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ASSOCIATION OF DIABETES MELLITUS AND HYPERTENSION WITH MORTALITY IN PATIENTS HOSPITALIZED WITH ACUTE CORONARY SYNDROME AND POSITIVE COVID-19.

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ABSTRACT

OBJECTIVE: To determine the Association of diabetes mellitus and hypertension with mortality in patients hospitalized with acute coronary syndrome and positive Covid-19. **MATERIAL AND METHODS:** An hospital based prospective observational study was conducted in the department of Cardiology, Isra University Hospital, Hyderabad for a period of one year from from 1st March 2021 to 28th February 2022. All the adult males and females, admitted with ACS and COVID-19 positive, diabetic and hypertensive, and those who consented to participate were included in this study. SPSS version 26.0 was used for data processing and analysis and a p value <0.05 was considered as statistically significant. **RESULTS:** A total of 108 patients were included for final analysis. Hypertensive (61.11%) were more prevalent than diabetics (38.88%). Overall mean age of admitted patients was 54.36±10.68 years. Most of the patients (53.7%) admitted with COVID-19-ACS were improved and discharged to home. In-hospital complications were observed in 37.96% (n = 41) of the patients and unfortunately, 8.33% (n = 9) of the patients died in hospital. In-hospital complications were significantly observed in hypertensive patients (n = 28, 68.29%) while in-hospital mortality was more prevalent among T2 DM patients (n = 6, 66.66%), p 0.001. C**ONCLUSION:** This study concludes that, older patients with diabetes mellitus were more prevalent and T2 DM was associated significantly with in-hospital mortality while hypertension was assocaited with in-hospital complicatios.

KEYWORDS: Acute coronary syndrome, COVID-19, Hypertension, type 2 diabetes mellitus, in-hospital outcome

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INTRODUCTION:

In Pakistan, deadly virus named Corona, derived from Latin word, was diagnosed on 26th February, 2020 and then spread all over the country in few days. This disease not only affecting lungs but if left untreated may complicate to multiple organ failure and even deaths. Due to its higher rates of morbidity and mortality the World Health Organization (WHO) declares it a global emergency[1]. The risk of death and disease related complications may increase to double among patients with hypertension and/or diabetes mellitus.

Hypertension and type 2 diabetes mellitus are the two major risk factor of acute coronary syndrome (ACS) globally and now they are becoming more prevalent in Pakistan too. The prevalence distribution of hypertension from 1990s to 2010 was 19.55% to 35.77% [2]. Similarly, the prevalence of diabetes mellitus in Pakistan has increased from 11.77% in 2016 to 17.1% in 2019[3] The larger scale data obtained from International Diabetes Federation (IDF) has listed the Pakistan as number 01 country with highest number of adults with diabetes mellitus [4]. Patients with type 2 diabetes mellitus are 2-4 folds increased risk of cardiovascular disease than non-diabetics [5] and hypertension has 2-3 folds increased risk of CVD than non-hypertensives[6]. Acute coronary syndrome combined with positive COVID-19 in hypertensives and diabetics may be associated with poor in-hospital outcome, as observed in many other previously published studies[7,8]. But, data is limited regarding the difference between these two risk factors and in-hospital outcome. That is why, this study aims to evaluate the association between hypertension and T2DM among COVID-19 positive ACS patients in our hospital

MATERIAL AND METHODS:

This prospective study was conducted in the Department of Cardiology, Isra University Hospital Hyderabad for a period of one year from 1st March 2021 to 28th February 2022 through a convenient sampling technique. This hospital is a tertiary care hospital and captures population of Hyderabad and all other cities of Sindh. We did not calculated sample size for this study but, enrolled all the patients who met our inclusion & exclusion criteria. Ethical approval from the hospital's ethical review committee was taken before commencement of the study.

Inclusion criteria for this study was, all males and females who presented and admitted in our department with ACS and positive COVID-19, adults (age between 40 years to 80 years), hypertensive, diabetic, and consented to participate in this study. Verbal informed consent was taken from the patients and/or their attendants after explaining no harm and potential benefits of the study. Exclusion criteria for this study was, age less than 40 years (as these patients are least likely to be type 2 diabetic or hypertensive, and may affect the outcome by causing sample selection bias), already had COVID-19 infection, patients who are suffering from disease which may affect their life expectancy (malignancy, end-stage liver, kidney, and/or lung disease), already diagnosed cardiomyopathy or valvular heart disease, pregnant women, and those who had history of CABG/PCI.

Data collection

A detialed questionnaire was made to collect the relevant data. Data regarding baseline and clinical characteristics were collected, inclusing age, gender, area of marital status, body mass index, current smoking history, type of ACS (UA, NSTEMI, and STEMI), cardiac troponin levels, serum creatinine, random blood

sugar, hospital duration of stay, and in-hospital outcome (improved and discharged, in-hospital complications, and death).

