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Clinical characteristics of COVID-19 among COVID-19 patients with and without Diabetes in the Tertiary Care Center of Birat Medical College Teaching Hospital of Morang District, Nepal

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ABSTRACT

Introduction: The COVID-19 outbreak was declared a global "Public Health Emergency of International Concern (PHEIC)" by the World Health Organization (WHO) in 2020. The epidemiology and clinical characteristics were under investigation among chronic patients with diabetes.

Objectives: This study aimed to determine the clinical characteristics of COVID-19 among COVID-19 patients with diabetes and without diabetes.

Methodology: A single-centered and retrospective study was carried out among 195 consecutive COVID-19 patients. Frequencies, percentages, mean, and standard deviation were determined to describe the characteristics of participants. A Chi-square test was conducted to determine the association between an individual's characteristics and clinical characteristics of COVID-19. All the tests were conducted at a 95% Confidence interval and p-value of less than 0.05.

Results: The mean±SD age was 50.9±14.7 years of 195 participants. Among them, 32.8% of the participants were female. Almost half of the participants (51.8%) had any form of diabetes. Most of the participants (62.6%) had an abnormal body mass index (BMI) and 58.8% of the patients had at least one form of comorbidities. Clinical characteristics such as cough (OR=3.1, CI: 1.4-7.5), Chest pain (OR=3.9, CI: 2.0-7.6), Tachypnea (OR=24.0 (11.3-50.9), Tachycardia (OR=20.3, CI:10.2-30.3), loose stool (OR=4.8, CI:1.8-12.3) were significantly associated among COVID-19 patients with diabetes. Hypertension (93.3%) was the leading comorbidity among COVID-19 patients with diabetes.

Conclusion: Most of the clinical characteristics of COVID-19 are common among COVID-19 patients with diabetes. The findings of this study suggest patients with comorbidities like diabetes and hypertension should be more aware to avoid infectious diseases like COVID-19.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1,2] It is a global concern due to its independent zoonotic transmission and rapid spread.[1] Over the past two years, COVID-19 infections have been increasing worldwide.[2] The World Health Organization (WHO) declared COVID-19 as a "Public Health Emergency of International Concern (PHEIC) worldwide on January 30, 2020.[3] The outbreak of the novel coronavirus was on December 31, 2019, in China.[2] The outbreak of COVID-19 has had a significant impact on global health, the global economy, and the healthcare system of several countries worldwide.[2] Besides, people with chronic diseases such as diabetes, cardiovascular diseases, hypertension, chronic obstructive pulmonary disease, and cancers are at a greater risk of getting COVID-19 infection.[4]

The COVID-19 pandemic has resulted in significant loss of life, economic consequences, and increased poverty.[5] Patients with comorbidities such as diabetes, chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), hypertension, cancer, and HIV are at a higher risk of experiencing severe complications from COVID-19.[4,1] Age difference, sex, BMI and comorbidities like diabetes, hypertension, asthma and other cardiovascular have a significant impact on the progression of COVID-19.[5,6] DM and hypertension are often considered an independent risk factor for infections like COVID-19 and uncontrolled diabetes can lead to serious complications and damage to various organs and systems in the body.[7]

Diabetes is a medical condition that can considerably impact affected persons and society owing to the high costs associated with its care, especially those arising from complications.[5,6] The situation becomes more serious during a pandemic, such as that of COVID-19, as having DM entails a greater risk of extended hospital stay and death.[6] Diabetes patients are more prone to infections due to impaired immune cell function.[6] The prevalence of diabetes mellitus has reached pandemic proportions, with an estimated 463 million adults affected in 2019.[7] It is one of the leading causes of morbidity worldwide and is associated with serious long-term complications such as cardiovascular disease and chronic kidney disease.[8] High plasma glucose levels and diabetes have been identified as independent predictors of mortality and morbidity in patients with severe acute respiratory syndrome (SARS).[1,5,6]

Low and middle-income countries (LMICs) like Nepal had a threat of facing challenges in managing the COVID-19 pandemic, especially among chronic patients.[9] However, the epidemiological characteristics and comorbidities are still under-explored among chronic patients.[9] Furthermore, patients with COVID-19 and diabetes have a worse prognosis with a threefold greater relative risk of developing severe disease and higher mortality compared.[2,6,9,11] This study comprehensively analyzed the clinical characteristics of COVID-19 and its associations among COVID-19 patients with and without diabetes.

METHODOLOGY

Study design and setting

A single-centered and retrospective study was carried out in the COVID-19 ward of Birat Medical College Teaching Hospital, Morang district. During the COVID-19 pandemic, this hospital was categorized as a referral hospital for treating COVID-19 patients.

