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Research

ASSOCIATION OF COVID-19 INFECTION IN ACUTE STROKE AND ACUTE CORONARY SYNDROME PATIENTS

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Abstract
Background: Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The resultant inflammatory process due to COVID-19 infection increases the susceptibility to systemic thromboembolic complications. Objectives: 1. To determine the proportion of COVID -19 infection in acute coronary syndrome and acute stroke patients. 2. To determine the association of COVID -19 infection in acute coronary syndrome and acute stroke patients. **Materials and Methods:** After taking approval from the hospital ethics committee, a retrospective study was conducted in the department of Emergency Medicine, KMC Hospital, Ambedkar Circle. Patients who were admitted to the Emergency department with the diagnosis of acute coronary syndrome/acute stroke were retrospectively studied to find out the association of COVID 19 in these patients. **Result:** It was found that about 84.5 % of covid positive patients had Acute Coronary Syndrome and 15.5% had Acute Stroke, however this was not statistically significant (P= 0.09). **Conclusion:** COVID 19 infection has multiple effects on the different organ systems. As thromboembolic events can be life threatening complications, early recognition and treatment of the same along with treatment of the infection could decrease the morbidity and mortality associated with the infection.

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiological agent of coronavirus disease 2019 (COVID-19).[1] The COVID-19 virus, SARS-CoV-2, affects multiple organ systems, especially the lungs and heart. Elevation of cardiac biomarkers, particularly high-sensitivity troponin and/or creatine kinase MB, is common in patients with COVID-19 infection.[2] Proposed mechanisms of myocardial injury include inflammation within the myocardium (due to direct viral infection or cytokine storm), endotheliitis, coronary vasculitis, myocarditis, demand ischemia, plaque destabilization and right ventricular failure.[3] There is mounting evidence that patients affected by the illness may develop clinically significant coagulopathy with thromboembolic complications including ischemic stroke.[4] Early brain imaging showed higher severity large vessel occlusion strokes in patients with COVID-19.[5]

MATERIALS AND METHODS

Study Design: Retrospective hospital based cross sectional study.
Study Location: Department of Emergency Medicine, KMC Hospital, Ambedkar Circle, Mangalore
Study Population: Patients admitted with diagnosis of acute stroke and acute coronary syndrome between the period of April 2020 –November 2020
Study Period: April 2020 -November 2020

Patient Selection
Inclusion Criteria
● Patients admitted with diagnosis of acute coronary syndrome/acute stroke.

Exclusion Criteria
● Patients with diagnosis of a chronic infarct.

56

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Methodology

After taking approval from the hospital ethics committee, a retrospective study was conducted at the department of Emergency Medicine, KMC Hospital, Ambedkar Circle. Patients who were admitted to the Emergency department with the diagnosis of acute coronary syndrome/acute stroke was retrospectively studied to find out the association of COVID 19 in these patients.

Data Analysis

Among the diagnosed acute stroke and acute coronary syndrome patients within the time period of April 2020 -November 2020 the proportion of cases who diagnosed COVID 19 was reported. Graphical representation of proportion of COVID 19 among acute stroke and acute coronary syndrome patients was analysed. Descriptive and inferential statistics has been used to express the results.

RESULTS

This study looked at a total of 764 patients with a diagnosis of acute stroke or acute coronary syndrome. The mean age of the sample was 59.31($\pm$ 11.22) and age ranged from 25-93. It was observed that majority of the affected patients were males (n =584,76.4%) as shown in Graph 1.
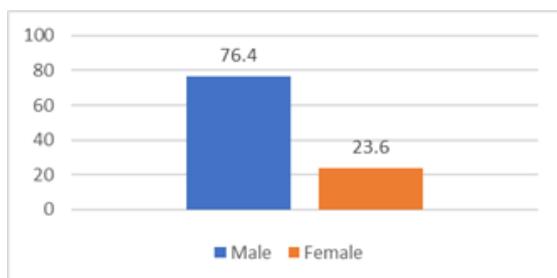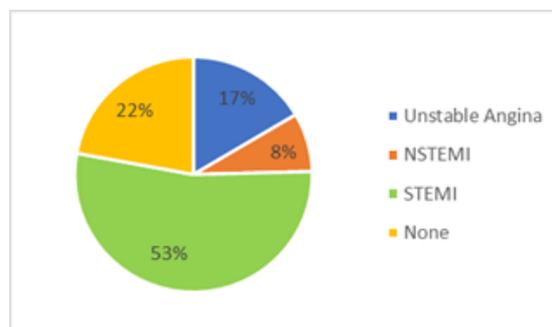

