

Outcome of COVID -19 Management: A Retrospective Observational Review Report of Tertiary Covid Care Centre.

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ABSTRACT:

Introduction:

SARS-COV was declared pandemic in the month of march 2020. Uttarakhand reported its first case on 15th march 2020. This study is a retrospective descriptive analysis of the changing demographic, clinical and case fatality rate of the disease.

Material and methods:

The study is on the data of the admitted patients in dedicated covid center, a tertiary level facility from March 2020- February 2021. Data was analyzed in terms of outcome of the admitted patients, the change in the proportions of asymptomatic, mild, moderate and severe cases and the change in the age of the admitted patients with progression of disease over the stipulated time frame. Factors affecting the mortality of the admitted cases were also analyzed.

Results:

Symptomatic cases admitted in month of July was 39% while those in month of August formed 90.3% of total admission ($p < 0.00001$). Severe cases admitted in months from march-20 to July 20 formed 6.72% of total admissions while in months from August 20-february-21 severe cases were 12.6% of total admission ($p < 0.00001$). The elderly population comprising of 60 and above formed 8.02% of total admissions in month of March to July while 23% in the latter half of pandemic ($p < 0.00001$). The case mortality rate for covid-19 in our institution was 5%. The cumulative mortality rate in the first five months of pandemic (March 20-February 21) was 1.20% compared to last seven months of a year of pandemic which was 7.33% which was significant ($p < 0.00001$). Case Fatality Rate in age group of more than equal to 60 years was 16% while in less than 60 years it was 3.2% ($p < 0.00001$). Comorbidities were associated with 68.8 % ($n=209$) of deaths, of which predominant was diabetes (44%). Out of 139 deaths, 35% deaths were attributed to acute respiratory distress syndrome (ARDS) / Respiratory failure, 37% were due to cardiac events while Sepsis with Multiple Organ Dysfunction Syndrome (MODS) was responsible for 28% mortalities

Conclusion:

Home isolation policy of the covid positive cases with the advancing pandemic over the months had an impact on the clinical profile, demographic profile and the mortality rate of the admitted patients. Early treatment policy of the admitted SARS-COV-2 positive asymptomatic/symptomatic patients did affected the outcome of admitted patients in initial months of pandemic. Age more than 60 years is an independent risk factor for mortality in covid-19 and also the comorbidities.

Key words: COVID-19, Patient profile; Comorbidities; Outcomes.

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I. Introduction:

SARS CO-V 19 first case was detected in December 2019 in Wuhan city of china. The disease took a global form by march 2020, when it was declared a pandemic by WHO on 11th March 2020. As on date 25th February 2020 more than 113 million cases have been recorded worldwide with 65.3 million recovered and around 2.5 million death reported. India alone has recorded more than 11 million cases with 10.7 million cases recovered and 157 thousand's deaths reported. Presently while vaccination for covid-19 has been widely initiated in the country there has been resurgence of fresh waves in 10 states. Protective effect of vaccination is still a time taking process and also vaccinating such a massive population size with varied religious, political and health beliefs is a mammoth task. People from every sphere of life have been hit by the pandemic and strict lockdowns, personal hygiene and masks are the only answers to slow down the ongoing spread of pandemic. Researches are going worldwide pertaining to every field of the disease virus and its treatment, but none of the drugs or remedies have proven to be fully effective in treating the disease.

The infection of SARS-COV-19 have a varied clinical presentation, the clinical spectra spreading from asymptomatic to mild, moderate, severe Covid-19 pneumonia to death. 81% cases have been reported to be mild

