



FREQUENCY OF DIABETES MELLITUS IN PATIENTS WITH COVID-19 INFECTION

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Abstract:

Objective: The current study aims to determine the frequency of diabetes mellitus in patients with COVID-19 infection.

Methodology: Our cross-sectional study was conducted on 120 patients who presented with COVID-19 to Dr. Ziauddin Hospital, North Nazimabad, Karachi, from December 2021 to May 2022. The frequency of diabetes in these patients was determined.

Results: In this study, the mean age of the patients recorded was 53.72 ± 10.42 years. Frequency of diabetes was 37 (30.8%). Diabetes was significantly associated with hypertension, ischemic heart disease, and chronic kidney disease.

Conclusion: The frequency of diabetes in COVID-19 patients in our study was 37 (30.8%). Diabetes was significantly more common in patients with comorbidities such as hypertension, ischemic heart disease, and chronic kidney disease. We recommend proper management of diabetic patients with COVID-19 infection as it can lead to a fatal manifestation of the disease.

Keywords: Diabetes, COVID-19, Hypertension, Ischemic heart disease, Pandemic

Introduction:

The coexistence of diabetes mellitus and COVID-19, two global health crises, has drawn significant attention in the medical community. The intersection of these two diseases has raised complex questions and challenges for healthcare professionals, researchers, and policymakers^{1,2}

The reasons for this heightened vulnerability are multifaceted, involving both biological and social determinants. Immunological Dysregulation Diabetes, particularly type 2 diabetes, is associated with impaired immune function^{3,4}. This compromised immune response can hamper the body's ability to effectively combat viral infections like COVID-19. It is thought that hyperglycemia, a hallmark of diabetes, can weaken the immune system's response to pathogens, making patients more susceptible to severe infections⁵. Inflammation and Cytokine Storm COVID-19 is known to induce a phenomenon referred to as a cytokine storm, characterized by an overproduction of inflammatory molecules. In individuals with diabetes, this inflammatory response can be exacerbated, leading to a

more aggressive and damaging immune reaction. This heightened inflammation may contribute to the increased severity of COVID-19 in diabetic patients⁶.

Endothelial Dysfunction Both COVID-19 and diabetes affect endothelial cells, which line blood vessels. In individuals with diabetes, there is often endothelial dysfunction, which can lead to vascular complications⁷. SARS-CoV-2 can directly infect these cells, further compromising vascular health. The interplay of diabetes-induced endothelial dysfunction and COVID-19's direct impact on the endothelium could contribute to the increased risk of blood clotting and cardiovascular complications seen in co-infected patients⁸. Many diabetics rely on medications, to manage their condition. Early in the pandemic, there were concerns about whether these medications could increase susceptibility to COVID-19 or worsen outcomes¹⁰⁻¹².

As the world continues to grapple with both diabetes and the COVID-19 pandemic, it is imperative to prioritize public health measures, access to healthcare, and research efforts to address the needs of individuals at the intersection of these two diseases. By doing so, we can hope to mitigate the adverse outcomes faced by diabetic patients during the COVID-19 pandemic and improve their overall health and well-being.

MATERIAL AND METHODS:

Our cross-sectional study was conducted on 120 patients aged between 35 and 70 years of either gender presenting with COVID-19 from December 2021 to May 2022 after obtaining ethical clearance from the hospital. All the patients were subjected to polymerase chain reaction for confirmation of COVID-19. Patients were labeled diabetic based on an oral glucose tolerance test (OGTT) if fasting plasma glucose ≥ 126 mg/dl or 2-hour plasma glucose ≥ 200 mg/dl during OGTT. Patients' demographics and comorbidities were recorded on predesigned pro forma for data collection.

Data was analyzed using IBM SPSS 20. Age was as mean and standard deviation. Gender, diabetes, and comorbidities were presented as frequencies and proportions. The chi-square test was applied to assess the association between diabetes and comorbidities. P value < 0.05 was considered significant.

RESULTS:

We conducted this study on 120 COVID-19 patients. The mean age recorded was 53.72 ± 10.42 years. Male patients were 70 (58.3%) while 50 (41.7%) were female. Frequency of diabetes was 37 (30.8%). Regarding the comorbidities, hypertension was the leading comorbidity found in 25% of patients, ischemic heart disease was found in 14.2% of patients, chronic kidney disease was found in 8.3% of patients, and lung disease was seen in 5 (4.2%) patients. In our study we observed a statistically significant association of diabetes with hypertension ($P = 0.0001$), ischemic heart disease ($P = 0.0001$), and chronic kidney disease ($P = 0.03$). However, we did not find an association between diabetes and lung disease ($P = 0.65$).