Graph 1: Distribution of study participants according to gender

More than three-fourths of the admissions were due to acute coronary syndrome(n=595,77.9%) while (n=169,22.1 %) was due to acute stroke as shown in Graph 2.
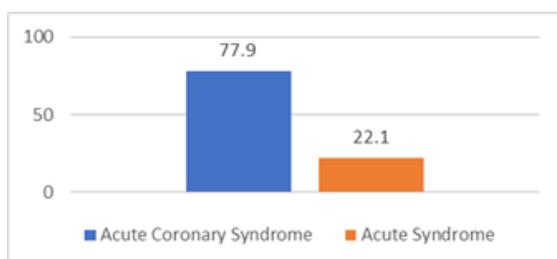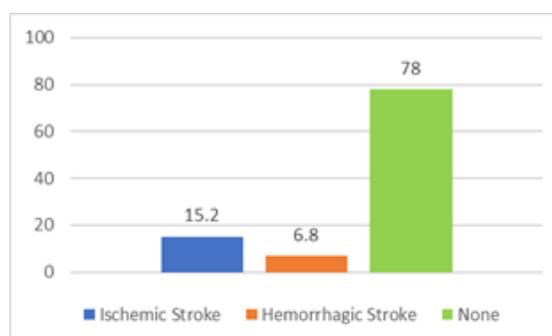

Graph 2: Distribution of study participants according to ACS/AS

Of the 764 patients, 595 presented with acute coronary syndrome, majority had ST Elevation Myocardial Infarction (STEMI) (n=407,53%), followed by unstable angina (n=126,17 %) and Non-STEMI (62,8%) as shown in Graph 3 and 169 had acute stroke, out of which majority had ischaemic stroke(n=116,15.2%) and others had hemorrhagic stroke (n=53, 6.8%) as shown in Graph 4.

Graph 3: Distribution of study participants according to USA/NSTEMI/STEMI

Graph 4: Distribution of study participants according to types of stroke

Out of 764 patients, 13% have hypertension (n=100),13% have diabetes mellitus(n=97) and 19 % have both (n=149) and 55% (n=418) found to have none of the above comorbidities as shown in Graph 5.
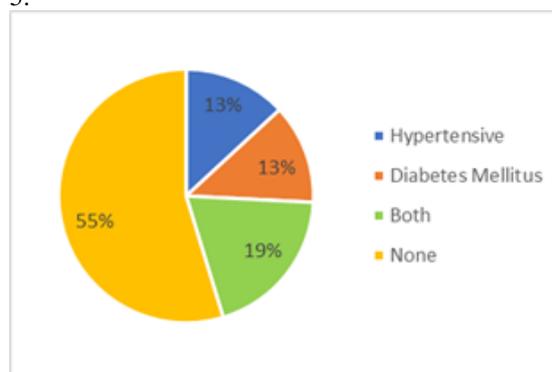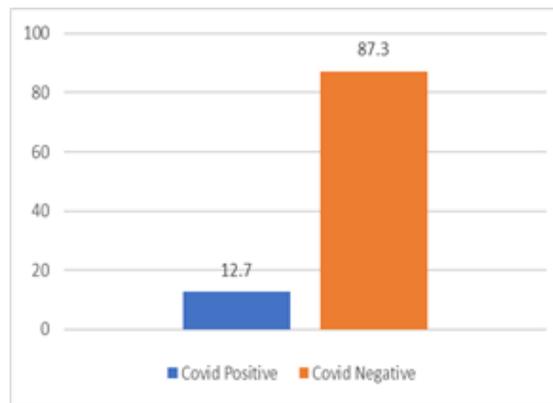

Graph 5: Distribution of study participants according to co-morbidities

Graph 6: Distribution of study participants according to COVID positive/negative

COVID test done was positive in patients (n = 97,12.7%) and negative in patients (n =667, 87.3%) as shown in Graph 6.

Table 1: Association between covid positive and ACS/AS

	Acute Coronary Syndrome	Acute Stroke	Total	P value
Covid positive	82 (84.5)	15 (15.5)	97 (100)	P = 0.09
Covid negative	513 (76.9)	154 (23.1)	667 (100)	NS
Total	595 (77.9)	169 (22.1)	764 (100)	

Level of significance at P < 0.05　　　　　　　　　　NS-not significant using Chi-Square test

It was found that about 84.5 % of covid positive patients had Acute Coronary Syndrome and 15.5% had Acute Stroke, however this was not statistically significant (P = 0.09) as shown in Table 1.

Table 2: Association between COVID positive and USA/NSTEMI/STEMI

	USA	NSTEMI	STEMI	None	Total	P value
Covid positive	11 (11.3)	14 (14.4)	57 (58.8)	15 (15.5)	97 (100)	P = 0.018*
Covid negative	115 (17.2)	48 (7.2)	350 (52.5)	154 (23.1)	667 (100)	
Total	126 (16.5)	62 (8.1)	407 (53.3)	169 (22.1)	764 (100)	

Level of significance at P < 0.05　　　　　　　　*Statistically significant using Chi-Square test at P < 0.05
USA-Unstable Angina; NTEMI-Non ST Elevated Myocardial Infarction; STEMI-ST Elevated Myocardial Infarction.

