Prevalence of Co-Morbidity Diseases in Suspected Corona Virus Disease-19 Patients

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Running Title: *Co-Morbidity diseases in Suspected COVID-19*

Abstract: *Introduction: The severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is a lifethreatening respiratory disease in those patients having underlying medical condition and has worse prognosis irrespective of the age of patient. Subjects and Methods: A prospective study conducted at dedicated COVID-19 hospital, Bengaluru. Detailed history of underlying medical conditions, Clinical examination and nasopharyngeal and oropharyngeal swab collection were done for all the patients visiting Victoria. Hospital with a history of suspicion of COVID-19. The collected swab was tested for SARS-CoV-2as per ICMR approved protocol.[7] Results: Among 13634 patients attending the fever clinic of pulmonary medicine department in Victoria hospital attached to Bangalore Medical College Research Institute 839 patients were excluded as they did not fit the inclusion criteria. Half of (6637) the patients were asymptomatic at the time of presentation. Twenty five percent (3199) of the suspected COVID-19 and fifty percent (765) of confirmed COVID-19 patients had at least one comorbid condition. The most common underlying medical condition of both confirmed and suspected COVID-19 patients was Hypertension (32.06%>17.64%) followed by diabetic mellitus (22.4%>14.81%), cardio-vascular diseases (10.81%<11%), chronic pulmonary diseases (2.31%<4.43%), cerebrovascular diseases (0.77%<2.93%), chronic renal diseases (0.32%<1.76%), chronic liver diseases (0.32%<2.23%), and malignancy (0.12%<0.87%). Conclusion: Fifty percent of confirmed COVID-19 patients had at least one underlying medical condition. Hypertension and diabetes mellitus had higher prevalence in confirmed COVID-19 patients in that order. 50% of COVID positive patients were asymptomatic at the time of presentation.*

Keywords: SARS-CoV-2, COVID-19, Co-Morbidity diseases

1. Introduction

The Initial reports of corona virus disease-19(COVID-19) indicated that elderly people with comorbidities were most affected and carry high risk of mortality as they have inefficient immune system.[1] People with underlying uncontrolled medical conditions such as diabetes; hypertension; lung, liver, kidney disease; chemotherapy patients, smokers, transplant recipients and patients taking steroids chronically are at increased risk of COVID-19 infection.[2]

Since having chronic conditions determines the prognosis [1] but very little is known about the risk of acquiring the infection among them and most studies are done only in confirmed COVID19 patients the present study was conducted in a suspected COVID-19 patients to detect the prevalence of co-morbid conditions.

2. Aims

To determine the prevalence of Co-morbid diseases among the suspected COVID-19 patients.

3. Subjects and methods

A prospective observational study was conducted in dedicated COVID-19 hospital in Bengaluru, from March 2020 to July 2020 among all patients attending the fever clinic in pulmonary medicine department of Victoria Hospital attached to Bangalore Medical College and Research Institute.

Patients fulfilling the inclusion criteria were enrolled for the study after obtaining informed consent. Demographic variables with detailed clinical examination of the individuals along with details regarding the co-morbid diseases were noted. Two respiratory samples (one nasopharyngeal and another oropharyngeal swab) were taken for virus isolation as per Centre for Disease Control (CDC) guidelines.[2]

Inclusion criteria:
1) Suspected COVID-19 patients attending the Victoria hospital.
2) Age more than 18 years

Exclusion criteria:
1) Patient not willing to give informed consent.
2) Age less than 18 years

Suspect COVID-19 case definition.[3]
Suspect case definitions were initially based on the occurrence of fever and at least one respiratory sign or symptom, with a history of the person having traveled to places with local transmission or contact with a confirmed case of COVID-19 during the 14 days prior to symptoms onset and in the absence of an alternative diagnosis that fully explains the clinical presentation. The SARS-CoV-2 laboratory test for the isolated sample was based on the detection of unique sequences of virus RNA by nucleic acid amplification test such as real-time reverse transcriptionpolymerase chain reaction (rRT-PCR). The rRT-PCR test was done in a Virus Research and Diagnostic Laboratory (VRDL) attached to BMCRI, Bengaluru as per ICMR Guidelines. [4]

The isolated samples were initially screened by targeting the SARS-CoV-2 *E* gene (envelope protein gene) and later confirmed by detection of SARS-CoV-2 *RdRp* gene(RNA-dependent RNA polymerase gene). The isolated specimen of patient sample should have both genes of SARS-CoV2, for the sample to be considered as *positive to COVID-19*, if the

sample did not have one or both of them; it was considered as *negative to the COVID-19*.

4. Results

During five months of our study we screened 13634 patients of which 12795 patients were included. The remaining patients (839) were excluded as they did not meet inclusion criterion.

