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General Medicine

PREVALENCE OF COMORBIDITIES AND THEIR IMPACT ON MORTALITY IN COVID-19 PATIENTS - A CROSS SECTIONAL STUDY IN A TERTIARY CARE COVID HOSPITAL.

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ABSTRACT
BACKGROUND: Since the origin of novel corona virus (COVID-19) in December 2019, it engulfed more than 200 countries worldwide within short time and was declared as pandemic by WHO. Even though the overall fatality rate is low in COVID-19, presence of certain risk factors and comorbidities more likely result in severe disease and subsequent mortality. **METHODOLOGY:** Retrospectively we evaluated the details of total 200 COVID-19 patients from the medical records. These 200 patients include two groups. Each group consisted of 100 patients. One group consisted 100 patients who were discharged successfully after recovery from COVID-19. Second group consisted 100 patients who demised during hospital stay with COVID-19. We have studied prevalence of comorbidities and their impact on mortality in these two groups in relation to gender, severity. This was a cross sectional study of COVID-19 patients admitted from 01-04-2020 to 31-05-2020 (period of two months) in our state COVID tertiary care hospital, Vijayawada, Andhra Pradesh. **RESULTS:** There was no statistically significant association between presence of comorbidities and gender in relation to mortality. There was statistically significant association between presence of comorbidities and severity of disease. The association of comorbidities and mortality was statistically significant. **CONCLUSION:** Patients with COVID-19 who have comorbidities are more likely to have severe disease course, rapid progression, increased need for admission in ICU and mortality.

KEYWORDS : COVID-19, Comorbidities, Mortality.

INTRODUCTION:

After its origin in December 2019, COVID-19 in China, has become pandemic with in short span of time. Clinical manifestations of COVID-19 are heterogeneous. Main target organ of COVID-19 is respiratory system. Although overall fatality rate is low in COVID-19, older adults and patients with comorbidities are more likely to have severe disease and subsequent mortality.[1] Most common non-communicable diseases that predict poor prognosis in COVID-19 include Diabetes mellitus, Hypertension, Cerebrovascular disease, coronary artery disease, chronic obstructive pulmonary disease, and Chronic Kidney disease.

In a study it was documented that 20-51% of patients were reported as having at least one comorbidity, with diabetes (10-20%), hypertension (10-15%), and other cardiovascular and cerebrovascular diseases(7-40%) being most common.[2] It was noted that presence of any comorbidities was associated with a 3.4 fold increased risk of developing ARDS.[2]

Individuals with preexisting cardiometaboic disorders tend to have worse prognosis through infection course. Patients without comorbidities had lower case fatality rate (0.9%), while those with cerebrovascular diseases, diabetes and hypertension had higher case fatality rates(10.5%, 7.3%, 6.5% respectively).[3]

COVID-19 patients having comorbidities emerged as vulnerable population at risk for death from Indian data. India has a huge burden of non-communicable diseases which will drive mortality. In COVID-19 patients, the underlying comorbidities will increase RAS(Renin angiotensin system) , which will predispose them to cytokine storm, which further triggers increased mortality.[4]

The objective of our study is to study the prevalence of comorbidities and their impact on mortality in COVID-19 patients managed in our state tertiary care COVID hospital.

MATERIALS AND METHODS:

This is a retrospective cross-sectional study, from the medical records of COVID-19 patients admitted during period of two months from 01-04-2020 to 31-05-2020 in tertiary care State COVID hospital, Vijayawada, Andhra Pradesh.

We analyzed two groups of patients. One group consisted of 100 patients who demised during hospital course. The other group consisted of 100 patients who survived and discharged successfully. We studied three issues in these two groups. One is prevalence of comorbidities gender wise in two groups. Second one is relation of presence of comorbidities to disease severity. Third one is presence of comorbidities and their impact on mortality in two groups.

Inclusion Criteria:
- Individuals above 18 years.
- RT-PCR positive for COVID-19.
- Association of comorbidities.

Exclusion Criteria:
- RT-PCR negative for COVID-19.
- Children.
- Pregnant women.
- Absence of comorbidities.

DATA COLLECTION:

Medical records of 200 patients were analyzed. This included details of 100 patients who demised during hospital course and details of 100 patients who survived and discharged. Details of gender, disease severity and comorbidities were taken for both groups of patients. The diagnostic criteria were followed as per the guidelines laid down by the National institute of virology, Pune. Disease severity as mild, moderate and severe were classified as per the norms given by Ministry of Health and Family Welfare, Government of India.

STATISTICAL ANALYSIS:

Data was tabulated in Microsoft excel sheets. All the variables related to gender, disease severity, comorbidities were kept in tabulated form. P values were used to assess statistical significance.

RESULTS:

Medical records of total 200 COVID-19 patients consisting two groups of demised and survived, with 100 in each group, who were admitted during period of two months i.e. from 01-04-2020 to 31-05-2020, were analyzed.

Most common comorbidities found in our study were Diabetes mellitus, Hypertension, Chronic kidney disease (CKD) and Chronic liver disease.

