



## COVID-19 AND DIABETES MELLITUS: TWO GLOBAL PANDEMICS THE WORLD IS RESISTING NOW

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The current COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a colossal global challenge.<sup>5</sup> The numerous studies suggest that the presence of risk factors such as old age, arterial hypertension, obesity and diabetes mellitus increase the risk of severe COVID-19, necessity in oxygen therapy, admission to the intensive care unit and mortality rate.<sup>4</sup> We report the results of our study, realized on a group of patients hospitalized in the period September 2020 – June 2021 in the COVID-19 Department of Timofei Mosneaga Republican Clinical Hospital, Chisinau, Republic of Moldova. Their clinical and paraclinical characteristics (inflammatory biomarkers level, need for supplemental oxygen, ICU admission) were collected and analyzed.

*Key words:* COVID-19, diabetes mellitus, pandemic.

### INTRODUCTION

The world is currently facing two global pandemics: Diabetes Mellitus and COVID-19. Several studies state the two-way relationship between these two conditions. The relationship between COVID-19 and diabetes mellitus is complicated and bidirectional. On the one hand, diabetes mellitus is considered one of the most important risk factors for a severe course of COVID-19. On the other hand, severe COVID-19 infection and its treatment with steroids, can have a specific negative impact on diabetes itself leading to worsening of hyperglycemia.<sup>1</sup>

Wang *et al.* described the epidemiological and clinical characteristics of the 138 hospitalized patients in Wuhan, China, from January 1 to January 28, 2020. They declare that compared to COVID-19 patients who did not receive intensive care, people admitted to the intensive care unit (ICU) were more likely to have preexisting diabetes [8 (22.2%) vs 6 (5.9%)].<sup>2</sup> Another retrospective study including 191 COVID-19 patients in Wuhan showed that comorbid diabetes was more frequently seen in non-survivors compared to survivors [17 (31%), 19 (14%)].<sup>3</sup>

### MATERIALS AND METHODS

The study is retrospective, performed on a group of patients hospitalized in the period September 2020 – June 2021 in the COVID-19 Department of Timofei Mosneaga Republican Clinical Hospital, Chisinau, Republic of Moldova. The data on their clinical characteristics, age, duration of diabetes, current treatment, blood glucose, HbA1c, inflammatory markers (such as CRP, LDH), ICU admission, supplementary oxygen necessity were collected and analyzed.

Based on the American Association of Clinical Endocrinologists and American Diabetes Association Consensus Statement on Inpatient Glycemic Control, hyperglycemia in hospitalized patients was defined as any blood glucose > 7,8 mmol/L (>140 mg/dL). Therefore, patients were grouped as normoglycemic with a mean blood glucose level < 7,8 mmol/L or hyperglycemic with a mean blood glucose level of  $\geq 7,8$  mmol/L, regardless of the presence or absence of diabetes.<sup>6,7</sup>

### RESULTS

A total of 1838 patients were hospitalized in the Republican Clinical Hospital, COVID-19 Department. Among them 1414 (77%) patients

were normoglycemic and 421 (33%) of patients had carbohydrates metabolism disorder: 7 (3%) patients had type 1 diabetes, 410 (96%) patients had type 2 diabetes and there were only 4 (1%) patients with prediabetes.

### 1. COMORBIDITY STRUCTURE IN PATIENTS WITH COVID-19

Our study identified obesity to be the most common comorbidity in COVID-19 patients 60,9%, followed by arterial hypertension 59,34% and diabetes with a prevalence of 22,94%. Other reported comorbidities were hepato-pancreato-biliary diseases which were found in 11,06% of patients, lung chronic diseases with a prevalence of 5,66%, followed by kidney disease 4,2% and GI disease 1,85%.

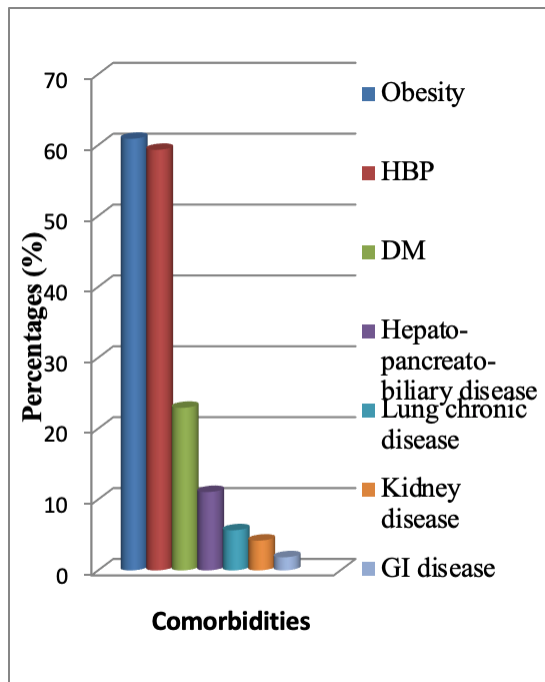


Figure 1. Comorbidities in COVID-19 patients.