The Median age of the studied patient was 58 year (18-99). Majority of the studied subjects were men (7603{59.42%}) and (5188{40.54%}) were women (table-1). The positive rate of the SARS CoV-2 was 12.13% in our study, positivity rate was higher in males than females (59.62%>40.24%). Both suspected (6637) and confirmed (637) Fifty percent of COVID-19 patients were asymptomatic but fulfilling the ICMR testing criteria {bar chart-1}. Clinical symptoms of the present study were as follows, cough (25%, 1548), fever (17.81%, 1097), sore throat (13.20%, 813) and breathlessness (8.46%, 521) vomiting (1.7%, 105), abdominal pain (1.36%, 84), nasal discharge (0.45%, 28), diarrhea (1.52%, 94) and hemoptysis (0.68%, 42).

One fourth (3199) of the suspected COVID-19 patients had at least one underlying medical conditions (table-1). Co-morbid diseases among the study population was as follows hypertension (17.64% {2258}), Diabetic mellitus (14.81% {1896}), cardiovascular diseases (11% {1408}), chronic pulmonary diseases (4.43% {568}), cerebrovascular diseases (2.93% {376}), chronic liver diseases (2.23% {286}), chronic renal diseases (1.76% {226}) and malignancy (0.87% {112}).

From the table-1, fifty percent (765) of confirmed COVID-19 patients had at least one comorbid condition. Diabetic mellitus (22.4%>14.81%) and hypertension (32.06%> 17.64%) were higher in confirmed SARS-CoV-2 than the suspected SARS-CoV-2 patients, but the prevalence of other Co-morbid condition was similar in both.

The prevalence of under lying medical condition in relation to clinical features (table-1) of the patients as follows, Hypertension (64.85%>35.14%), diabetic mellitus (56.03%>43.96%) and chronic pulmonary diseases (55.55%>44.44%) were higher in asymptomatic patients than the symptomatic patients. Symptomatic patients had higher incidence of chronic renal diseases (60%>40%) cerebrovascular diseases (58.34%>41.67%) and cardiovascular diseases (52.97%>47.02%) than asymptomatics. Occurrence of Chronic liver diseases (50% each) and malignancy (50% each) did not show any difference in asymptomatic or symptomatic patients.

5. Discussion

In this study, we assessed the prevalence of comorbid conditions in the suspected COVID-19 patients. 12.13% of studied patient tested positive to SARS-CoV-2, Men (59%) were more affected than women (40%) and half of the patients had no symptoms at the time of diagnosis (table-1 & Bar chart-1). The most common symptoms were cough, fever followed by sore throat and breathlessness. Vomiting, abdominal pain, diarrhea and hemoptysis were less likely.

Asymptomatic COVID-19 carriers are estimated to comprise 10–30% of SARS-CoV-2 infected patients. As viral RNA sheds in the upper respiratory tract, it has been proven that both asymptomatic and pre-symptomatic patients are contagious. [5]

Around this time of our study the States/ UTs with the highest test positivity were Maharashtra (10.6%), Delhi (7.8%), Gujarat (6.3%), and Madhya Pradesh (6.1%). [6] as per ICMR COVID Study Group Laboratory surveillance for SARS-CoV-2 in India, as the patients involved in our study were attending dedicated COVID tertiary care hospital the increased positivity rate (12%) can be accounted for by selection bias.

Symptoms reported at the time of specimen collection among COVID-19 cases India, during January 22 - April 30, 2020 in The ICMR group study, were as follows, Cough 8269 (64.5%), Fever 7675 (60.0%), Breathlessness 4083 (31.9%), Sore throat 3420 (26.7%), Myalgia 1599 (12.5%), Sputum/expectoration 696 (5.4%), Rhinorrhea 216 (4.8%), Vomiting 546 (4.3%), Loose stools 396 (3.1%), Nausea 316 (2.5%), Abdominal pain 259 (2.0%), Hemoptysis 151 (1.2%), Chest pain 8 (0.1%), Symptomatic without details 13 (0.03%)[6] which was nearly similar to our study.

In Wuhan (China) the most common symptoms observed from the onset of COVID-19 outbreak include fever, cough, and fatigue, while some features that were not so prevalent were sputum production, headache, hemoptysis, and gastrointestinal (GI) symptom such as diarrhea.[7-8]

Questionnaire study done by Maragakis in johns Hopkins university, some of the most common symptoms include cough, fever, chills, shortness of breath (SOB), muscle aches, sore throat, unexplained loss of taste or smell, diarrhea, and headache.[9]

From table-1, 1/4th of suspected and half off the confirmed SARS-CoV-2 patients had at least one underlying medical conditions. 58 years (18-99) was the median age of the studied patients. The common prevalent comorbidity in suspected and confirmed SARS-CoV-2 patients as follows, hypertension (17.64%, 32.06%), Diabetic mellitus (14.81%, 22.4%) and cardiovascular diseases (11%, 10.81%) while other comorbidities are counting for less than 10% among the suspected and confirmed SARS-CoV-2 patients chronic pulmonary diseases (4.43%, 2.31%), chronic renal diseases (1.76%, 0.32%), chronic liver diseases (2.23%, 0.32%), cerebrovascular disease (2.93%, 0.77%) and malignancy (0.87%, 0.12%).

