

PREVALENCE OF MORTALITY IN SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS-2 WITH DIABETES MELLITUS

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Abstract: *The coexistence of Diabetes Mellitus (DM) and COVID-19 has garnered considerable attention due to the elevated prevalence of DM among COVID-19 patients. Understanding the impact of DM on the severity of COVID-19 infections is imperative for effective treatment, given the challenges it poses across various healthcare systems. This study aimed to assess the frequency of Type II Diabetes Mellitus among symptomatic COVID-19-positive individuals and calculate the mortality rate among those diagnosed with Type II Diabetes Mellitus contracting COVID-19. Utilizing a cross-sectional approach, 142 samples were randomly selected for analysis to determine the prevalence of Diabetes Mellitus among individuals diagnosed with COVID-19. The findings revealed that out of the 142 COVID-19-positive individuals tested via RT-PCR, 66.2% were diabetic, while 33.8% were non-diabetic. Among the entire sample, 31% of patients succumbed to the infection, while 69.0% achieved full recovery. Specifically, within the diabetic group, 81.8% experienced mortality, with 59.2% recovering fully, whereas among the non-diabetic group, 18.2% passed away, and 40.8% recovered fully. The highest mortality rate was observed among individuals aged 60-74, comprising 45.1% of the total population under observation. The study underscores the elevated mortality risk associated with COVID-19 among diabetic individuals, with a mortality rate of 25.35%, significantly higher than the 5.63% mortality rate observed among non-diabetic individuals. Notably, the vulnerability to COVID-19 and increased mortality rates were particularly pronounced among individuals aged 45-74, with a notable emphasis on the heightened risk among those aged 60-74. Furthermore, the study found no significant disparity in mortality rates between male and female patients. These findings shed light on the heightened susceptibility of diabetic individuals to severe outcomes of COVID-19 and underscore the importance of targeted interventions and preventive measures, especially among the elderly diabetic population.*

Keywords: COVID-19, Diabetes Mellitus, Type 2, Mortality, Prevalence, SARS-CoV-2

Introduction

The term "COVID-19" denotes coronavirus disease 2019, where "CO" stands for coronavirus, "VI" for virus, and "D" for disease, with "19" signifying the year of its emergence. Coronaviruses (CoVs) are enveloped viruses with a single-stranded, positive-sense RNA genome known to cause respiratory infections in humans (Malik, 2020; Rastogi et al., 2020). In December 2019, an outbreak of diverse interstitial pneumonia cases linked to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified in Wuhan, China, marking the emergence of the COVID-19 pandemic (Mohan and Nambiar, 2020). The World Health Organization (WHO) officially declared COVID-19 a global pandemic on March 11, 2020, due to its rapid and widespread transmission (Zanke et al., 2020). SARS-CoV-2 is the seventh coronavirus known to infect humans, with its origins traced to zoonotic transmission (Singh and Yi, 2021). Initially considered relatively non-pathogenic in humans, coronaviruses gained significant attention following the severe acute respiratory syndrome

(SARS) outbreak in 2002-2003 in Guangdong province, China (Zhu et al., 2020). Subsequently, coronaviruses were recognized as potential threats to human health.

COVID-19 presents unique challenges, particularly for individuals with comorbidities such as diabetes mellitus (DM). Studies have reported a high prevalence of diabetes among individuals with severe COVID-19 infection, raising concerns about the impact of DM on disease severity and outcomes. The angiotensin-converting enzyme 2 (ACE2) receptor, targeted by antihypertensive medications, has facilitated SARS-CoV-2 entry into cells (Davidson et al., 2020; Rath et al., 2021). Additionally, the dysregulation of dipeptidyl peptidase-4 (DPP-4) enzyme activity in individuals with diabetes may contribute to increased susceptibility to COVID-19.

Understanding the mechanisms underlying the association between DM and COVID-19 severity is essential for guiding clinical management and therapeutic interventions. This study aims to investigate the frequency of Type II Diabetes Mellitus among COVID-19-positive individuals

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with symptoms and assess the mortality rate among those with diabetes who contract COVID-19. By elucidating the relationship between DM and COVID-19 outcomes, this research seeks to contribute to the growing body of knowledge on managing comorbidities in the context of the COVID-19 pandemic.

Methodology

This study employed a descriptive cross-sectional design to investigate the prevalence of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection among individuals diagnosed with Diabetes Mellitus. A total of 142 participants were recruited using a random sampling technique from individuals with positive RT-PCR attending Khyber Teaching Hospital in Peshawar, Pakistan. Participants were selected based on their willingness to provide data and consent to participate in the study. Data collection was conducted over four months. Approval for the study was obtained from the institutional review board, and informed consent was obtained from all participants. A structured questionnaire was developed based on a review of relevant literature and previous studies. The questionnaire included demographic information, medical history related to diabetes, and COVID-19 status. Participants' COVID-19 status was assessed through laboratory confirmation using RT-PCR testing. The collected data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0 and Microsoft Excel. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the characteristics of the study population. The prevalence of SARS-CoV-2 infection among individuals with Diabetes Mellitus was estimated, and the findings were presented using tables, graphs, and pie charts to facilitate interpretation and visualization.

Results

A total of 142 participants with positive RT-PCR results were analyzed. The mean age of the study population was 60.21 years - 82 were male, and 60 were female. Table 1 presents the distribution of variables within a sample population of 142 individuals. Among these individuals, 48 (33.8%) were classified as non-diabetics, while 94 (66.2%) were identified as diabetics. Furthermore, the table reveals that out of the total sample, 44 individuals (31.0%) were classified as non-survivors, indicating those who did not survive, while 98 individuals (69.0%) were categorized as survivors. The table provides a clear breakdown of the frequencies and percentages of each variable, offering insight into the prevalence of diabetes and survival outcomes within the studied population.