Continuous data were analysed as mean±SD and categorical data were analysed as frequencies and percentage. Comparison between the variables were made using student's *t*-test, *chi*-square or fisher's exact test, where appropriate. A p value of <0.05 was considered as statistically signficant.

RESULTS:

A total of 108 patients admitted with ACS and positive COVID-19 infection were selected for final analysis. hypertensive patients were more common than

Most of the patients (53.7%) admitted with COVID-19-ACS were improved and discharged to home. In-hospital complications were observed in 37.96% (n = 41) of the patients and unfortunately, 8.33% (n = 9) of the patients died in hospital. Graph 01. Graph 2 shows

Data analysis:

diabetics, 61.11% (n = 66) and 38.88% (n = 42), respectively. Diabetic patients were older (53.43±5.91) as compared to hypertensive patients (49.02±6.77), p 0.002. Hypertension was more prevalent among female patients (n = 42, 56.75%) and T2 DM was more prevalent among males (n = 32, 43.24%), p >0.05. Smokers were more likely to be hypertensives than diabetics, (n = 21, 61.76%) and (n = 13, 38.23%), p 0.02. STEMI more common among diabetics (n = 14, 58.33%) and NSTEMI was more common in hypertensive patients (n = 36, 61.01%), p . Table 1.

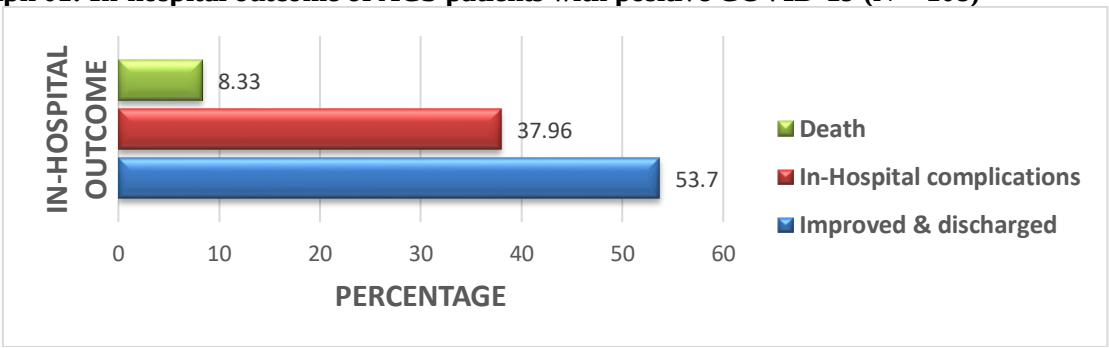
association of DM and Hyperension with In-hospital outcome of patients admitted with ACS and COVID-19 infection. In-hospital complications were significantly observed in hypertensive patients (n = 28, 68.29%) while in-hospital mortality was more prevalent among T2 DM patients (n = 6, 66.66%), p 0.001.

Table 01: Table 01. Baseline and clinical characteristics of patients admitted with ACS and COVID-19 positive (N = 108)

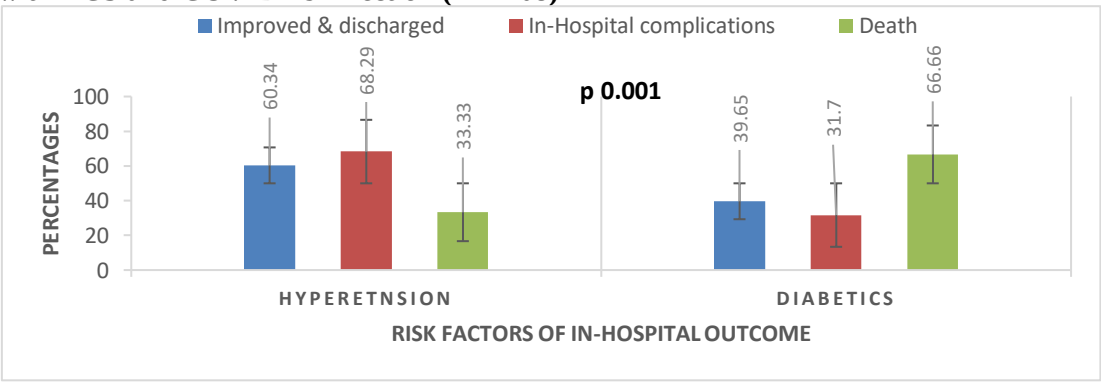
Baseline & clinical parameters	Total	Hypertension	T2 DM	P - Value
	(N = 108)	(N = 66)	(N = 42)	
Age- year	54.36±10.68	49.02±6.77	53.43±5.91	0.002
Weight - kg	84.61±12.87	73.40±14.39	85.22±9.61	0.001
Height - cm	168.53±8.42	172.33±7.54	169.78±66	0.06
BMI - kg/m2	25.08±4.67.2	25.01±3.37	26.48±3.61	0.09
Serum creatinine - mg/dl	1.10±2.61	1.1±4.2.8	1.2±1.5	0.23
Gender				
Male	74 (68.51)	42 (56.75)	32 (43.24)	0.08
Female	34 (34.48)	24 (70.58)	10 (29.41)	
Area of Residence				
Urban	81 (75)	58 (71.60)	23 (21.29)	0.41
Rural	27 (25)	8 (29.62)	19 (17.59)	
Marital Status				
Single	8 (44.44)	6 (75)	2 (25)	0.12
Married	97 (8.81)	58 (53.70)	39 (40.20)	

