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ORIGINAL ARTICLE

Prevalence of Diabetes Mellitus and Impaired Glucose Tolerance in Patients with Covid-19

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ABSTRACT

Objective: The aim of this study is to determine the prevalence of diabetes mellitus and impaired glucose tolerance in patients with COVID-19.

Study Design: Cross-sectional study

Place and Duration: Conducted at department of Medicine, Khyber Teaching Hospital (KTH),Peshawer and Avicenna Teaching Hospital, Lahorefor the duration from July 2020 to December 2020.

Methods: There were one hundred and fifteen patients of both genders had coronavirus disease were included in this study.Patients ranged in age from 25 to 80 years.After obtaining informed written permission, we collected detailed demographic information on all of the registered patients, including their age, gender, BMI, educational attainment and place of residence. All of the patients had their blood tested for corona disease using RT-PCR. After screening positive (fasting capillary glucose >100 mg/dl and 200 mg/dl) and each sixth consecutive negative (fasting capillary glucose <100 mg/dl) subjects, the 75-g oral glucose tolerance test was administered. The SPSS 23.0 software was used for analyzing of data.

Results: Included patients had mean age 59.4±12.55 years with mean body mass index 29.12±11.76 kg/m^2. There were 70 (60.9%) male patients and 45 (38.1%) females. Majority of the patients were illiterate 65 (56.5%) and 49 (42.6%) patients were from urban areas. Most common co-morbidities were hypertension, hyperlipidemia, chronic kidney disease and coronary artery disease. We found 62 (53.9%) patients had diabetes mellitus in which majority of the cases were pre-existing. Frequency of impaired glucose tolerance was found among 26 (22.6%) cases in which majority of the cases had pancreatic cancer. 28 (24.4%) cases had intubation. Overall mortality was found among 18 (15.3%) cases.

Conclusion: This research found that people with diabetes and poor glucose metabolism are more likely to have severe Covid-19. A previously undiagnosed symptom of primary infection has been linked to a disorder in glucose metabolism. Pathways through which SARS-CoV-2 affects glucose metabolism must be investigated if disease aetiology is to be fully understood.

Keywords: Coronavirus, DM, IGT, Co-morbidities, Mortality

INTRODUCTION

Until the last century, diabetes mellitus was thought of as an extremely unusual medical ailment in the continent's medical community. A distinct image, on the other hand, has emerged from epidemiological research conducted in the 1990s. Among African-Americans, Afro-Caribbeans, and African migrants in Europe, all of whom share genetic heritage with Africans of colour, type 2 diabetes is prevalent [2]. Those of African descent residing in Western nations are more likely to develop diabetes and associated long-term problems than people of European descent living there. Diabetes mellitus is on the rise in Africa because of a worldwide trend toward the adoption of Western lifestyles [3,4]. Non-communicable illnesses are becoming a greater burden in Africa, which is causing one of the world's fastest demographic and epidemiological shifts in recent history. It has been difficult to have a long-term view of the disease's burden and preventative initiatives because of a lack of data on diabetes in Africa [5]. Population expansion, ageing, urbanisation, and rising rates of obesity and inactivity all contribute to an increase in the number of persons with diabetes [6]. Non-communicable illness epidemiological studies are uncommon in Africa, and more data on the incidence of these diseases in this part of the globe is needed. Rational planning and efficient resource allocation need accurate estimates of diabetes prevalence and prevalence among those who are diabetic. [7]

The first SARS-CoV-2-associated atypical pneumonia patients were discovered in December of this year. On March 11th, 2020, the World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a pandemic due to the virus's fast spread around the world. Clinical signs of COVID-19 range from moderate upper respiratory tract symptoms and asymptomatic infection to respiratory collapse and death, which need special care and hospitalisation. One of the most common causes of severe acute respiratory syndrome (SARS) in humans is the SARS-CoV-2 virus, which has 82% homology with the human SARS virus and is contained in an envelope of proteins adorned with lipid bilayers (SARS).[8]

Angiotensin-converting enzyme 2 (ACE2)[9] is the primary entrance receptor for SARS-CoV-2 in human cells, and it is abundantly expressed in lung alveolar cells, cardiac myocytes, vascular endothelium, and other cell types. [9] respiratory droplets contaminated with virus are the primary vector for SARS-CoV-2 transmission in

humans. [10] Patients with COVID-19 often have symptoms 5–6 days after contracting the illness. Although symptoms of SARS-CoV-2 infection are modest for two weeks on average, they may lead to a systemic inflammatory response syndrome (SIRS), acute respiratory distress syndrome (ARDS), multiple organ involvement, and even shock, much as SARS and MERS-CoV, respectively. At high risk of COVID-19 or mortality is a group of patients with a number of criteria including advanced age and male sex; they also have underlying health concerns such cardiovascular disease, diabetes mellitus and/or obesity. [11] (T2DM). [12,13] Many patients admitted to ICUs with COVID-19 had underlying cardiovascular disease and diabetes mellitus, according to early research. [14,15] The presence of diabetes mellitus as a COVID-19 risk factor above and beyond advanced age is presently unclear in patients with T2DM, which is often an old condition.

