Comparison of the presence of Comorbidities in Recovered and Expired patients with COVID-19 infection

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ABSTRACT

Background The Covid 19 pandemic, has been reverberating across the globe with varying severity & disease presentations. The epidemiological factors associated with the disease included the age & the associated comorbidities like Hypertension, Diabetes Mellitus & Chronic heart & Lung diseases amongst others. Objectives To study the presence of Comorbidities in Covid 19 patients. Methods A retrospective observational study from the laboratory and medical records was conducted on consecutive 100 recovered & Expired patients admitted to a tertiary care centre. Results & Conclusions; The average age of the Recovered & Expired patients was 43.68 years & 58.71 years with a male female ratio of 58:42 & 74::26 respectively. An increase in the age with an increasing no of comorbidities was seen in both the groups. A significant male preponderance was seen showing an increase with increasing number of the associated comorbidities. Amongst other comorbidities, more than 50% of the expired patients were hypertensive compared to only 20% of the recovered patients. 38% of the expired patients were admitted with a history of Diabetes Mellitus compared to 23% of the expired patients. 70% of all patients having Hypertension & 63% of all having DM as the only comorbidity expired from the disease. 86% of all patients with a cardiac disease & 100% of all patients in the study having an associated kidney disease or immunocompromised expired from the disease. Hence a significant association was found between associated comorbidities & mortality in the patients.

Keywords: Covid 19, Comorbidities, Hypertension, Diabetes Mellitus

1. INTRODUCTION

The Covid 19 pandemic, ever since its emergence from China in December 2019, has been reverberating across the globe with varying severity & disease presentations. The Epidemiology & The cause of the varying severity of the disease still remains controversial issue with the changing disease course following each wave of the disease. The epidemiological factors proposed for the increased severity of the presentation & prognosis included the age & the associated comorbidities.[i,ii,iii]The study was conducted on the RT PCR confirmed cases of patients admitted to a tertiary care centre dedicated to the care of Covid 19 disease to compare the association of comorbidities in the recovered & expired patients.

2. MATERIALS AND METHODS

A retrospective observational study from the laboratory and medical records was conducted on patients admitted from 17th March 2020 to 31st May 2020 at the tertiary care centre dedicated to the treatment of RT-PCR confirmed COVID-19 positive patients, after obtaining the institutional review board approval on 10th June 2020. Out of a total of 2739 patients admitted during the period, consecutive 100 expired patients & 100 recovered patients were studied during the study period after applying the inclusion and exclusion criteria. The inclusion criteria for the expired patients included all the deaths, where the cause of the death was reported as COVID-19 disease. The recovered patients group comprised of the patients discharged from the hospital following two consecutive negative RT PCR swabs for COVID 19. The patients with an incomplete data, and patients with conflicting RT-PCR test during the course of the disease; were excluded from the study. Patients with positive reports shifted to other hospitals at any point of care were also excluded from the study.

3. RESULTS

The comorbidities recorded for all the patients included Hypertension, Diabetes Mellitus, Cardiac disease, Pre-existing Kidney disease, Bronchial Asthma, Chronic pulmonary infections including Tuberculosis, & Immunocompromised patients. The presence of more than one comorbid condition, other factors like age & male female ration were compared in both the groups along with the comparison of an association with the number of comorbidities & the percentage of ICU admission.

The average age of the Recovered & Expired patients was 43.68 years & 58.71 years respectively. (Figure 1a), with a male female ratio of 74::26 in the expired patients & 58:42 in the recovered patients .(Figure 1b)

An inverse association was seen between the number of comorbities in the recovered & the expired patients. The percentage of recovered patients reduced from more than 60% associated with no comorbidity to 0% associated with 4-5 comorbid conditions, whereas the expired patients increased from 37% in patients with no co morbidity to 100% in patients with 4-5 comorbidities (Figure 2a)

An increase in the age with an increasing no of comorbidities was seen in both the groups. A lower average age was observed in the recovered patients.(Figure 2b)

A significant male preponderance was seen showing an increase with increasing number of the associated comorbidities. The recovered patients however had an almost equal male to female ratio with an increase in the no of comorbidities. This underscores the association of a poorer prognosis in the male patients with associated comorbidities. (Figure 3a)

The percentage of patients requiring an ICU admission increased with an increase in the number of comorbidities in the expired patients. None of the recovered patients had required an ICU admission.(Figure 3b)

More than 50% of the expired patients were hypertensive compared to only 20% of the recovered patients. 38% of the expired patients were admitted with a history of Diabetes Mellitus compared to 23% of the expired patients. 18% of the expired patients had a history of cardiac disease compared to 3% of the recovered patients. Other comorbidities like the Kidney disease, Bronchial Asthma was present in 3-5% of the expired patients. Chronic lung disease like bronchial asthma was present in 4% of the recovered patients. 19% of the expired & 12% of the recovered patients had a coexisting DM associated with HT.(Figure 4a)

70% of all patients having Hypertension & 63% of all having DM as the only comorbidity expired from the disease. 86% of all patients with a cardiac disease & 100% of all patients in the study having an associated kidney disease or immunocompromised expired from the disease. 61% of all patients having coexisting DM & HT expired from the disease. (Figure 4b)

4. DISCUSSION

The results in the present study show a proportion of 74% males with a mean age of 60.47 years with a median of 61 years in the expired patients compared to a mean age of 43.68 years with a median of 44 years & 58% males in the recovered patients, indicating a higher age & male sex as a poor prognostic indicator in patients with a Covid 19 infection.