### 2. DISTRIBUTION OF PATIENTS ACCORDING TO THE SEVERITY OF COVID-19

Among the patients with type 2 diabetes, 75,4% were admitted to the hospital with the severe form of disease, 21,7% with moderate evolution of the COVID-19 and only 2,9% were identified with the mild form of disease. The rate of the mild form of the disease in patients without diabetes was 6,2%,

28,4% – moderate form and 65,4% of hospitalized patients were with the severe form.

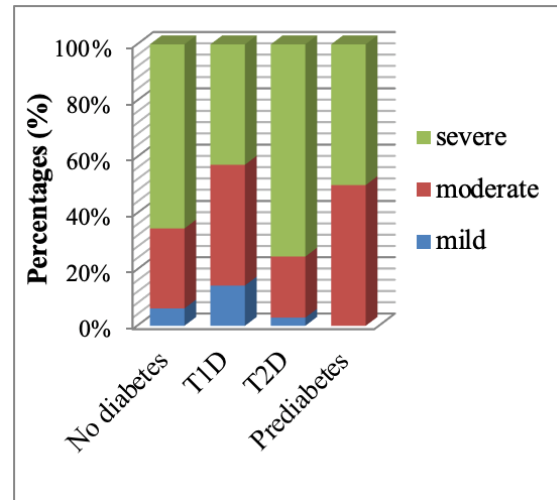


Figure 2. The severity of the disease in patients with COVID-19 according to the presence of diabetes.

### 3. INFLAMMATORY MARKERS LEVEL

The analysis of inflammatory marker levels among the groups stratified by presence and absence of T2D and hyperglycemic status are demonstrated in Figure 3 and 4. Serum CRP and LDH level were higher in patients with hyperglycemia among both group of patients (with and without diabetes).

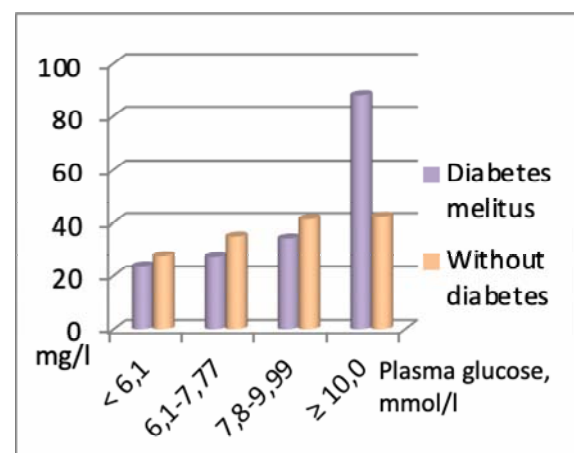


Figure 3. Analysis of CRP level depending on glycemic status in patients with vs without DM.

### 4. THE NEED FOR SUPPLEMENTAL OXYGEN

Among all the patients (421) with diabetes, 86% (n=363 patients) needed oxygen therapy during hospitalization and 14% (n=58 patients) of patients did not present supplemental oxygen necessity.

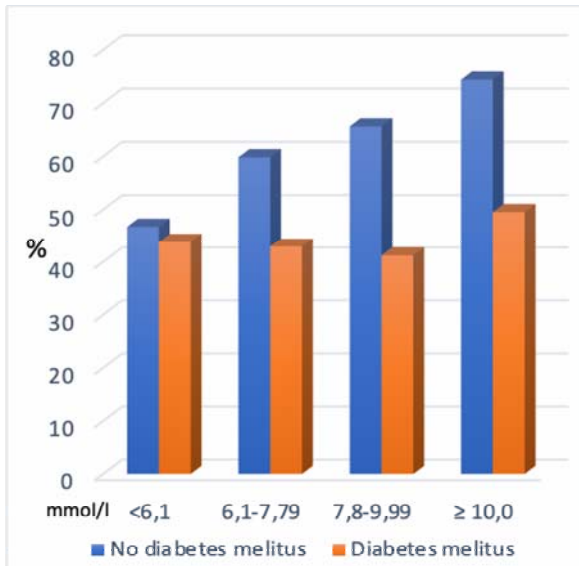


Figure 4. Analysis of LDH level depending on glycemic status in patients with vs without DM.

known with diabetes and 62,0% (n=83 patients) did not have carbohydrates metabolism disturbance.