Widowed	3 (2.77)	2 (66.66)	1 (33.33)	
Cigarette Smoking				
Yes	34 (31.48)	21 (61.76)	13 (38.23)	0.02
Comorbids				
Chronic liver disease	3 (2.77)	1 (3.33)	2 (66.66)	0.1
Chronic kidney disease	2 (1.85)	0 (0)	2 (100)	0.97
COPD	4 (3.70)	3 (75)	1 (25)	0.12
Type of ACS				
UN	25 (23.14)	20 (80)	5 (20)	0.001
NSTEMI	59 (54.62)	36 (61.01)	23 (38.98)	
STEMI	24 (22.22)	10 (41.66)	14 (58.33)	
P value <0.05 is statistically significant				
BMI = Body mass index, UN: Unstable angina, NSTEMI = Non-ST segment elevation myocardial infarction				
STEMI = ST-Segment elevation myocardial infarction				

Graph 01: In-hospital outcome of ACS patients with positive COVID-19 (N = 108)



Graph 02: Association of DM and Hypertension with In-hospital outcome of patients admitted with ACS and COVID-19 infection (N = 108)



DISCUSSION

Diabetes mellitus, hypertension, and COVID-19 infections have been associated with higher rates of morbidity and mortality in patients with acute coronary syndrome as compared to those without these risk factors[9]. Previously conducted studies have shown variable associations of these risk factors on the outcome of ACS and COVID-19[10]. Multiple internatioanl studies have been

conducted and some studies shows poor prognostic outcome in hypertensive ACS and diabetic ACS patients when they were coinfected with COVID-19 but all these studies are still unclear that whether these effects are caused by COVID-19 or not[11,12].

To our knowledge, no such study has been conducted particualry in our area in which asssociation of HTN and DM were assessed in patients admitted with ACS with positive COVID-19. In our study we have observed that most of the patients (53.7%) admitted with ACS and had positive COVID-19 infection were improved and discharged to home. In-hospital complications were observed in 37.96% (n = 41) of the patients and unfortunately, 8.33% (n = 9) of the patients died in hospital. In a study conducted by Rashid R in 2021[13] has shobserved higher rates of mortality (41.9%). The reason could be that our study participants were mainly immunized and their patients possibly could not be immunized or they may have severe coronary artery disease. Another international study conducted by Pourasghari H and colleagues also observed higher rates of mortality in ACS patients during the COVID-19 era[14]. In a national study from a private cardiac hospital of Karachi has observed lower rates (4.2%) of in-hospital mortaltiy among ACS patents admitted during COVID-19 era[15] than our study (9.0%). The lower rates of in-hospital mortality could be because of the enrolment of both COVID-19 positive and negative patients in their study while our study only included COVID-19 ACS patients.

In a general population, diabetes mellitus does not affect mortality in COVID-19 patients[16]. On the other hands, in our study, in-hospital complications were significantly observed in hypertensive patients (n = 28, 68.29%) while in-hospital mortality was more prevalent among T2 DM patients (n = 6, 66.66%), p 0.001. the same findings were observed in previously conducted studies in which hypertensive patients were more likely to have in-hospital complications[17]. Zou M and colleagues in their study did not observe any significant association in COVID-19 patients among patients with ACS[18]. Different studies have observed different outcomes in ACS patients with COVID-19 infection. Our study will provide scientific data for future studies and also to the clinicians to plan their managemnet accordingly.

CONCLUSION

This study concludes that, older patients with diabetes mellitus were more prevalent and T2 DM was associated significantly with in-hospital mortality while hypertension was assocaited with in-hospital complicatios.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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CONFLICT OF INTEREST: No competing interest declared.

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