabol.2020.154216.

Wen Kong[1]
Jiaoyue Zhang[1]
Department of Endocrinology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China
Hubei Provincial Clinical Research Center for Diabetes and Metabolic Disorders, Wuhan 430022, China

[1] These authors contributed equally to this work. They are co-first authors

https://doi.org/10.1016/j.metabol.2020.154255

Ying Xu
Department of Endocrinology, The Fifth Hospital of Wuhan, Wuhan 430050, China

Li Li
Department of Endocrinology, Wuhan Wuchang Hospital, Wuchang Hospital Affiliated to Wuhan University of Science and Technology, Wuhan 430063, China

Qin Li
Department of Endocrinology, General Hospital of the Yangtze River Shipping, Wuhan 430010, China

Li Yang
Department of Endocrinology, Hankou Hospital of Wuhan City, Wuhan 430012, China

Hanyu Wang
Department of Endocrinology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China
Hubei Provincial Clinical Research Center for Diabetes and Metabolic Disorders, Wuhan 430022, China

Yu Hu
Institute of Hematology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China
Hubei Clinical and Research Centre of Thrombosis and Haemostasis, Wuhan, China

Lulu Chen
Department of Endocrinology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China
Hubei Provincial Clinical Research Center for Diabetes and Metabolic Disorders, Wuhan 430022, China
Corresponding authors at: Department of Endocrinology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China.
E-mail address: cheria_chen@126.com.

An Pan
Department of Epidemiology and Biostatistics, School of Public Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China
Corresponding author.
E-mail address: panan@hust.edu.cn.

Tianshu Zeng
Department of Endocrinology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China
Hubei Provincial Clinical Research Center for Diabetes and Metabolic Disorders, Wuhan 430022, China
Corresponding authors at: Department of Endocrinology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China.
E-mail address: tszeng@126.com.

10 April 2020