Patients with coronavirus illness were the primary focus of this population-based investigation, which sought to identify the prevalence of diabetes and impaired glucose tolerance.

MATERIAL AND METHODS

This cross-sectional study was conducted at department of Medicine, Khyber Teaching Hospital (KTH),Peshawerand Avicenna Teaching Hospital, Lahorefor the duration from July 2020 to December 2020. The study was comprised of 118 patients f both genders had COVID-19 infection. After obtaining informed written permission, we collected detailed demographic information on all of the registered patients, including their age, gender, BMI, educational attainment, and place of residence. Pregnant females and patients did not provide any written consent were excluded from this study.

Patients ranged in age from 25 to 80 years. The glucose oxidase technique was used with a portable electronic blood glucose monitor to rapidly determine the fasting blood glucose concentration in capillary blood from a finger puncture. Capillary glucose was measured two hours after an oral glucose tolerance test in those with fasting capillary glycemia (FCG) 100 mg/dl or > 200 mg/dl (positive screening test) (second phase of the study). The glucose load test was administered to every sixth person who tested negative (FCG 100 mg/dl) on the first screening. Diabetes mellitus was presumed in those who had been previously diagnosed and in those whose fasting or two-hour capillary glycemia was 200 mg/dl or above. Two-hour capillary glycemia below 140 mg/dl and over 200 mg/dl was termed impaired glucose tolerance (IGT), whereas FCG below 140 mg/dl was regarded normal glucose tolerance. Those people with a systolic blood pressure (SBP) of 140 mmHg and a diastolic blood pressure (DBP) of 90 mmHg or lower were regarded to be hypertensive. Those with a BMI of 18.5 to 24.9 were deemed normal, while those with a BMI of 25 to 29.9 were termed obese.The SPSS 23.0 software was used for analyzing of data.

RESULTS

Mean age was 59.4±12.55 years with mean body mass index 29.12±11.76 kg/m^2. There were 70 (60.9%) male patients and 45 (38.1%) females. Majority of the patients were illiterate 65 (56.5%) and 49 (42.6%) patients were from urban areas. (table 1)

Table 1: Baseline characteristics of enrolled cases

Variables	Frequency	Percentage
Mean age (years)	59.4±12.55	
Mean BMI (kg/m^2)	29.12±11.76	
Gender		
Male	70	60.9
Female	45	38.1
Education Status		
Yes	50	43.5
No	65	56.5
Place of Living		
Urban	49	42.6
Rural	66	57.4

Most common co-morbidities were hypertension, hyperlipidemia, chronic kidney disease and coronary artery disease.(fig 1)

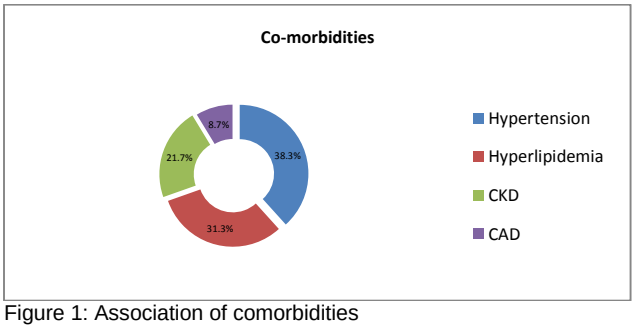

Figure 1: Association of comorbidities

We found 62 (53.9%) patients had diabetes mellitus and impaired glucose tolerance was found among 26 (22.6%) cases.(fig 2)

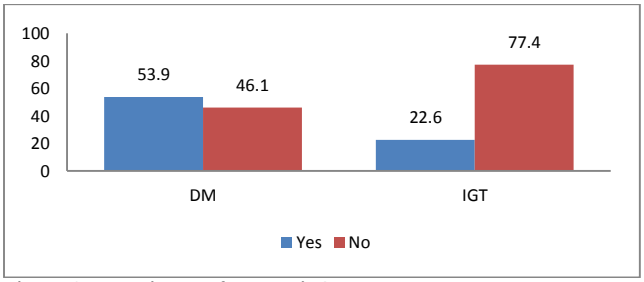

Figure 2: Prevalence of DM and IGT

Severity of disease found among 72 (62.6%) cases in which most of the cases had diabetes mellitus 45 (39.1%) patients and 25 (21.7%) cases had IGT.(table 2)