Table 1: Demographics of the study population:

Variables	Frequency	Percent
Non-Diabetics	48	33.8
Diabetics	94	66.2
Total	142	100.0
Non-survivors	44	31.0
survivors	98	69.0
Total	142	100.0

Table 2 illustrates the distribution of mortality across different subgroups based on variables such as Diabetes Mellitus Type II, age subgroups, and gender. Among individuals with Diabetes Mellitus Type II, 36 out of 94 (38.3%) patients who tested positive for COVID-19 succumbed to the disease, while among those without diabetes, 8 out of 48 (16.7%) patients passed away. Regarding age subgroups, the highest mortality rate was observed among individuals aged 60-74 years, with 20 out of 64 (31.3%) patients succumbing to COVID-19. In contrast, the lowest mortality rate was observed among individuals aged 30-44 years, with only 6 out of 18 (33.3%) patients passing away. Furthermore, among male patients, 22 out of 82 (26.8%) succumbed to the disease, while among female patients, 22 out of 60 (36.7%) passed away. These findings provide insights into the differential impact of COVID-19 mortality across various demographic and clinical subgroups, emphasizing the importance of targeted interventions and risk stratification in disease management.

Table 2 Distribution of mortality in different subgroups:

Variables	Constructs	Death (N)		
		Yes	NO	Total
Diabetes Mellitus Type II	NO	8	40	48
	YES	36	58	94
Age subgroups	30-44 Years	6	12	18
	45-59 Years	10	27	37
	60-74 Years	20	44	64
	Above 74 Years	9	14	23
Gender	Male	22	60	82
	Female	22	38	60

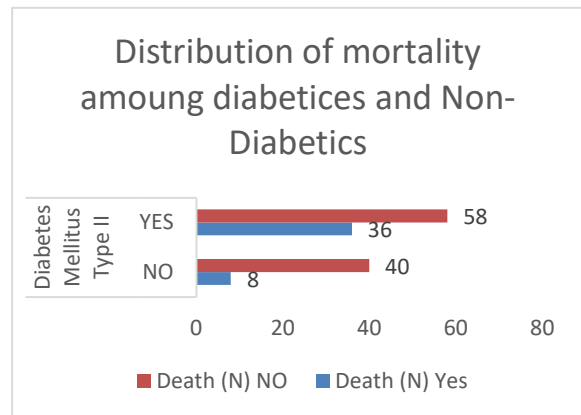


Figure 1: Morality among people with diabetes and Non-Diabetics

Discussion

The findings from our study suggest that patients with diabetes who contract severe COVID-19 exhibit a heightened inflammatory response and are more likely to require mechanical ventilation, leading to a significantly higher mortality rate compared to non-diabetic patients (McElvaney et al., 2020). Our data revealed an alarming mortality rate of 81.8% among diabetic patients with severe COVID-19, contrasting with a mortality rate of 18.2% among non-diabetic patients. These results align with

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previous studies indicating a higher mortality rate among diabetic individuals with severe COVID-19, highlighting the increased vulnerability of this patient population to adverse outcomes (Booth et al., 2021; Lares et al., 2021). Additionally, our study observed a higher proportion of diabetic patients among severe and critical COVID-19 cases, underscoring the elevated risk faced by individuals with diabetes. However, it is noteworthy that patients with and without diabetes exhibited similar severity levels in our study, which may reflect the complex interplay of various factors contributing to COVID-19 severity (Landstra and de Koning, 2021; Ortega et al., 2021; Wu et al., 2020).

Age emerged as a significant risk factor for mortality in our study, with individuals aged 60-74 years showing the highest mortality rate (Farshbafnadi et al., 2021; Ioannidis et al., 2020). This finding is consistent with existing literature indicating that older age is associated with increased susceptibility to severe COVID-19 outcomes. Furthermore, our study aligns with global trends, indicating a substantial proportion of adults at risk for severe COVID-19, particularly among older age groups and those with comorbidities such as diabetes and hypertension (Booth et al., 2021; Navaratnam et al., 2021).

Gender did not appear to significantly influence mortality rates in our study, with similar mortality rates observed among male and female patients. This finding suggests that gender may not be a prominent factor contributing to COVID-19 mortality risk, highlighting the importance of focusing on other risk factors, such as age and comorbidities, in risk stratification and clinical management.

Conclusion

In conclusion, our study underscores the critical need for targeted interventions and preventive measures to mitigate the disproportionate impact of COVID-19 on vulnerable populations, particularly individuals with diabetes and older adults. Comprehensive risk assessment and tailored management strategies are essential for optimizing outcomes and reducing mortality rates in high-risk patient populations. Further research is warranted to elucidate the underlying mechanisms driving the association between diabetes and COVID-19 severity and to inform evidence-based interventions for effective disease management.

Recommendation

COVID-19 is a dangerous disease that can be fatal, especially for older people and those with underlying medical conditions like diabetes. We aim to educate diabetic patients about the virus and how they can protect themselves. Preventive measures like physical distancing, wearing masks, and avoiding crowded places can help lower the risk of infection. Diabetic patients who are already hospitalized need extra precautions to stay safe from the virus. Awareness activities in the media and different seminars need to be arranged to inform the public about such an issue

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

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Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

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Manuscript revisions, critical input.

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Coordination of collaborative efforts.

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Study Design, Review of Literature

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