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A STUDY OF COMORBIDITIES IN ASSOCIATION WITH COVID-19 POSITIVE PATIENTS.

General Medicine

Dr. Nilima K. Shah	Professor and Head of Unit, Department of Medicine, B.J. Medical College, Civil Hospital, Ahmedabad.
Dr. Kamlesh J Upadhyay	Professor and Head of Department, Department of Medicine, B.J. Medical College, Civil Hospital, Ahmedabad.
Dr. Vishwakarma Nirali Rakeshkumar*	Senior Resident, Department of Medicine, B.J. Medical College, Civil Hospital, Ahmedabad. *Corresponding Author
Dr. Umeshkumar Solanki	Assistant Professor, Department of Medicine, B.J. Medical College, Civil Hospital, Ahmedabad.
Dr. Vatsal H. Mehta	Senior Resident, Department of Medicine, B.J. Medical College, Civil Hospital, Ahmedabad.
Dr. Yash Chaudhary	Senior Resident, Department of Medicine, B.J. Medical College, Civil Hospital, Ahmedabad.

ABSTRACT

Background: Many researchers have noted the higher mortality rate of COVID-19 infections in subjects with comorbidities such as hypertension, cardiovascular disease, obesity, diabetes, and cancer. Further predisposing conditions are chronic kidney disease, chronic lung diseases like asthma, neurological conditions like dementia, liver diseases, solid organ transplant, chronic respiratory disease, Down syndrome, immunocompromised individuals, autoimmune diseases, those on long term steroid and immunomodulatory treatment and alcohol consumption. **Method:** This study was a cross sectional analytical study conducted on Covid-19 Positive inpatients at Medicine Department, CHA from September 2020 to August 2021. **Result:** Comparison was done between patients with comorbidities(group A) and without co-morbidities(group B) and it was found that presenting complaints like sputum production and dysnoea as well as severity of the disease was more in group A patients. Biochemical parameters such as (S. creatinine (mg/dL) and D-Dimer (µg/l)), duration of hospital Stay (day) were found statistically significant between the two groups($p<0.0001$). Higher severity of disease and mortality rate was found in group A. **Conclusion:** As a conclusion, pneumonia-like symptoms were seen by a broad population worldwide as a result of SARS-CoV-2, and individuals with comorbidities are particularly at risk of contacting the virus. Higher mortality risks were associated with co-infected individuals with COVID-19, including those who have HTN and IHD. However, other comorbidities like diabetes, diseases of the lower respiratory tract, and problems with the liver and kidneys may further aggravate the severity of COVID-19. As our study was carried out during early phase of pandemic comordity like mucormycosis was not observed in our patients. The comorbid people must take diligent precautions like vaccination and other personal protective equipments to safeguard themselves throughout the pandemic.

KEYWORDS

COVID-19, Comorbidities.

INTRODUCTION:

A public health emergency of international concern occurred due to an pandemic of COVID-19 which began in china in December 2019. The novel virus was first identified in an outbreak in the Chinese city of Wuhan in December 2019. The World Health Organization (WHO) declared the outbreak a public health emergency of international concern on 30 January 2020, and a pandemic on 11 March 2020. [1,2]

COVID-19 transmits when infectious particles are breathed in or come into contact with the eyes, nose, or mouth. The risk is highest when people are in close proximity, but small airborne particles containing the virus can remain suspended in the air and travel over longer distances, particularly indoors. Transmission can also occur when people touch their eyes, nose or mouth after touching surfaces or objects that have been contaminated by the virus. People remain contagious for up to 20 days and can spread the virus even if they do not develop symptoms.Testing methods for COVID-19 to detect the virus's nucleic acid include real time reverse transcriptase polymerase chain reaction (RT-PCR), transcription mediated amplification and reverse transcription-loop mediated isothermal transcription (RT-LAMP) from a nasopharyngeal swab. Several COVID -19 vaccines have been approved and distributed in various countries, which have initiated mass vaccination campaigns. Other preventive measures include physical or social distancing, quarantining, ventilation of indoor spaces, use of fce masks and coverings in public, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. While work is underway to develop drugs that inhibit the virus, the primary treatment is symptomatic. Management involves the treatment of symptoms through supportive care, isolation, and experimental measures.