It was found that about 58.8 % of covid positive patients with Aute Coronary Syndrome had STEMI and 15.5% of covid positive patients did not have any of USA/NSTEMI/STEMI and this was statistically significant (P = 0.018) as shown in Table 2.

Table 3: Association between COVID positive and strokes

	Ischemic Stroke	Hemorrhagic Stroke	None	Total	P value
Covid positive	10 (10.3)	5 (5.2)	82 (84.5)	97 (100)	P = 0.248
Covid negative	106 (15.9)	47 (7)	514 (77.1)	667 (100)	NS
Total	116 (15.2)	52 (6.8)	596 (78)	764 (100)	

Level of significance at P < 0.05　　　　　　　　　　NS-not significant using Chi-Square test

It was found that majority of covid positive patients had neither ischemic nor hemorrhagic stroke and about 10.3% of covid positive patients had ischemic stroke. However, this was not statistically significant (P = 0.24) as shown in Table 3.

Table 4: Association between COVID positive and co-morbidities like hypertension and Diabetes

	Hypertension	Diabetes Mellitus	Both	None	Total	P value
Covid positive	7 (7.2)	8 (8.2)	18 (18.6)	64 (66)	97 (100)	P = 0.06
Covid negative	93 (13.9)	89 (13.3)	131 (19.6)	354 (53.1)	667 (100)	NS
Total	100 (13.1)	97 (12.7)	149 (19.5)	418 (54.7)	764 (100)	

Level of significance at P < 0.05　　　　　　　　　　NS-not significant using Chi-Square test

Overall, our study could not prove any association of Acute Coronary Syndrome /Acute Stroke in COVID positive patients. However, it was found that majority (58.8%) of covid positive patients had STEMI (P = 0.018).
In addition, not significant does not mean that the event did not happen clinically, it implies that the event was not statistically significant.

DISCUSSION

SARS-CoV-2, is a positive-sense single-stranded RNA. SARS-CoV, COVID-19 infection can lead to life-threatening condition. Due to wide geographic impact and affecting an extremely high proportion of the world population it was defined by the World Health Organization as a global public health pandemic.[1]

This study is a hospital base retrospective study conducted to find out the association of COVID-19 infection with acute coronary syndrome and acute stroke. The study was conducted to assess the thromboembolic effects of COVID 19 infection in cardiovascular and central nervous system.

Predomination of males over females were observed among the study population. It was observed that majority of the affected patients were males (n =584,76.4%). The mean age of the sample was 59.31(± 11.22).

In our study, most of the patients with acute coronary syndrome presented with symptoms of chest pain or breathlessness. ECG / 2 D ECHO screening was done for all patients.

Acute stroke patients mostly presented with symptoms of unilateral or bilateral limb weakness or numbness, facial deviation, seizures and some presented with giddiness. MRI Brain stroke protocol was done for all the patients. Most of the patients had ischemic stroke, some patients had hemorrhagic stroke, mostly intracerebral bleed.

The test of association performed between COVID - 19 infection and acute coronary syndrome and acute stroke (p =0.24) yielded non-significant probability values. However, it was found that majority (58.8%) of covid positive patients had STEMI.

In a study conducted by Aaron Rothstein et al. Acute Cerebrovascular Event in COVID-19 Patients, 844 hospitalized patients with COVID-19, 20 had confirmed ischemic stroke; and 8 had intracranial hemorrhage.[6] A retrospective study by Oxley et al., 2020, data from the COVID-19 outbreak in Wuhan, China, showed that the incidence of stroke among hospitalized COVID-19 patients was approximately 5%.[7]

A study conducted by Daniel Modin et al. in which, 5,119 patients diagnosed with COVID-19 were included in the analysis. Forty-four patients received a diagnosis of ischemic stroke, and 18 received this diagnosis during the 14-day risk interval. Seventeen patients received a diagnosis of AMI, and four received this diagnosis during the 14-day risk interval.[8]

This study couldn't find any significant association of acute coronary syndrome/acute stroke in COVID-19 patients. This can be attributed to a smaller sample size in our study. Nonetheless, the study helped in recognizing the thromboembolic complications and the need for further evaluation in COVID 19 infected patients to prevent such complications.

CONCLUSION

COVID 19 infection has multiple effects on the different organ systems. As thromboembolic events can be life threatening complications, early recognition and treatment of the same along with treatment of the infection could decrease the morbidity and mortality associated with the infection.

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