Study population and sampling

The study population consisted of confirmed COVID-19 cases admitted to the COVID-19 ward of Birat Medical College Teaching Hospital. A consecutive sampling method was adopted to collect the data. A total of 195 diagnosed cases of COVID-19 who were admitted to the COVID-19 ward of Birat Medical College Teaching Hospital, were only included in this study.

COVID-19 patients who were aged 18 years or above were included in this study. Laboratory confirmed i.e. real-time PCR COVID-19 were included in this study. COVID-19 patients who were not admitted to the COVID-19 ward were not taken. Physically disabled patients such as speech problems, mental problems, communication problems, severe COVID-19 patients, and participants not being able to respond were not considered in this study.

Tools and techniques

A structured tool was derived from the study conducted by Alshukry Y et al. in 2021.[9] We reviewed the clinical records of all 195 diagnosed COVID-19 patients. We collected information regarding age, sex, height, weight, chronic medical history (hypertension, chronic obstructive pulmonary disease, pulmonary tuberculosis, heart failure, ischemic heart disease, and chronic kidney disease), clinical features (fever, cough, shortness of breath, chest pain, tachypnea, tachycardia, and loose stool), and history of smoking and alcoholism were taken from medical records of patients. Participants with a BMI 18.5-24.9 kg/m^2 were classified as normal and a BMI less than 18.5 or greater than 25 were classified as abnormal in this study. [12]

Data management and analysis

All the collected information was systematically compiled, cleaned, and coded before exporting to Statistical Package for the Social Sciences (SPSS) version 24 for analysis. Univariate analysis was performed using frequency, percentages, mean and standard deviation to determine the characteristics of individuals. A Chi-square test was conducted to determine the association between an individual's characteristics and clinical characteristics of COVID-19 among diabetic and non-diabetic COVID-19 patients. All the tests were conducted at a 95% Confidence interval and p-values of less than 0.05 were considered statistically significant.

Ethical approval

The Institutional Review Committee (IRC) of Birat Medical College Teaching Hospital, Morang district reviewed and approved this study [Reference IRC Approval Code: 173]. Both

verbal and written consent were taken from all the participants after delineating the objectives of this study. The information of each individual was kept confidential and anonymous during the study period.

RESULT

Social and demographical characteristics of the participants

A total of 195 participants were included in this study. The mean ± SD age was 50.9 ±14.7 years. Among them, 67.2% were male and 51.8% were having any forms of diabetes. On taking the history of participants, we found that the majority of the participants (57.4%) were current smokers and about one-third of them were involved in alcohol drinking. Participants with abnormal BMI compared to those with normal BMI were 62.6% vs 37.4%, respectively. In this study, 58.8% of the patients had at least one form of comorbidities, among them, hypertension (93.3%) was the leading comorbidity. (Table 1)

Table 1: Social and demographical characteristics of the participants

Characteristics	Number (n)	Percentage (%)
Age (Mean±SD)	50.9±14.7	
Less than or equal to 50	93	47.7
Greater than 50	102	52.3
Sex		
Female	64	32.8
Male	131	67.2
Diabetes		
Yes	101	51.8
No	94	48.2
Current smoker		
Yes	112	57.4
No	83	42.6
Current alcohol drinking		
Yes	60	30.8
No	135	69.2
Body Mass Index		
Abnormal (below 18.5 and above 24.9)	122	62.6
Normal (18.5-24.9)	73	37.4
Comorbidities		
Having at least one comorbidity	114	58.8
Hypertension	112	93.3
Thyroid	2	1.7
Pulmonary tuberculosis	1	0.8
Chronic kidney disease	2	1.7
COPD	1	0.8
Heart failure	1	0.8
Ischemic Heart Disease	1	0.8

Association between clinical COVID-19 features with diabetes and non-diabetes status among COVID-19 patients

Table 2 shows that the majority of COVID-19 patients who had diabetes (65.3%) were from the higher age group, while 61.7% of the COVID-19 patients without diabetes were from the lower age group. In our study, 66.3% of the COVID-19 patients with diabetes were current smokers and one-third (35.6%) were involved in alcohol drinking. Majority of the participants had abnormal BMI among diabetes and non-diabetes (62.4% vs 62.8%).

Table 2 demonstrated COVID-19 patients with diabetes were significantly associated with cough (OR= 3.1, CI: 1.3-7.5), chest pain (OR=3.9, CI: 2.0-7.6), tachypnea (OR=24.0, CI: 11.3-50.9), tachycardia (OR=45.5, CI: 9.1-45.5) and loose stool (OR= 4.8, CI: 12.3). This study revealed, hypertension was the most associated comorbidity with COVID-19 patients with diabetes (100%) as compared to non-diabetes (11.8%) followed by other comorbidities.

