CLINICAL CHARACTERISTICS OF HOSPITALIZED AND HOME ISOLATED COVID-19 PATIENTS WITH TYPE 1 DIABETES

A b s t r a c t

Aim: To investigate pathological conditions of COVID-19 individuals having type 1 diabetes throughout hospitalization and home isolation.

Methods: This retrospective analysis included 32 COVID-19 in addition T1D individuals who sought therapy at the Prince Sultan Military Medical City in Riyadh, Saudi Arabia, between May 1, 2020, and July 30, 2020. Patient information was obtained from electronic medical records.

Results: 23.8 percent of 32 COVID-19 individuals having T1D needed hospitalization, whereas 78.1 percent needed home isolation. 10.6 percent (4/35) of the study group had hypertension, 23.7 percent (8/34) had chronic pulmonary disease (CPD), 17.9 percent (7/35) had thyroid abnormalities, and 19.9 percent (7/37) had celiac disease. Of the 36 individuals tested, 66.9 percent (21/37) were classified as normal, 29.3 percent (10/36) as having serious kidney illness (CKD) II, and 4.3 percent (2/37) as having end-stage renal failure. The most facing health reported amongst hospitalized individuals remained nausea and vomiting (72.5 percent ; 5/7), fever (57.1 percent ; 4/7), cough (42.8 percent ; 3/7), sore throat (42.8 percent ; 3/7), stomach discomfort (42.8 percent ; 3/7), and dyspnea (42. percent ; 3/7). Diabetic ketoacidosis (71.4 percent ; 5/7) was the most prevalent cause for hospitalization, followed by bacterial pneumonia (14.3 percent ; 1/7), fever (14.3 percent ; 1/7), sore throat (14.3 percent ; 1/7), severe hyperglycemia (14.3 percent ; 1/7), and COVID-19 pneumonia (14.3 percent ; 1/7). Excluding for harshness of COVID-19 (p 14 0.0001), no demographic or medical indicators revealed statistically substantial changes between patients needing hospitalization also those who could be isolated at1. home.

Conclusion: The popular of COVID-19 T1D individuals healed at home without conservative treatment. The most prevalent cause for admission was diabetic ketoacidosis.

Keywords: SARC, Covid-19, China, Mayo Hospital, Diabetes.

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7. **INTRODUCTION:**

In latter half of 2019, the novel coronavirus that caused severe acute respiratory syndrome (SARS-CoV-2) emerged in Wuhan (China) [1]. Coronavirus Illness 2019 (COVID-19) blowout like wildfire over various countries in first half of 2020 .

COVID-19 has caused widespread public health harm and exacerbated global economic difficulties.

As on August 23, 2020, the COVID-19 has impacted 227 countries and territories worldwide, including Saudi Arabia [3].

SARS coronavirus 2 (SARSCoV-2) is a member of SARS coronavirus family and is well recognised for attacking the pancreas, damaging both exocrine and endocrine cells [1]. Diabetes has previously been linked to poor patient outcomes during earlier coronavirus outbreaks, including the SARS-CoV and Middle East Respiratory Syndrome. Diabetes, according to the hypothesis, predisposes to the dysregulated immune response, resulting in a diseased state of lung [2]. There is evidence that individuals having type 2 DM have the higher frequency of simple acute respiratory suffering disorder, a greater requirement for hospitalization, and even a higher fatality rate (T2D). Unfortunately, the main symptoms of individuals through DM Type-1 and confirmed COVID-19 remain little documented. Several factors may account for low frequency of COVID-19 in patients with T1D, including greater proportion of T1D in younger age sets and disease's lower incidence comparable to T2D in the general population. Researchers have noted that individuals having T1D are at danger for contracting a simple form of COVID-19 that requires hospitalization. Age, sex, civilization, comorbidities just as hypertension, cardiovascular disease, and obesity, and a pro-inflammatory and pro-coagulant condition all increase patient's chance of having poor outcomes, that are asymptomatic of the syndromic aspects of diabetes [3].

Geographically, Lahore, Pakistan is one of most important sovereign nations in Western Asia, ranking second among Arab countries in terms of population. It is Asia's fifth-largest nation, with a population of more than 34.8 million people. According to 9th edition of the International Diabetes Federation (IDF) Diabetes Atlas (2019), 27,800 Saudi children and adolescents have T1D. This puts Lahore to the top of the list of nations in terms of the number of TID sufferers. Saudi Arabia is fifth on a worldwide scale in terms of T1D incidence (31.4 per 100,000 people) [4]. As a result, danger of COVID-19 among T1D patients is more concerning in Pakistan, where there is a large population of T1D patients who confront unique concerns and problems during the current and ongoing COVID-19 pandemic. As the outcome, the goal of our current research remained to determine medical features of COVID-19 individuals through T1D who either need hospitalization or succeed condition at home [5].