Du et al reported the clinical features of 85 fatal cases of COVID-19 disease with a median age of 65.8 years, of which 72.9% were male, with Hypertension, Diabetes, and Coronary heart disease were the most common comorbidities. [iv]

Various studies in the literature show a poorer prognosis associated with diseases like Hypertension, Diabetes, Kidney Disease , Chronic Lung diseases & Cardiovascular diseases.[i,ii,iii,iv]

We compared the presence of the number of comorbidities in the recovered & the expired patients. An increase in the number of comorbidities was associated with an increased mortality reaching 100% in patients having more than 3 comorbidities.

In a case series involving sequentially hospitalised patients between March 20 & April 21 with a confirmed Covid infection, by Richardson et al on 5700 patients, the most common comorbidities were hypertension (56.6%) followed by Diabetes Mellitus(33.8%).[i]

In their literature review Tadic et al observed that there was data indicating hypertension, diabetes, and cardiovascular diseases being more important risk factors for progression and unfavourable outcome in COVID-19 patients with a limited amount of data regarding follow-up of these patients & their outcome.[ii]

In a Meta-analysis including 6 studies & 1558 CoviD-19 patients by Wang & Bolin the authors concluded that Hypertension, diabetes,& chronic obstructive pulmonary disease cardiovascular disease and cerebrovascular disease were independent risk factors associated with COVID-19 patients. However, No correlation between increased risk of COVID-19 and other diseases like liver disease, malignancy, or renal disease was found. [iii]

In a mini review related to the metabolic comorbidities in association with the SARS -CoV -2, de Lucena et al concluded that a higher rate of inflammatory processes are seen in Diabetics following a constant glucose recognition by C type lectin receptors and an increased incidence seen in the Hypertensives due to an increased ACE 2 expression which is used by the SARS-CoV-2 for human cell entry.[v]

Singh et al reviewed the association between diabetes & Covid 19 and the pathophysiology of the disease in diabetes. He observed an evidence of increased incidence and severity of COVID-19 in patients with diabetes & a possible role of COVID-19 on the pathophysiology of diabetes.[vi]

In their study, Orioli et al reported that Diabetes is among the most frequently reported comorbidities in patients infected with COVID-19 & is seen to be associated with a poor glycaemic control. They concluded that diabetes is a risk factor for developing severe and critical forms of COVID-19, the latter requiring admission to an intensive care unit and/or use of invasive mechanical ventilation, with high mortality rates.[vii]

In a literature review by Hussain et al to provide a better understanding of the coronavirus disease (COVID-19) in people with diabetes they observed that Chronic inflammation, increased coagulation activity, immune response impairment, and potential direct pancreatic damage by SARS-CoV-2 might be among the underlying mechanisms of the association between diabetes and COVID-19.[viii]

Bassendine MF et al discussed the dysregulation of DPP4 & the onset of a metabolic syndrome in COVID-19 comorbid conditions following the observation that the COVID-19 disease severity is worse in older obese patients with comorbidities such as diabetes, hypertension, cardiovascular disease, and chronic lung diseases. [ix]

In a systematic review of Literature from the ten Chinese studies (n = 2209),Singh et al observed that the reported comorbidities in patients with COVID-19 disease were hypertension (21%), diabetes (11%) & cardiovascular disease (7%), with an increase in mortality in these patients following a Covid 19 infection.[x]

5. CONCLUSIONS

- Increased age and a male sex are associated with an increased mortality.
- Increase in the number of comorbidities are associated with an increase in mortality.
- Incidence of ICU admissions increase with an increase in the number of comorbidities.
- Hypertension as a sole associated comorbidity is associated with the mortality followed by Diabetes Mellitus.
- Chronic Lung disease does not show a significant high mortality in the present study.
- The patients with a kidney disease had a 86% mortality while those with a cardiovascular disease had a 100% mortality.