Table 2: Association between clinical COVID-19 features with diabetes and non-diabetes status among COVID-19 patients

Characteristics	Diabetes (n=101)	Non-Diabetes (n=94)	P-value	Odds ratio at 95% CI
	n (%)	n (%)		
Age (in years)				
≤ 50	35 (34.7)	58 (61.7)		
Above 50	66 (65.3)	36 (38.3)		
Sex				
Male	69 (68.3)	62 (66)	0.7	0.8 (0.4-1.6)
Female	32 (31.7)	32 (34)		
History				
Smoking	67 (66.3)	45 (47.9)		
Alcohol drinking	36 (35.6)	24 (25.5)		
Body Mass Index				
Normal	38 (37.6)	35 (37.2)	0.9	1.0 (0.5-1.8)
Abnormal	63 (62.4)	59 (62.8)		
Symptoms				
Cough	93 (92.1)	74 (78.7)	0.008	3.1 (1.3-7.5)
Fever	86 (85.1)	78 (83)	0.700	1.1 (0.5-2.5)
Chest pain	45 (44.6)	16 (17)	0.000	3.9 (2.0-7.6)
Tachypnea	84 (83.2)	16 (17)	0.000	24.0 (11.3-50.9)
Tachycardia	69 (68.3)	9 (9.6)	0.000	20.3 (10.2-30.3)
Loose stool	25 (24.8)	6 (6.4)	0.001	4.8 (1.8-12.3)
Comorbidities				
Hypertension	101 (100)	11 (11.8)	0.001	7.8 (2.3-12.5)
Thyroid	0 (0)	2 (2.2)		

Chronic Obstructive Pulmonary Disease	0 (0)	1 (1.1)		
Pulmonary tuberculosis	0 (0)	1 (1.1)		
Chronic Kidney Disease	0 (0)	2 (2.2)		
Ischemic Heart Disease	1 (1)	0 (0)		
Heart failure	0 (0)	1 (1.1)		

DISCUSSIONS

This retrospective study was conducted among 195 COVID-19 patients who were admitted in the COVID-19 ward. The purpose of this study was to determine the clinical difference regarding signs and symptoms of COVID-19 among COVID-19 patients with diabetes and non-diabetes.

Consistent with the findings of other studies, this study also demonstrated that COVID-19 patients with diabetes had clinical symptoms such as cough, tachycardia, tachypnea, and loose stool.[1,7,9] This study revealed prevalence of diabetes was higher among COVID-19 patients of a higher age group. This is due to the senior age group having a high prevalence of comorbidities like diabetes, hypertension, cardiovascular disease, chronic lung disease, chronic kidney disease, and liver disease.[5] Another reason can be, with the increase in age, these groups are at a greater risk of getting infectious diseases due to their low immunity.[5,11]

COVID-19 patients with diabetes had odds of 3.1 times higher for cough than their counterparts with non-diabetes indicating a higher prevalence which is similar to the study conducted in Iran. [7] In contrast to our study, a conducted in China had no association with cough among COVID-19 patients with diabetes. [13] This study showed that chest pain was significantly associated with COVID-19 patients having diabetes which is similar to previous similar studies.[11]

Our study revealed that cough, chest discomfort, tachypnea, tachycardia, and loose stools were more common in COVID-19 patients with diabetes.[7,9,13] It is due to the chest pain initially associated with dry cough, later on, productive cough leads to chest pain and tachypnea with difficulty in breathing, and heart rate was higher in patients with COVID-19, during observation in the COVID-19 ward.[1,6,8,2,14] These symptoms were common among COVID-19 patients with diabetes which is consistent with the previous studies conducted in Kuwait, global and regional study. [8,9] This study found that the prevalence of hypertension was the leading comorbidity and was significantly associated with COVID-19 patients with diabetes. It can be due to diabetes and hypertension are the major comorbidities that are associated with many chronic diseases like CVDs.[5,6]

CONCLUSION

This study reported COVID-19 patients with diabetes were more likely to have clinical symptoms such as fever, chest pain, difficulty in breathing, and diarrhea compared to non-diabetic patients. COVID-19 patients with diabetes have a higher prevalence of comorbidity like hypertension which suggests these populations should be targeted for early diagnosis and treatment when suffering from COVID-19 and another infectious disease to prevent critical condition.

Strengths and limitations of the study

This study was conducted during the peak of the COVID-19 pandemic so the findings are generalizable with other studies. This study provides additional evidence to the limited literature explored on COVID-19 and chronic disease.

The limitation of the study was that it is difficult to include a large number of COVID-19 patients with higher BMI due to the fear of infection and nationwide lockdown. Besides, this study was limited to including COVID-19 patients with comorbidities like COPD, Asthma, chronic kidney disease, and ischemic heart disease that influence the prognosis of COVID-19.

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CONFLICT OF INTEREST

There is no conflict of interest.

FINANCIAL DISCLOSURE

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