8. METHODOLOGY:

8.1. Study design and setting

This research comprised 37 COVID-19 also T1D patients who started help at Mayo Hospital, Lahore Pakistan, during June 2019 and May 2020. Depending on documentation their doctors had included in Mayo Hospital electronic medical records, our analysis revealed that all of the people had T1D. Pakistan's Mayo hospital Study and Ethics Committee authorized the research process.

8.2. Inclusion and exclusion criteria

Our current research will include altogether COVID-19-positive T1D individuals. Pregnant females with gestational diabetes, individuals through T2D, and diabetes identified after COVID-19 test has been verified were all excluded from taking part in the study.

8.3. Measurements

People remained identified as COVID-19 positive published by World Health Organization's interim advice, using nasopharyngeal and RT-PCR average methods of SARSCoV-2 testing.

8.4. Home isolation

Solitary certified asymptomatic individuals or primary care setting persons with minimal signs (no oxygen necessities/not any indications of pneumonia) were allowed to be isolated at home.

8.5. Hospital admission severity criteria

1) Mild to moderate: Individuals with obvious upper respiratory and related indications, as well as those with initial medical or radiological pneumonia. 2) Severe: Individuals who develop 1 of the following symptoms within 24 to 48 hours: respiratory rate 30/min, blood oxygen saturation 92 percent, PaO2/FiO2 ratio 300, or lung infiltrates >54 percent of lung field. 3) Critical: Clients who exhibit one of the symptoms associated: acute respiratory suffering disorder, sepsis, altered consciousness, multi-organ failure, or toxic shock disorder.

2) Data collection

Medical records and laboratory data remained evaluated for all hospitalized prisoners, such as these on home or self-isolation. It was determined the patient's age, gender, body mass index, diabetes history, too hemoglobin A1c number. In addition, researchers collected information on the individual's other comorbid conditions, including hypertension, heart disease, peripheral arterial disease, chronic respiratory embolism, thyroid disorder, gluten intolerance, chronic kidney illness, COVID-19 pneumonia, cancer, and glucose protection appraisal. Researchers similarly maintained track of DM medication information for altogether of trial participants.

8.6. Statistical analysis

The statistical examines remained achieved using Microsoft Excel 2010 and SPSS, version 22. The longitudinal variables are expressed by means and standard deviations, whilst categorical variables are represented by frequency in addition proportion. In addition to descriptive statistic, unpaired t-test was used to routinely produced observable variables, the Manne Whitney U examination to non-normally distributed dependent variables, and the chi-square test to explaining information.

9. RESULTS:

Table 1 shows the demographics and average scores of the variables in the research. Females (57.5 percent; 19/37) were shown to be more susceptible to COVID-19 infection than men. A greater number of COVID-19 individuals were 20-year-old (64.7 percent; 21/37) age group, 57.5 percent (19/37) had BMI 25, 94.8 percent (32/37) reported HbA1c values 8%, and 57.4 percent (19/36) had been diabetes for 10 years. Furthermore, 10.6 percent (4/37) of the patients had hypertension, whereas 23.5 percent (5/36) had CPD, 18.8 percent (6/32) had thyroid issue, and 19.9 percent (5/37) had celiac disease. Of the 34 individuals investigated, 67.9 percent (24/37) were classified normal, while 29.2 percent (10/37) had CKD II and end-stage renal failure. Of the overall number of T1D patients, 23.8 percent (7/37) were hospitalized, whereas 78.1 percent (25/37)

had only minor COVID-19, which was treatable at home isolation depending on local standards. For hospitalized patients, median duration of stay remained 3.33 2.5 days.

The prevalent signs noticed in hospitalized COVID-19 T1D individuals remain registered in Fig. 1. The most prevalent signs noticed amongst hospitalized were nausea and vomiting (71.4 percent; 5/7), followed by fever (57.1 percent; 4/7), and cough (42.8 percent); Table 1 displays demographic also medical features of our research set (n 14 32).