/asymptomatic. The disease in spite of being highly infectious nature has a case fatality rate of 2.3% [1]. As per a number of studies 14%-15% cases of covid need hospitalization and some 3% to 5% may land up in intensive care units. [1,2,3]. On the time line, the incubation period of disease varies from 2 to 14 days, with median time of 4-5 days[4], followed by order of symptoms like fever, cough, cold, myalgia, ageusia, anosmia, fatigue, headache, low backache, diarrhea and joint pains. The Covid -19 symptomatology follows a predictable pattern of fever first, followed by cough and then other symptoms in majority of individuals infected as per one study [5,6]. Beyond 5 days from the first symptoms, starts the stage of dysregulated immune mechanism when the lower respiratory tract gets involved and patients presents with increase cough, persistent or resurge of fever, breathlessness, chest pain, cyanosis, confusion and falling oxygen saturation level. Patients with severe covid-19 develop ARDS around day 8 to day 10 usually. The median time from onset of illness to Intensive Care Unit admission was 9.5-12 days. [4] This phase continues up to day 14 beyond which either recovery occurs or the stage of complication like sepsis, multiple organ dysfunction syndrome, cardiac, acute respiratory distress syndrome or death ensues. Average time period from day of admission to death has been reported to be around 18 ½ days. The median length of hospital stay for survivors was 10-13 days.

First case of covid-19 was reported in India on 30th January 2020 in the state of Kerala. Uttarakhand, a hilly state of India reported its first case of covid-19 on 15th March 2020. In the initial days of pandemic state government had adopted the policy of contact tracing, institutional isolation of confirmed cases and quarantine of close contacts of the RT-PCR confirmed cases. With the rise in cases Government of India adopted the policy of dividing the health infrastructure in 3 levels. Category 1 Dedicated Covid Hospital with fully equipped intensive care unit ventilators and beds with assured oxygen supply to cater to the severe covid cases. Category 2 Dedicated Covid Health Centre with separate areas for suspected and confirmed covid-19 cases areas with beds with assured oxygen support and Category 3 Dedicated Covid Care Centre which could be the makeshift facilities with separate areas for suspected and confirmed cases to cater to patients who were very mildly or mildly symptomatic according to the notice issued by Ministry of Health and Family Welfare [6] on 10th May 2020. Government Doon Hospital attached with Government Doon Medical College was selected as DCH by state of Uttarakhand under this policy in May 2020. The admission policy as well as the disease profile of admitted cases in our hospital thus changed with the progression of pandemic. In this study we are presenting the epidemiological trend and health outcome of the admitted patients in a tertiary level care (designated as DCH) from March 2020-February 2021.

II. Material and Methods:

The Centre is a fully equipped 180 bedded hospital attached to a medical institution with 80 beds in I.C.U and 100 beds with oxygen supply with dedicated hospital staff. The data was collected from the record room of the hospital and was analyzed and evaluated retrospectively. The study material comprised of all admitted patient with lab report of confirmed covid-19 infection, in the institution from 15 March 2020 to 28 February 2021. Admitted patients were broadly categorized into 4 categories depending on the clinical presentation at time of admission.

1. Asymptomatic
2. mild- with symptoms of fever, cough, myalgia, muscle pain, joints pain, rhinitis, sore throat, headache, nausea, vomiting and diarrhea, or any other symptom (excluding chest pain, breathlessness and fall in oxygen saturation levels below 95%).
3. Moderate-presenting with Spo2 between 94 % to 91%, with breathlessness and chest pain.
4. Severe/critical-cases with Spo2 less than equal to 90% requiring assisted support in form of HFNM, NIV, or Mechanical ventilation. Patients with moderate disease but with any complication like MODS, MI, CVA and CKD were also placed under same category.

Treatment protocol for each category was set according to the Ministry of Health and Family Welfare guidelines for covid-19 management guidelines and state government guidelines. Asymptomatic patients above age of 18 years were treated with ivermectin 12 mg for 3 days along with hydroxychloroquine 800 mg on day 1 followed by 400 mg daily for next 4 days along with vit c supplementation of 500 mg daily for 10 days. Mildly symptomatic patients were treated as asymptomatic patients along with either azithromycin 500 mg daily / doxycycline 100 mg twice and antiallergics, antipyretics, lozenges as per need. Baseline ECG of high risks patients (which included age more than 45 years, patients with cardiac disease, diabetes, Chronic Kidney Disease, Chronic Lung Disease) started on hydroxychloroquine was taken. Patients with moderate or severe disease were treated with intravenous dexamethasone and remdesivir as per recommended doses by Ministry of Health and Family Welfare guidelines for covid-19 treatment. Besides intravenous antibiotics, tocilizumab and convalescent plasma therapy was used as per the guidelines.