Figure 1 Gender distribution

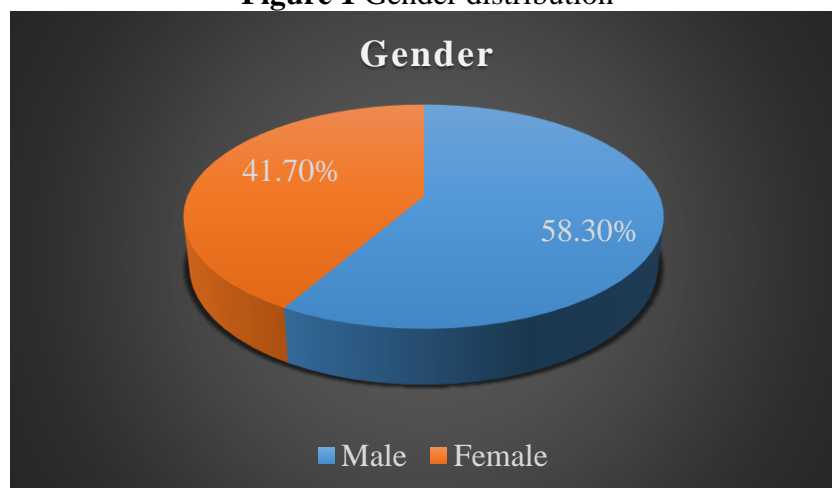


Table 1: Frequency of diabetes

Diabetes	Frequency	Percent
Yes	37	30.8
No	83	69.2
Total	120	100.0

Table 2: Association of diabetes with comorbidities

Comorbidities		Diabetes				P value
		Yes		No		
		N	%	N	%	
Hypertension	Yes	23	62.2%	7	8.4%	0.0001
	No	14	37.8%	76	91.6%	
Ischemic heart disease	Yes	13	35.1%	4	4.8%	0.0001
	No	24	64.9%	79	95.2%	
Chronic kidney disease	Yes	6	16.2%	4	4.8%	0.03
	No	31	83.8%	79	95.2%	
Lung disease	Yes	2	5.4%	3	3.6%	0.65
	No	35	94.6%	80	96.4%	

Discussion:

COVID-19 has resulted in the infection of over 619 million individuals and the loss of more than 6.6 million deaths. Within a short span of approximately one month after the initial documentation of the initial COVID-19 case, diabetes mellitus emerged as a significant prognostic indicator for unfavorable outcomes in individuals afflicted with COVID-19. In numerous viral pandemics observed in recent decades, individuals with diabetes have consistently exhibited significantly higher susceptibility to catastrophic illness outcomes compared to those without diabetes¹³. During the 2003 pandemic of severe acute respiratory syndrome (SARS), diabetes and hyperglycemia played significant roles in contributing to death associated with SARS. During the influenza A (H1N1) pandemic in 2009, those diagnosed with diabetes exhibited a threefold increase in the likelihood of being hospitalized and a fourfold increase in the likelihood of being admitted to the intensive care unit, in comparison to those without diabetes who contracted the flu¹⁴. In a similar vein, it was shown that individuals afflicted with diabetes exhibited a greater incidence of clinical problems and a markedly elevated mortality risk during the outbreaks of the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012. Nevertheless, it is important to note that none of the previous pandemics have exhibited a degree of worldwide transmission and death that is equivalent to that observed in the case of COVID-19. Although several worldwide catastrophes have indeed arisen, it is worth noting that these illnesses were ultimately contained and eradicated. In contrast, it is anticipated that COVID-19 will persist alongside the human population for an extended duration¹⁵.

Diabetes, in and of itself, has been a longstanding and substantial contributor to the worldwide burden of disease. It is anticipated that the number of individuals living with diabetes will continue to rise, reaching approximately 783 million individuals, or approximately 12.2% of the global adult population, by the year 2045. Multiple studies have documented a substantial incidence of diabetes among individuals afflicted with severe cases of COVID-19 and those who have succumbed to the disease¹⁷. The prevailing body of research indicates that those with diabetes are at a considerably higher risk of experiencing more severe manifestations of COVID-19 and facing a greater likelihood of fatality. The present substantial worldwide illness burden resulting from both COVID-19 and diabetes necessitates recognition of the potential public health implications arising from the convergence of these two epidemics on a global scale. The quantification of the influence that diabetes has on the COVID-19 pandemic is of utmost importance to formulate effective intervention measures for the management of COVID-19 and to alleviate its global illness burden¹⁸.

The proportion of diabetic patients in our study turned out to be 37 (30.8%) in COVID-19 patients. A study reported that the proportion of diabetic patients in their study was 40.2%¹⁹. A Pakistani study showed a higher proportion of diabetic patients in their study 57.7%²⁰. We found a significant

association of diabetes with hypertension, ischemic heart disease, and chronic kidney disease. Our findings are in comparison with the aforementioned study which also reported similar results¹⁹.

Conclusion:

From our study, we conclude that the frequency of diabetes in COVID-19 patients was 30.8%. Diabetes was significantly more common in patients with comorbidities such as hypertension, ischemic heart disease and chronic kidney disease. We recommend proper management of diabetic patients with COVID-19 infection as it can lead to a fatal manifestation of the disease.

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