Variables• Groups• Numbers• Percentage• Groups• Numbers• Percentage• • Sex• Woman• 18• 56.3• • • Man• 14• 43.8• • Age (years)• <20• 12• 37.5• • Body mass index (kg/m2)• 20
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56.3• • Hemoglobin A1c (%)• 25
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25
<7%• 14
14
2• 43.8
43.8
6.3• • Duration of Diabetes (years)• 7%
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Duration of Diabetes (years)• 7%
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56.3• • Continuous Glucose Monitoring• 10
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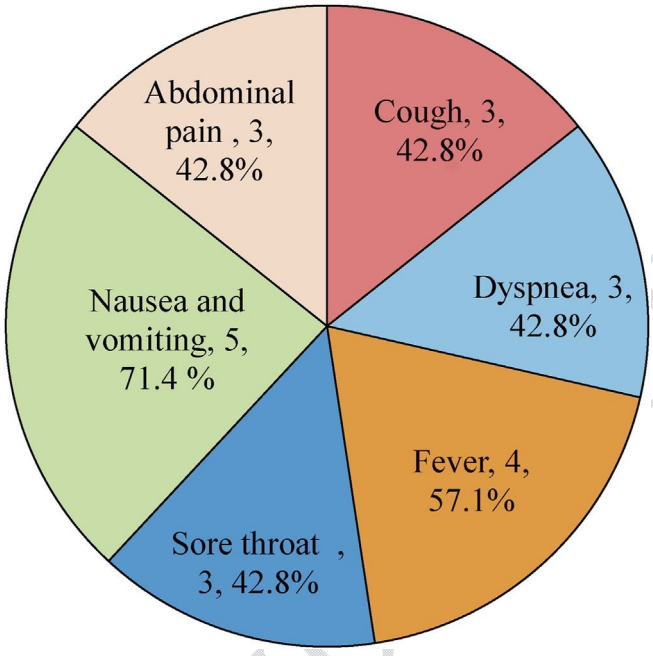

Fig. 1. Symptoms of COVID-19 among hospitalized patients with type 1 diabetes (n ¼ 7).

10. The causes for hospitalization of research subjects are mentioned in Table 2. DKA was clearly the most prevalent reason for hospitalization (71.4 percent; 5/7), trailed through bacterial pneumonia (15.4 percent; 1/7), fever (14.3 percent; 1/7), sore throat (14.3 percent ; 1/7), severe hyperglycemia (14.3 percent ; 1/7), and COVID-19 pneumonia (14.3 percent ; 1/7).

11. The significant differences of demographic also medical parameters to hospitalization and home isolation of T1D individuals having COVID-19 are indicated in Table 3. There was no statistical significance link among people require hospitalization and home isolation and their age, HbA1c levels, or diabetes length. This was same for individuals having hypertension, CVD, cerebrovascular illness, CPD, cancer, and those with advanced CKD (p 14> 0.05). However, there was a significant difference in COVID-19 severity across the groups (p 14 0.0001).

DISCUSSION:

The current also evolving COVID-19 is a severe transferrable respiratory illness that may result in acute pneumonia and mortality. It is currently the top worldwide health story, causing widespread public worry. Spite of the fact that there is a lack of evidence about the impacts of present COVID-19 epidemic on T1D, the insufficient research studies conducted in initial half of 2020 had shown the bidirectional link connecting T1D and COVID-19. Diabetes, in fact, has become well-known as a key danger aspect for hospitalization, severe illness, and even death in individuals infected with COVID-19. However, it should be noted that not all T1D patients are equally vulnerable to greater COVID-19-encouraged harshness danger and casualty. Here remain significant medical also biochemical aspects that distinguish high-risk phenotypes in diabetics, and these critical prognostic indicators must be precisely defined [20]. The present research aims to understand the clinical parameters that separate COVID-19 T1D patients who needed hospitalization from those who were treated at home. To best of our information, this is the first research in South Asia that provides a complete description of the COVID-19 in T1D individuals, including demographic information also medical aspects.

Of 34 COVID-19 affected role through T1D, 21.9 percent needed hospitalization, whereas 79.2 percent had

moderate COVID-19 symptoms that were treated at home. Furthermore, no deaths were reported in the study's small population sample, suggesting that, although hyperglycemia and DKA are common in T1D persons who get COVID-19, some patient role last to treat this infection at home, and the overall fatality risk is low. In comprehensive research conducted in England, this was revealed that of 24,678 instances of COVID-19 necessitating hospitalization, 7438 (31.5%) of T2D patients died, whereas solitary 369 (2.7%) of T1D patients died.

According to present research, the most prevalent symptoms reported in patients needing hospitalization remained nausea and vomiting (72.5 percent), followed by fever (58.2 percent), cough (43.9 percent), sore throat (43.7 percent), stomach pain (44.6 percent), and dyspnea (45.9 percent) (45.9 percent). According to an earlier research from Centers for Disease Control also Anticipation in UK, the most common symptoms for those infected with COVID-19 were fever, cough, shortness of breath, myalgia, runny nose, sore throat, headache, nausea or sickness, abdominal pain, diarrhea, or somewhat combined effect of such.