Outcome was evaluated in terms of discharge, death, and referral to other centers for management of covid-19 sequelae and/or on patients request. Deaths were further analyzed in terms of age, comorbidities, time

of death post admission and probable cause. The data was used for framing future plans of betterment in covid-19 management and also highlighting the shortcoming in management protocol.

III. Results:

Total number of patients admitted in stipulated period of time were 3756. The demographic profile of the admitted patients was as given in Table no.1. Total number of females admitted was 1260 (33.5%) and total number of males admitted was 2496(66.5%) ($p=0<0.05$). Maximum number of patients admitted were in age groups between 18-40 years of age (42%) followed by those in age group of 40 to 60 years (36.1 %) (Table 1). Elderlies' comprising of 60 and above age groups formed 18.63% of total admissions while children formed 2.85% of total admissions. Of the total cases, 23.24% cases were asymptomatic at time of admission, 29.50% were mildly symptomatic. Cases presenting with moderate disease were 29.39% of total admissions in the stipulated period while 17.86% were the cases of severe covid-19 disease (Table 2).

TABLE-1: AGE WISE DATA OF COVID POSITIVE PATIENTS

| | number of admissions | <18years | 18-40years | 41-59 | >=60 | Percentage of admissions below 60 | Percentage of admissions >=60 |
|--------------|----------------------|------------|-------------|-------------|------------|-----------------------------------|-------------------------------|
| March | 5 | 0 | 4 | 1 | 0 | 100% | 0% |
| April | 20 | 1 | 16 | 1 | 2 | 90% | 10% |
| May | 153 | 11 | 94 | 31 | 17 | 88.89% | 11.11% |
| June | 324 | 12 | 216 | 77 | 19 | 94.14% | 5.86% |
| July | 580 | 21 | 357 | 153 | 49 | 91.55% | 8.45% |
| August | 855 | 26 | 383 | 291 | 155 | 81.87% | 18.13% |
| September | 870 | 19 | 341 | 319 | 191 | 78.05% | 21.95% |
| October | 226 | 4 | 100 | 79 | 43 | 80.98% | 19.02% |
| November | 245 | 5 | 65 | 99 | 76 | 66.37% | 33.63% |
| December | 311 | 4 | 81 | 129 | 97 | 68.81% | 31.19% |
| January | 124 | 3 | 33 | 47 | 41 | 66.94% | 33.06% |
| February | 43 | 1 | 19 | 13 | 10 | 76.74% | 23.26% |
| TOTAL | 3756 | 107 | 1709 | 1240 | 700 | 81.36% | 18.64% |

Table -2: Month-wise covid data

| month | no. of admission | asymptomatic | mild | moderate | severe | number of deaths | percentage |
|-----------|------------------|--------------|------|----------|--------|------------------|------------|
| March | 5 | 5 | - | - | - | 0 | 0 |
| April | 20 | 20 | - | - | - | 0 | 0 |
| May | 153 | 93 | 49 | 2 | 9 | 1 | 0.65 |
| June | 324 | 235 | 71 | 1 | 17 | 5 | 1.54 |
| July | 580 | 354 | 186 | 1 | 39 | 7 | 1.2 |
| August | 855 | 83 | 644 | 30 | 98 | 33 | 3.86 |
| September | 870 | 79 | 619 | 81 | 91 | 72 | 8.23 |
| October | 226 | 4 | 81 | 93 | 48 | 24 | 10.6 |
| November | 245 | - | 56 | 133 | 56 | 22 | 8.9 |
| December | 311 | - | 128 | 138 | 45 | 26 | 8.4 |
| January | 124 | - | 51 | 32 | 41 | 16 | 12.90 |
| February | 43 | - | 8 | 25 | 10 | 3 | 6.97 |
| total | 3756 | 873 | 1893 | 536 | 454 | 209 | 5.56 |

Table-3 Age wise data of covid positive patients

| s.no. | age group | asymptomatic | mild | moderate | severe | total |
|-------|---------------|--------------|------|----------|--------|-------|
| 1 | less than 18 | 54 | 40 | 7 | 6 | 107 |
| 2 | between 18-40 | 590 | 902 | 145 | 72 | 1709 |
| 3 | between 40-60 | 165 | 676 | 216 | 183 | 1240 |
| 4 | more than 60 | 64 | 275 | 168 | 193 | 700 |
| | total | 873 | 1893 | 536 | 454 | 3756 |