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APPPENDIX

Table 1 Comparison of Comorbidities, Age & Duration of hospital stay in the Recovered & Expired patients

No. of Co-Morbid	No of patients		Age		M::F		Days of hospital Stay		1cu		%ICU	
	Expired	Recovered	Expired	Recovered	Expired	Recovered	Expired	Recovered	Expired	Recovered	Expired	Recovered
0	36	61	52.01	43.08	27::9	37::24	5	12.58	28	0	77.77	0
1	21	26	61.38	53.5	19::2	1:1	7	14.46	19	0	90.4	0
2	32	10	62.83	59.6	21::11	1:1	6	13.9	29	0	90.6	0
3	9	3	60.7	64	5::4	2:01	5	15.66	9	0	100	0
4	1	0	72	-	1::0	-	17	-	1	0	100	0
5	1	0	66	-	1::0	-	2	-	1	0	100	0
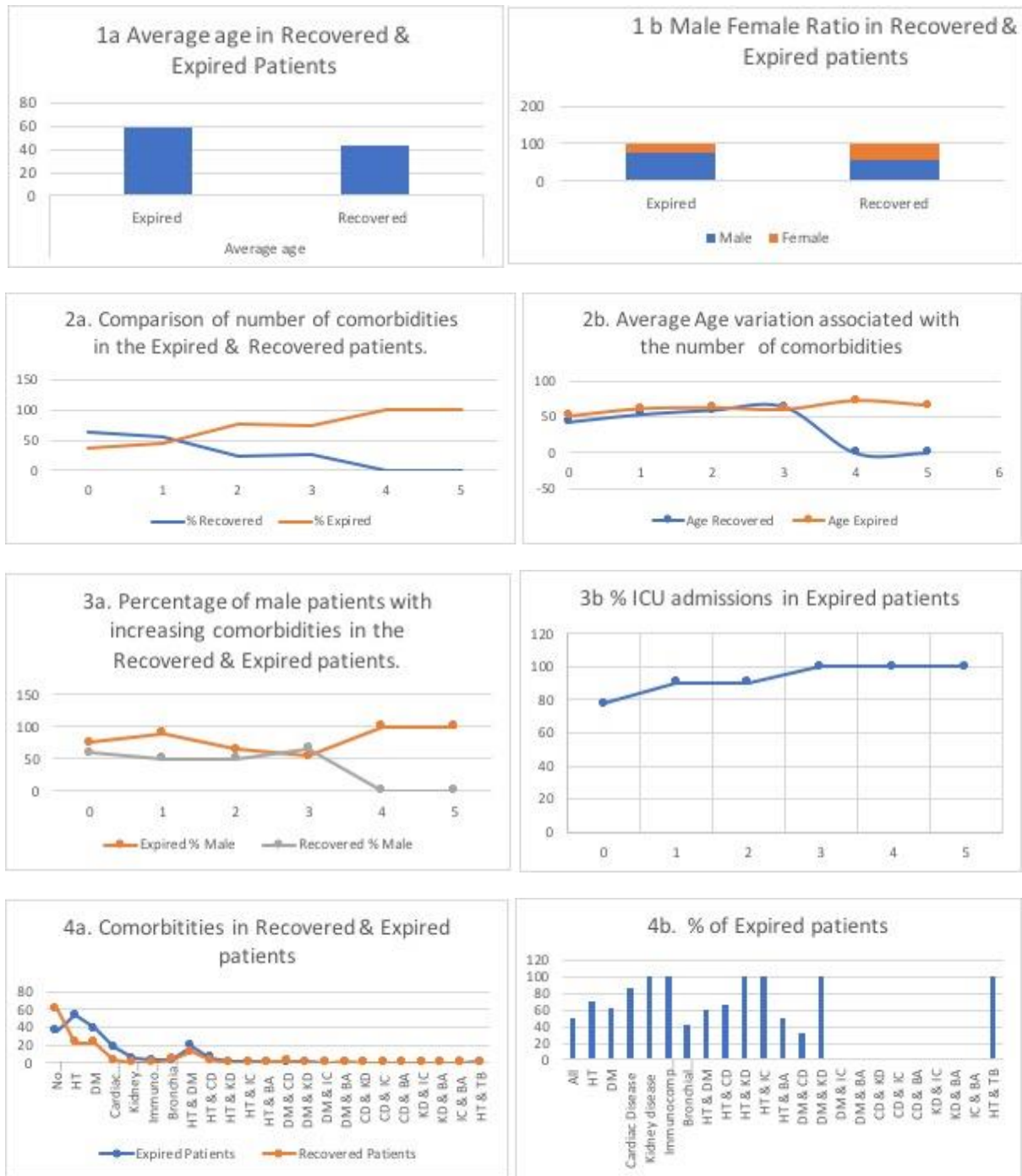
Figure Legends

Figure 1

1a Average age in Recovered & Expired Patients

1 b Male Female Ratio in Recovered & Expired patients

Figure 2

2a. Comparison of number of comorbidities in the Expired & Recovered patients.

2b. Average Age variation associated with the number of comorbidities

Figure 3

3a. Percentage of male patients with increasing comorbidities in the Recovered & Expired patients.

3b % ICU admissions in Expired patients

Figure 4

4a. Comorbidities in Recovered & Expired patients.

4b. % of Expired patients