The clinical manifestations of COVID-19 are heterogeneous. The clinical feature of COVID-19 are varied, including asymptomatic infection, mild upper respiratory tract infection, sever viral pneumonia complicated by respiratory failure, and even death. The most common clinical symptoms include fever, dry cough, anosmia, ageusia, sore throat, fatigue, sputum production, dyspnea. Some patients with covid-19 can rapidly progress to acute respiratory distress syndrome. [3] On admission 20-51% of patients reported as having at least one of the comorbidity, such as diabetes (10-20%), HTN(10-15%) and other cardiovascular and cerebrovascular diseases (7-40%) being most common.[4] Previous studies have showed that the presence of any comorbidity has been associated with a 3.4 fold increased risk of developing acute respiratory distress syndrome in infected patients.[5] A recent meta-analysis reported that underlying disease, including hypertension, diabetes, respiratory and cardiovascular diseases as well as obesity may be risk factors for adverse outcomes.[6,7] So further studies of comorbidities as a risk of fatality at different communities are required.[8] Although previous studies have shown that comorbidities are a risk factor for severity and mortality in patients with covid-19, the specific impact of each comorbidities on patients with different types of COVID-19 had been rarely reported.

The vaccination drive in India was given in various phases. During the phase 1 which started from September 2020 all healthcare and frontline workers (police, paramilitary forces, sanitation workers, disaster management workers) were included. In phase 2 from March 2021 all people with age >60 years and people with comorbities in age group >45 years were included. In april 2021 vaccination was given to all people with age >45 years. Phase 3 from May 2021 all adults >18 years were included and in august 2021 expanded to include >12 years.

Our present study describes the relationship between comorbidities and clinical outcomes of COVID-19 that plays an important role in the clinical diagnosis, treatment, and prevention of COVID-19.

Study Design:
This study was a cross sectional analytical study conducted on Covid-19 Positive inpatients at Medicine Department, CHA from September 2020 to August 2021. The study was conducted after the Institutional Ethics committee's approval on the indoor patient.

Subject Selection:
- Inclusion Criteria: All patients of > 18 years of age admitted with covid-19 pneumonia (RAT/RTPCR confirmed) at tertiary care center who gave consent.
- Exclusion Criteria: Patients of <18 years age and pregnant females and those who have not given consent.
- Sample Size: 100 Patients

Study Process:
Epidemiological, clinical, laboratory and radiological characteristic data of patients were obtained with standardized data collection. The data included age, gender, addiction status, comorbidity (diabetes, hypertension, obesity, cardiovascular disease, chronic kidney disease, cerebrovascular accident, chronic liver disease,COPD,etc.), disease onset time (self reported the start of either fever or cough during epidemiological investigation), inflammatory markers and biochemical parameters severity of the disease as mild, moderate or severe, radiological parameters, hospital stay, outcome and comparison between patients with comorbidities and without comorbidities were studied. Among the patients included in study many were having one or more comorbidities. The study included people with comorbidities group A (n=71) and people without comorbidities group B (n-29).

Statistical Analysis:
Continuous variables were expressed as mean with standard deviation and were compared between the groups by the student 't' test. Categorical variables were expressed as number (%) and compared by chi-square (v2) test or Fisher's exact test as appropriate. All statistical analyses were performed using the IBM SPSS 22.0 software. The significance level of the hypothesis tests was set at 0.05 (two-sided). We followed case management, testing, tracing and treatment according to the guidelines of government of India and updated time to time.

RESULTS:

Table 1: Age Wise Distribution

Age (yrs)	No of patients(n=100)
18-30	1 (1%)
31-40	6 (14%)
41-50	20 (20%)
51-60	38 (38%)
61-70	28 (28%)
>70	7 (7%)
Total	100 (100%)
Mean age (yrs)	56.53 ± 10.31

In the present study, out of 100 COVID-19 pneumonitis, 38% were in age group of 51-60 years followed by 28 (28%) of patients were in 61-70 years age group,20(20%) in 41- 50 years, 7(7%) among >70 years, 6(6%) among 31-40 years, 1(1%) among 18-30 years age group. Moreover, the lowest age affected by COVID-19 pneumonitis was 26 years old, while highest was 78 years with mean age of 56.53 ± 10.31years.

Table 2: Gender Wise Distribution

Gender	
Male	65(65%)
Female	35(35%)
Total	100 (100%)
M:F Ratio	1.85:1

In the present study, it was found that 65 (65%) of male COVID-19 pneumonitis were predominantly higher then female COVID-19 pneumonitis 35(35%). Moreover, the male: female ratio was found 1.85:1.