Table-1 comorbidities in both groups

Comorbidities	Demised group (n)	Discharged group (n)
Diabetes plus hypertension	24	20
CAD	15	10
CKD	10	-
Old PTB	5	5
CVA	2	4
Prostate cancer	2	-
AML	2	-
Oral cancer	-	2
CLD	10	-
Only DM	5	20
Only HTN	4	15

There was male preponderance in COVID-19 infection and it was applicable for both demised and survived groups.

Table-2 Gender wise details

Gender	Demised group(n)	Discharged group(n)	Total(n)
Males	74	68	142
Females	26	32	58
Total	100	100	200

P value =0.34 (statistically not significant)
69% patients in demised group had severe disease, while only 14% in survived group had severe form of disease.

Table-3 severity of disease versus outcome

Severity	Demised group(n)	Discharged group(n)	Total(n)
Mild	17	60	77
Moderate	14	26	40
Severe	69	14	83
Total	100	100	200

P value is <0.05. statistically significant.
More severe was the disease, higher was the mortality.

85% of demised group had comorbidities, while only 70% of survived group had comorbidities.

Table-4 comorbidities versus outcome

Comorbidities	Demised group(n)	Discharged group(n)	Total(n)
Present	85	70	155
Not present	15	30	45
Total	100	100	200

P value is 0.01, statistically significant.
Presence of comorbidities was associated with increased mortality.

DISCUSSION:

Our study showed male preponderance in COVID-19 infection, irrespective of outcome status. 69% of demised group had severe disease, while only 14% in the survived group had severe disease. Mortality was low in mild and moderate disease groups. Comorbidities were more in the demised group than in the survived group.

Guan et al in their study of 1590 cases, reported that prevalence of comorbidities was as Hypertension 16.9%, cardiovascular disease 3.7%, cerebrovascular disease 1.9%, Diabetes 8.2%, Hepatitis B 1.8%, COPD 1.5%, CKD 1.3%, Malignancy 1.1% and Immunodeficiency 0.2%. At least one comorbidity was noted in severe cases than in non-severe cases (32.8% versus 10.3%). Patients having at least one comorbidity were older (mean age 60.8 years versus 44.8 years). Of 1590 cases males were more affected than females who were only 42.7%. [5]

Guan et al reported that compared with those with non-severe disease, those with severe disease had a higher prevalence of Hypertension (13.4% versus 23.75%), Diabetes mellitus (5.7% versus 16.2%), CAD (1.8% versus 5.8%), COPD (0.6% versus 3.5%) and cerebrovascular disease (1.2% versus 2.3%). [6]

Innate immunity, the first line of defense is inevitably compromised in patients with uncontrolled Diabetes mellitus, leading to uncontrolled proliferation of pathogen in host. [1]

Exaggerated cytokine response even in the absence of immune stimulation is characteristic of Diabetes mellitus. [7]

Leading comorbidities among COVID-19 deaths as reported by State department of Health, New York were as Hypertension 55.4%, Diabetes 37.3%, Hyperlipidemia 18.5%, CAD 12.4%, Renal disease 11.0%, Dementia 9.1%, COPD 8.3%, Cancer 8.1%, Atrial fibrillation 7.1%, and Heart failure 7.1%.

India has a high burden of Non-communicable diseases (NCDs), especially Obesity, Hypertension, Diabetes, Heart diseases, which will drive mortality in COVID-19 patients.

Indian COVID risk score has been declared consisting of parameters as, Age >55 years, male gender, Hypertension, Diabetes, Obesity, Chronic heart diseases, COPD/Asthma/Chronic lung disease, CKD, Chronic liver disease, Congenital/acquired immunodeficiency, Corticosteroids/immunosuppression/transplant recipients. [4] Higher the risk score, severity and mortality likely to be high. This risk score can be used to stratify the patients and to follow the treatment protocol accordingly.

Studies indicate that obese individuals are more likely to develop severe disease and adipose tissue acts as pathogen reservoir. In Diabetes constant glucose recognition by C-type lectin receptors leads to enhanced inflammatory process. Presence of comorbidities in COVID-19 patients leads to uncontrolled release of pro-inflammatory cytokines and unbalanced and overactive immune response, resulting in cytokine storm phenomenon. [8]

Individuals with respiratory infections and sepsis had reduced vitamin D levels. Vitamin D modulates immune system and plays important role in the control of cardio metabolic diseases. [9]

CONCLUSION:

India is second most populous country in the world with diabetes and hypertension prevalence of 7.3% and 28.9% respectively. Individuals with cardiometabolic diseases are more prone to COVID-19 infection due to dysregulated immune response. COVID-19 patients having comorbidities are at high risk of severe disease as well as high mortality. In view of aggressive nature of COVID-19 in presence of comorbidities, it is essential to stratify the patients with comorbidities, so that early and aggressive treatment of COVID-19 can be planned, there by mortality and morbidity can be reduced significantly, in these patients.

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