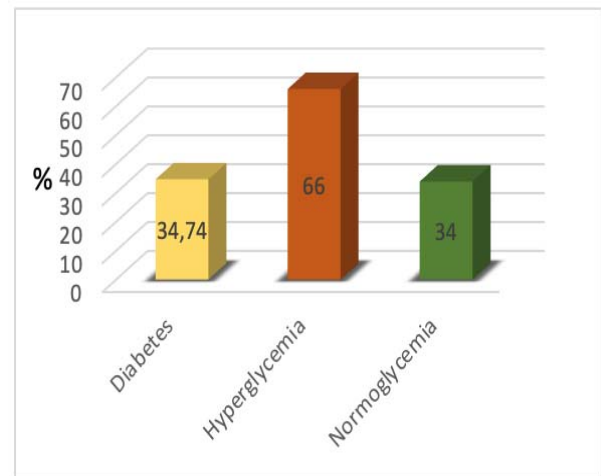


Figure 6. Glycemic status in the study group.

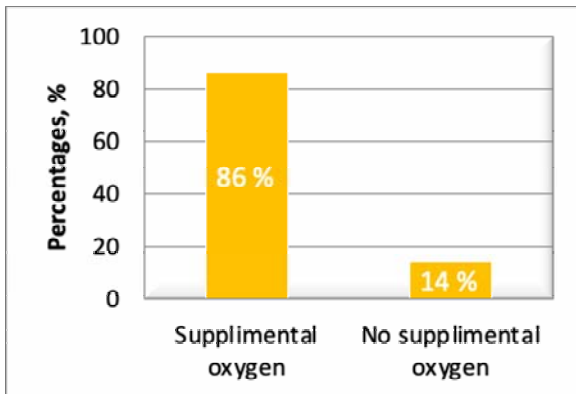


Figure 5. The prevalence of supplemental oxygen requirement in patients with diabetes.

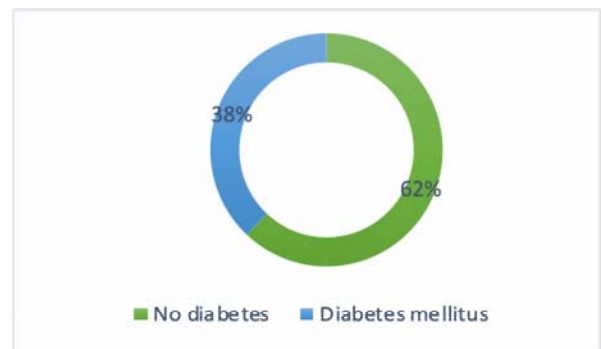


Figure 7. The mortality rate in patients with/without diabetes.

### 5. ICU ADMISSION IN PATIENTS WITH DM

There were 236 (12,86%) admissions into intensive care, of these 34,74% (n=82 patients) were patients with diabetes and 75,26% (n=154 patients) were patients without diabetes.

About 66% (n=102 patients) among patients without diabetes who needed treatment in ICU had increased glycemic values, 34% (n=32 patients) were normoglycemic. Otherwise, the hyperglycemia is an independent risk factor for ICU admission regardless of diabetes presence.

### 6. THE MORTALITY RATE IN PATIENTS WITH COVID-19

Among all the patients with COVID-19 134 (7,3%) died, of these 38,0% (n=51 patients) were

### CONCLUSIONS

Hypertension, obesity, and diabetes mellitus – are the medical conditions with a high rate in patients with severe form of SARS-CoV-2 infection. Patients with type 2 diabetes represented the largest group of persons with the severe form of COVID-19 (75,4%). DM contributed significantly to the severity of the disease, registering lower oxygenation values and increasing the necessity for ventilatory therapy. Diabetes was associated with an increased mortality rate: mortality in patients with DM was 21%, thus every 5th person with diabetes has died. Hyperglycemia is an independent risk factor directly associated with the severity of the evolution of SARS-CoV-2.

### CONFLICT OF INTEREST

The authors declare no conflict of interest. No financial support.

### ABBREVIATIONS

DM – Diabetes Mellitus  
 T2D – Type 2 Diabetes  
 ICU – Intensive Care Unit  
 CRP – C-Reactive Protein  
 LDH – Lactate Dehydrogenase  
 HbA1c – Glycated Hemoglobin  
 GI – Gastro-Intestinal  
 HBP – High Blood Pressure  
 FPG – Fasting Plasma Glucose

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