In the present study, many patients have more than one comorbidities. COVID-19 Pneumonitis patients were having Co-Morbidities like HTN in 52 (52%) then DM in 29(29%) and CAD in 19(19%) of patients, while CKD in 13% of patients, CLD in 9% of patients, COPD in 7 % of patients.

Table 3: Co-morbidities

Co-Morbidities	
HTN	53 (53%)
DM	29 (29%)
Obese (BMI>30)	25(25%)
CAD	19(19%)
CKD	13(13%)
CLD	9 (9%)
COPD	7(7%)
CVA	5 (5%)

Table 4: Clinical Presentations

Clinical presentation	
Fever	83 (83%)
Cough	76(76%)
Dyspnoea	64(64%)
Sputum	25 (25%)
Chest Pain	22 (22%)
Fatigue	16(16%)
Sore Throat	15 (15%)
Bodyache	14(14%)
Anosmia	11 (11%)
Ageusia	11 (11%)
Abdominal Pain	9 (9%)

In the present study, many patients had more than one symptom. Fever was commonest clinical presentation in 80 (80%) of patients then cough in 73(73%), dyspnoea in 64(64%), sputum in 25(25%), chest pain in 22(22%), fatigue in 16(16%), sore throat in15(15%), bodyache in 14(14%), anosmia in 11(11%), aguesia in 11(11%), abdominal pain in 9(9%) of patients.

Table 5: Severity Wise Distribution

Severity	
Mild	14 (14%)
Moderate	53(53%)
Severe	33(33%)
Total	100 (100%)

In the present study, COVID-19 Pneumonitis patients were categorized by severity of symptoms as mild 13 (13%), moderate 53 (53%) and severe 33(33%)

Table 6: Addiction

Addiction	No.	Percentage(%)	No. Of Patients With Severe Covid-19
Smoking	27	27%	7
Alcohol	15	15%	5
Both	5	5%	3

In the present study, 27 (27%) patients were smoker, 15(15%) patients were alcoholic and 5 (5%) were both smoker and alcoholic. 7(7%) among 27 smokers, 5(5%) among 15 alcoholic patients and 3(3%) among both alcoholic and smokers were having severe covid-19 pnenumonitis.

Table 7: Laboratory Investigations

LABORATORY PARAMETERS	
Hb (gm/dL)	12.24 ± 2.24
Total Count (*10^3/cmm)	8.88 ± 4.47
Platelet (*10^3/cmm)	217.11 ± 76.41
SGOT (U/L)	61.63 ± 59.69
SGPT (U/L)	41.51 ± 28.44
S. Creatinine (mg/dL)	0.99 ± 0.28
PT/INR	1.19 ± 0.17
CRP (mg/dL)	770.41 ± 665.84
D-Dimer (ng/l)	11.75 ± 8.04
LDH (IU/L)	284.95 ± 117.86
IL6 (pg/mL)	94.16 ± 49.33
Ferritin (µg/L)	308.34 ± 144.35

In the present study it was found that CBC, LFT and RFT were found in normal median range while biomarkers like CRP, D-dimer, IL6 were

found abnormally higher with CRP in mean value of 770.41 ± 665.84, D-dimer in mean value of 11.75 ± 8.04 and IL6 in mean value of 94.16 ± 49.33.

Table 8: Radiological Investigations

Radiological investigation	
Chest X ray · Normal · Unilateral lung involvement · Bilateral lung involvement	 18 (18%) 38 (38%) 44 (44%)
CT Score	11.91 ± 3.97

In the present study, bilateral lung zone involvement was in 44 (44%) patients more than unilateral involvement and normal 38 (38%) and 18 (18%) respectively. Moreover, the mean CT score were found as 11.91 ± 3.97.

Table 9: Hospital Stay

Parameters	With co-morbidities Group A(n=71)	Without co-morbidities Group B(n=29)
Hospital stay (days)	6.92 ± 3.04	5.55 ± 1.40
Survived	58	29
TOTAL=87		
Expired	13	0
TOTAL=13		

In present study, hospital stay were slightly higher in patients with co-morbidities with mean value of 6.92 ± 3.04.