Table 2: Severity of disease among cases

Variables	Frequency	Percentage
Severe		
Yes	72	62.6
No	53	37.4
Cause		
IGT	25	21.7
DM	35	39.1
Non	1	0.9

Among 62 cases of DM, mostly were obese or overweight had BMI >25kg/m^2. Pancreatic cancer among IGT cases were found among 16 cases.(table 3)

Table 3: Type of patients among DM and IGT cases

Variables	Frequency	Percentage
DM >30kg/m^2		
Yes	58	93.4
No	4	6.6
IGT (Pancreatic Cancer)		
Yes	16	61.5
No	10	38.5

28 (24.4%) cases had intubation. Overall mortality was found among 18 (15.3%) cases.(table 4)

Table 4: Prevalence of mortality and intubation

Variables	Frequency (115)	Percentage
Intubation		
Yes	28	24.4
No	87	75.6
Mortality		
Yes	18	15.3
No	97	84.7

DISCUSSION

Risk factors for severe Covid-19 in SARS-2-CoV patients must be identified in order to guide clinical choices about patient management. First-hand accounts from nations affected by the epidemic demonstrated a substantial link between older age and death risk. [16,17] It has been shown that people with hypertension, obesity and diabetes had a higher risk of developing severe Covid-19 compared to those without these co-morbid diseases. Managing the clinical course of Covid-19 in critically unwell patients and furthering our knowledge of the disease's aetiology would benefit greatly from this study's results.

In this cross-sectional study 115 cases of both genders with coronavirus disease were included. Included patients had mean age 59.4±12.55 years with mean body mass index 29.12±11.76 kg/m^2. There were 70 (60.9%) male patients and 45 (38.1%) females. Majority of the patients were illiterate 65 (56.5%) and 49 (42.6%) patients were from urban areas. These results were comparable to the previous some studies.[18,19] Most common co-morbidities were hypertension, hyperlipidemia, chronic kidney disease and coronary artery disease. COVID-19 has an early impact on diabetic individuals with elevated glucose levels, which is a risk factor. The condition of the pancreas might deteriorate as a result of an elevated glucose level. SARS-CoV-2 infection in diabetics and non-diabetics differed significantly, according to a number of independent studies. Researchers found that diabetic people had an increased risk of 79% compared to those without diabetes. [21.22]In our study 62 (53.9%) patients had diabetes mellitus and impaired glucose tolerance was found among 26 (22.6%) cases.

Overall mortality was found among 18 (15.3%) cases. COVID-19 and mortality are both increased in diabetics with poor glycemic control. HbA1c (> 86 mmol/mol) may be regarded a risk factor for death in diabetic individuals with COVID-19 [23]. According to a retrospective investigation, the death rate was found to be 41.7% in patients with hyperglycemic disorders. COVID-19 patients who had poor glycemic control or hyperglycemia were more likely to die in the hospital [24]. In individuals with severe COVID-19, diabetic ketoacidosis or hyperglycemia may soon cause mortality. To put it another way, when patients cease using glucose-lowering medicines, there is an increased risk of the SARS virus adhering and spreading throughout their bodies, which may lead to the worsening of their metabolic syndrome.

Severity of disease found among 72 (62.6%) cases in which most of the cases had diabetes mellitus 45 (39.1%) patients and 25 (21.7%) cases had IGT.28 (24.4%) cases had intubation.A direct link between alterations in glucose metabolism and host immunity is not expected to explain the emergence of severe Covid-19 in these individuals. AIDS or lupus-related immune dysregulation disorders have not been seen in Covid-19 patients as yet. We haven't observed any Covid-19 patients with lymphoma that is currently active, either. SARS-CoV-2 infection is related with physiological alterations in glucose metabolism, which may allow the virus to reproduce more effectively, as seen by these findings.Among 62 cases of DM, mostly were obese or overweight had BMI >25kg/m^2. Pancreatic cancer among IGT cases were found among 16 cases. More over half of the Covid-19 patients who were extremely unwell were diabetic, with mean BMIs of more than 30 and the majority of them had increased blood glucose levels. [26]

CONCLUSION

This research found that people with diabetes and poor glucose metabolism are more likely to have severe Covid-19. A previously undiagnosed symptom of primary infection has been linked to a disorder in glucose metabolism. Pathways through which SARS-CoV-2 affects glucose metabolism must be investigated if disease aetiology is to be fully understood.

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