A meta-analysis by Paudel, the most common comorbidities identified in confirmed COVID19 patients were hypertension (15.8%),cardiovascular and cerebrovascular conditions (11.7%), and diabetes (9.4%).[10-11] The less common comorbidities were coexisting infection with HIV and hepatitis B (1.5%), malignancy (1.5%), respiratory illnesses (1.4%), renal disorders (0.8%), and immunodeficiencies (0.01%).[10]

COVID-NET study showed that, among the 1478 patients studied, 12%of adults showed clinical data of underlying medical conditions with the most prevalent being hypertension (49.7%) and obesity a close second (48.3%). Other medical conditions included chronic lung disease (34.6%), diabetes mellitus (28.3%) and cardiovascular diseases (27.8%). [12]

Meta-analysis in china, [12] they observed more men than women, the COVID-19 infection.

MERS-CoV and SARS-CoV have also been found to infect more males than females. [13-14]

Another study in china, median age of patients was 59 years (26 to 76), with equally affecting the male (9) and female (9) patients. [15]

Multicenter retrospective study in china, the median age of the 191 patients was 56·0 years (IQR 46·0–67·0), ranging from 18 years to 87 years and most patients were male (62%). Comorbidities were present in nearly half of patients, with hypertension (30%) being the most common comorbidity, followed by diabetes (19%) and coronary heart disease (8%), chronic lung disease (3%), carcinoma (1%) and chronic kidney diseases(1%)[16] in a confirmed SARS-CoV-2 patients.

Retrospective study in Wuhan, a total of 1568 patients from three designated hospitals were enrolled in the study, including 79 asymptomatic patients (median age: 60.00 years [IQR, 41.00– 70.00]; age range: 9–96 years; gender: 32 males and 47 females) and 1489 symptomatic patients (median age: 60.00 years [IQR, 49.00–68.00]; age range: 14–100 years). [5]

A meta-analysis of the comorbidities suggests that hypertension prevalent in approximately 17% of the patients, diabetes, cardiovascular diseases, and respiratory system disease were present in 8%, 5%, and 2% of the cases, respectively.On admission, 20-51% of patients 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.[18-19]

Study in Japan, found that half of the 634 passengers who screened positive for SARS-CoV-2 while on board the ship were asymptomatic. [20]

A retrospective study showed that, hypertension and diabetes were the most common comorbidities and incidence rate of diabetes was higher in the asymptomatic group than in the symptomatic group (20.25% vs. 11.69%) cerebrovascular diseases (5.06% vs 3.36%), cancer (6.33% vs 2.22%), chronic renal diseases (3.80% vs 1%), whereas respiratory diseases (5.57%vs 1.27%), coronary heart diseases (5.17%vs3.38%) hypertension (27.94% vs 21.52%), chronic hepatopathy (1.48%vs1.27%).[17]

A retrospective meta-analysis including 1558 COVID-19 patients was conducted until March 1, 2020, on subjects with underlying comorbidities and the risk for acquiring COVID-19. Common comorbidities such as hypertension, COPD, diabetes, and cardio-cerebrovascular disease were observed to be the more significant risk factors in subjects when compared with other underlying disease states. [21]

6. Conclusion

Fifty percent of confirmed covid-19 patient had at least one co-morbidity diseases. Hypertension and diabetic mellitus conditions were the most common in both confirmed and suspected COVID-19 patients. Fifty percent of suspected COVID-19 patients had no symptoms at the time diagnosis however patients with hypertension, Diabetic Mellitus and chronic pulmonary diseases had more symptoms.

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Table 1: Co-morbidity condition of the patients in relation to SARS-CoV-2 status

		Suspected COVID-19 patients {total patients 12795}	Confirmed COVID-19 Patients		
			Total (1553 Patients)	Asymptomatic	Symptomatic
Gender	Male	7603(59.42%)	926(59.62%)	514	412
	Female	5188(40.54%)	625(40.24%)	390	235
	Transgender	4(0.03%)	2(0.12%)	1	1
	Total	12795	1553	905	648
Hypertension		2258 (17.64%)	498(32.06%)	323(64.85%)	175(35.14%)
Diabetic Mellitus		1896 (14.81%)	348(22.4%)	195(56.03%)	153(43.96%)
Cardiovascular Diseases		1408 (11%)	168(10.81%)	79(47.02%)	89(52.97%)
Chronic Pulmonary diseases		568(4.43%)	36(2.31%)	20(55.55%)	16(44.44%)
Chronic Renal diseases		226(1.76%)	5(0.32%)	2(40%)	3(60%)
Chronic liver diseases		286(2.23%)	6(0.32%)	3(50%)	3(50%)
Cerebrovascular diseases		376(2.93%)	12(0.77%)	5(41.67%)	7(58.34%)
Malignancy		112(0.87%)	2(0.12%)	1(50%)	1(50%)