Individuals with T1D who needed surgery for COVID-19 therapy were older (23.4 vs. 27.1), but there were no significant differences in sex, BMI, hypertension, Hba1c, or eGFR; the same remained true for those with the past record of CVD and CKD. These findings were also comparable with prior research that demonstrated no association among COVID-19 and HbA1c in addition comorbidity profile of admitted or stuck at home individuals. A Saudi Arabian analysis found that children formed the smallest proportion of confirmed COVID19 cases, without any noticeable change in recovery rates among children having illnesses such as T1D and healthy children.

Table 2
Reason for hospitalization, treatment, site of hospitalization among COVID-19 patients with diabetes (n ¼ 7).

Characteristic	Category	Numbers (Percentage)
Reason of hospitalization	Diabetic ketoacidosis (DKA)	5 (71.4)
	Bacterial pneumonia	1 (14.3)
	Fever	1 (14.3)
	Sore throat	1 (14.3)
	Sever hyperglycemia	1 (14.3)
	Covid-19 Pneumonia	1 (14.3)
Treatment	DKA treatment	4 (57.1)
	Antibiotics	2 (28.6)
	Favipiravir	1 (14.3)
	Supportive measures	2 (28.6)
	Hydroxychloroquin	1 (14.3)
Site of hospitalization	Medical word	6 (85.7)
	Intensive care unit	1 (14.3)

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Unpaired t-test for normally distributed continuous variables, ManneWhitney U test for nonnormally distributed continuous variables, Chi-square test for categorical variables.

According to the findings of this research, DKA (71.4 percent) was the most prevalent cause for hospitalization among individuals with T1D and COVID-19. Previous research suggests that in people with diabetes as a pre-existing illness, DKA may be a common consequence caused by severe COVID-19 and a marker of poor prognosis. In fact, COVID-19 caused ketosis or ketoacidosis in diabetic individuals, as well as DKA. Ketosis increased the likelihood of hospitalization, the duration of hospital stay, and the fatality rate. Other investigations have shown a significant frequency of ketoacidosis in individuals hospitalized because to COVID-19. Once children and teens were given to the patient as during COVID-19 pandemic, there was a considerable increase in diabetic ketoacidosis and severe ketoacidosis.

Some of the drawbacks of this research are its retrospective nature, small sample size, restricted socioeconomic and demographic parameters evaluated, and the fact that it was conducted only at one site. More study on a much larger scale is urgently needed to overcome the constraints mentioned.

CONCLUSION:

To conclusion, the most of COVID19 patients with T1D recovered with conservative therapy at home, despite the limitations of the few instances evaluated in this retrospective investigation. The most prevalent cause for admission was diabetic ketoacidosis. It is vital to highlight that T1D is regarded as one of the main health concerns in the Saudi community. As a result, it is critical to priorities comprehensive study that will provide a precise picture of the clinical, socioeconomic, and demographic components of COVID-19 and its link to T1D.

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Variables	Home/Self isolation (25)	Hospitalization (7)	P value

Gender (Female/Male)	14/11	4/3	0.649
Age (years)	23.4 ± 8.84	27.1 ± 6.1	0.411
Body mass index (kg/m2)	25.1 ± 6.75	23.4 ± 7.59	0.880
Hemoglobin A1c (%)	11.1 ± 2.66	8.68 ± 1.07	0.051
Duration of Diabetes (years, mean rank)	17.9	11.3	0.102
Continuous Glucose Monitoring (yes/no)	16/9	4/3	0.535
Insulin pump user (yes/no)	2/23	0/7	0.605
Cardiovascular disease (yes/no	0/25	0/7	1
Hypertension (yes/no)	3/22	0/7	0.464
Chronic pulmonary disease (yes/no)	5/20	2/5	0.489
Cerebrovascular disease (yes/no)	1/24	0/7	0.781
Malignancy (yes/no)	0/25	0/7	1
Thyroid disease (yes/no)	5/20	1/6	0.606
Celiac disease (yes/no)	4/21	2/5	0.394
C0VID-19 severity			0.0001
Mild	25	2	
Mild to moderate	0	4	
Severe	0	1	
Critical	0	0	
Creatinine	99.9 ± 27.2	57.2 ± 10.1	0.288
Estimated glomerular filtration rate (eGFR)	123 ± 65.9	139 ± 37.7	0.224
Chronic kidney disease (CKD)			0.131
CKD I	15	7	
CKD II	9	0	
CKD IIIa, IIIb, IV	0	0	
CKD V	1	0	
Death (yes/no)	0/25	0/7	1

Table 3 Demographic and clinical variables associated with hospitalization among COVID-19 patients with type 1 diabetes