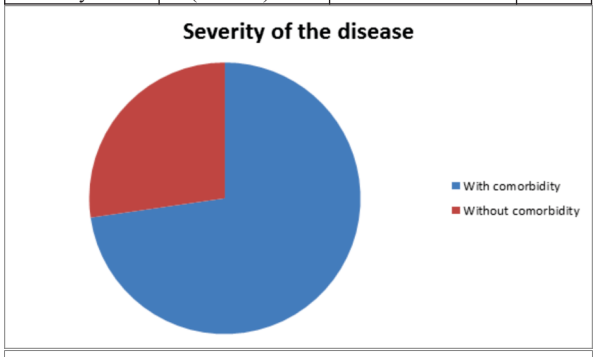
Table 10: Outcome

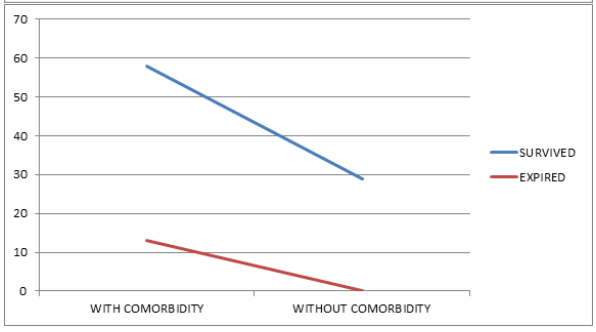
Outcome			total
	With co-morbidities	Without co-morbidities	
Survived	58	29	87(87%)
Expired	13	0	13(13%)

In present study, mortality was 13% among patients with co-morbidities and 0% in patients without co-morbidities.

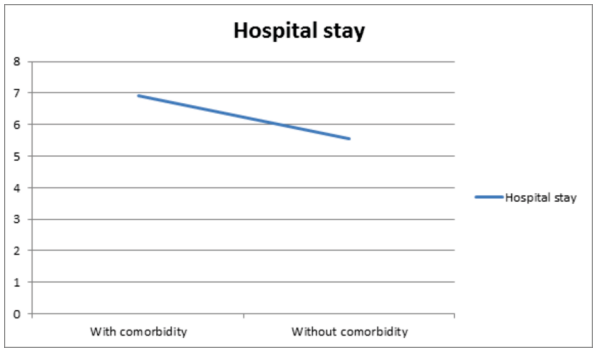
Table 11: Comparison Between Patients With Co-morbidities And Without Co-morbidities

	Patients with co-morbidities(n=71) (group A)	Patients without co-morbidities(n=29) (group B)	P value
Mean Age (yrs)	56.11 ± 10.12	57.62 ± 10.39	0.504
Gender Male Female	 46 (64.78%) 25 (35.21%)	 19 (65.51%) 10 (34.48%)	0.943
Clinical manifestations Fever Cough Dyspnoea Sputum Chest Pain Fatigue Sore throat Bodyache Anosmia Ageusia Abdominal pain	 57 (80.28%) 56 (78.87%) 51 (71.83%) 22 (30.98%) 17 (23.94%) 12 (16.96%) 11 (15.49%) 10 (14.08%) 8 (11.26%) 8 (11.26%) 8 (11.26%)	 26 (80.28%) 20 (68.96%) 13 (44.82%) 3 (10.34%) 5 (17.24%) 4 (13.79%) 4 (13.79%) 4 (13.79%) 3 (10.34%) 3 (10.34%) 1 (3.44%)	 0.258 0.192 0.013 0.031 0.463 0.700 0.829 0.550 0.894 0.894 0.215
Severity Mild Moderate Severe	 9 (12.67%) 38 (53.52%) 24 (33.80%)	 5 (17.24%) 15 (51.72%) 9(31.03%)	 0.832 0.174 0.028
Biochemical Parameters Hb (gm/dL) TC (*10^3/cmm) Platelet (*10^3/cmm) SGOT (U/L) SGPT (U/L) S. Creatinine (mg/dL) PT/INR D Dimer (µg/l)	 12.20 ± 2.20 8.91 ± 4.54 224.34 ± 78.67 65.69 ± 67.40 42.82 ± 30.96 1.05 ± 0.28 1.19 ± 0.17 878.14 ± 717.78	 12.36 ± 2.39 8.82 ± 4.39 199.41 ± 68.64 51.68 ± 33.06 38.34 ± 21.19 0.87 ± 0.24 1.20 ± 0.18 506.66 ± 421.91	 0.755 0.927 0.140 0.289 0.478 0.003 0.808 0.011
CRP (mg/dL) LDH (IU/L) IL6 Ferritin	11.78 ± 7.48 281.65 ± 114.80 89.44 ± 47.71 306.08 ± 142.73	11.69 ± 9.40 293.05 ± 126.76 105.73 ± 52.13 313.88 ± 150.66	0.956 0.663 0.135 0.808
CT Score	12.11 ± 4.05	11.41 ± 3.82	0.418
Hospital Stay (days)	6.92 ± 3.04	5.55 ± 1.40	0.023
Mortality	13 (18.30%)	0	<0.0001

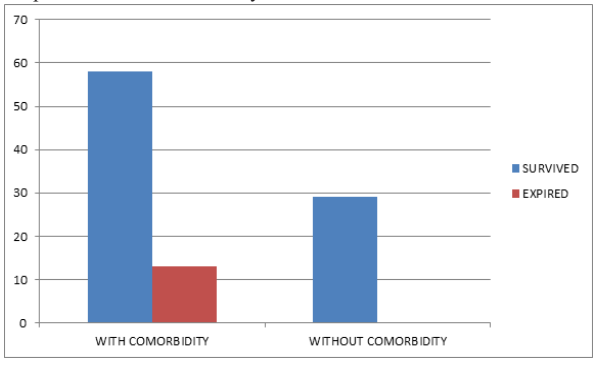




Mortality In Two Groups



In this study, by comparison of with(group A)and without (group B)co-morbidities patients, it was found that present complaints (dyspnoea and sputum), category distribution, biochemical parameters such as (S. creatinine (mg/dL) and D-Dimer (µg/l)), duration of hospital Stay (days) and mortality rate were found statistically significant between the two groups($p<0.0001$). From the above result it was clearly predict that influence of co-morbidities did reflect on onset of symptoms, hospital duration and mortality rate.



DISCUSSION:

SARS-CoV-2 is a single-stranded RNA-enveloped virus . An RNA-

based meta genomic next-generation sequencing approach has been applied to characterize its entire genome, which is 29,881 bp in length (GenBank no. MN908947), encoding 9860 amino acids . Gene fragments express structural and nonstructural proteins. The S, E, M, and N genes encode structural proteins, whereas nonstructural proteins, such as 3-chymotrypsin-like protease, papain-like protease, and RNA-dependent RNA polymerase, are encoded by the ORF region .

A large number of glycosylated S proteins cover the surface of SARS-CoV-2 and bind to the host cell receptor angiotensin-converting enzyme 2 (ACE2), mediating viral cell entry . When the S protein binds to the receptor, TM protease serine 2 (TMPRSS2), a type 2 TM serine protease located on the host cell membrane, promotes virus entry into the cell by activating the S protein. Once the virus enters the cell, the viral RNA is released, polyproteins are translated from the RNA genome, and replication and transcription of the viral RNA genome occur via protein cleavage and assembly of the replicase–transcriptase complex. Viral RNA is replicated, and structural proteins are synthesized, assembled, and packaged in the host cell, after which viral particles are released.

Comorbidity has always been a risk factor for many diseases, including the pandemic SARS, MERS, H7N9, or even common influenza and community-acquired pneumonia. Patients with underlying diseases, in general, show worse outcomes than the otherwise healthy patients, and their resistance to most diseases is low. This situation promotes the progression of disease condition. In patients with COVID-19, comorbidities are common. Approximately 30% to 50% of the patients were reported to have one or more comorbidities, the most common being hypertension, diabetes, cardiovascular disease, chronic liver disease, and chronic kidney disease. Patients with comorbidities have compromised immune status, decreased disease resistance, and are more likely to suffer from severe infection than those without comorbidities.[9-12]So present study describes the relationship between comorbidities and clinical outcomes of COVID-19 that plays an important role in the clinical diagnosis, treatment, and prevention of COVID-19. Differences were all statistically significant, corroborating the previous finding that comorbidity is a risk factor for patients with COVID-19.

CONCLUSION:

As a conclusion, pneumonia-like symptoms were seen by a broad population worldwide as a result of SARS-CoV-2, and individuals with comorbidities are particularly at risk of contracting the virus. Higher mortality risks are associated with co-infected individuals with COVID-19, including those who have HTN and IHD. However, other comorbidities like diabetes, diseases of the lower respiratory tract, and problems with the liver and kidneys may further aggravate the severity of COVID-19. The comorbid people must take diligent precautions like vaccination and other personal protective equipments to safeguard themselves throughout the pandemic.

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