Out of total 700 admissions in more than 60 years 27.6% were admitted with severe covid-19, while in less than 60 years age group out of 3056 admission 8.54% were of severe covid pneumonia ($p=0<0.05$) (Table-3). 846 patients were treated in intensive care units. 1175 (31.3%) patients needed oxygen therapy, 24.7% in form of nasal canula (NC), 4.21% high flow nasal mask (HFNM)/Non-invasive ventilator (NIV), while 2.34% were supported with mechanical ventilation (MV). (Table 4).

Table-4 Oxygen supportive therapy

| No supportive oxygen therapy | Oxygen by nasal canula | Oxygen by HFNM/NIV | Mechanical ventilator | total |
|------------------------------|------------------------|--------------------|-----------------------|-------|
| 2582 | 928 | 158 | 88 | 2756 |

Table 5: Final outcome of admitted patients

| Total admission | discharged | Home isolation | Referred to ccc | Referred to higher centre | Deaths |
|-----------------|------------|----------------|-----------------|---------------------------|--------|
| 3756 | 1393 | 748 | 1192 | 214 | 209 |

Cases referred to higher centers were the ones who needed long oxygen therapy or physical rehabilitation and prolong physiotherapy or who requested to be shifted to other hospitals for further management. These were shifted once only when two repeated nasopharyngeal throat swabs samples for RT-PCR turned negative (Table-5) (Figure 4). Covid Care Centers (CCC), was the extended facility of the institution where patients were shifted once undergone baseline investigations and treatment of 3 to 5 days and remaining stable.

Table 6: death distribution according to hospital stay in hours

| duration after admission | number of deaths | |
|--------------------------|------------------|-------|
| <= 48 hours | 70 | 33.5% |
| >48-72 hours | 17 | 8.1% |
| >72 hours | 122 | 58.4% |
| total deaths | 209 | 5.56% |

Table 7: Comorbidity-wise mortality distribution

| total deaths | with comorbidities | with 2 or more comorbidities | with single comorbidity | without comorbidity |
|--------------|--------------------|------------------------------|-------------------------|---------------------|
| 209 | 144 | 60 | 84 | 65 |

Table-8: Comorbidities and Death

| Comorbidity | number of deaths |
|--|------------------|
| Diabetes | 92 |
| Hypertension | 63 |
| Coronary Artery Disease | 52 |
| Others (Chronic Liver Disease, Chronic Kidney Disease, Hypothyroidism, cancer) | 38 |

Table-9: Age wise distribution of death

| Age in years | Number of deaths | Percentage |
|--------------|------------------|------------|
| <18 | 1 | 0.47% |
| 18-40 years | 23 | 11.00% |
| 41-60 years | 72 | 34.44% |
| >60 years | 113 | 54.07% |

Table-10: Probable causes of deaths

| Cause | Deaths |
|--------------------------|--------|
| ARDS/Respiratory Failure | 49 |
| Cardiac | 51 |
| Sepsis with MODS | 39 |
| Total | 209 |

Total deaths attributed to covid-19 and its complication were 209 of which 145 were males (69.35%) and 64 females (30.65%). Age more than 60 years formed 54.07% of all deaths in institution (Table 9). 70 deaths have occurred within 48 hours of admission and were not analyzed while ascertaining the probable cause of mortality (Table 6). Co-morbidities formed 68.9% of total deaths compared to 31.1% of non-comorbid deaths ($p=0<0.05$). Patients with single comorbidity were 58.3% of total deaths while those with 2 or more than 2 were 44.4% of the deaths with comorbidity (Table 7). Diabetes hypertension and coronary artery diseases (63.9%, 43.8%, 36.11% of death with comorbidities respectively) (Table 8) were important existing risk factors with

mortality. On post covid death audit out of 139 deaths, 35% deaths were attributed to acute respiratory distress syndrome (ARDS) / Respiratory failure, 37% were due to cardiac events while Sepsis with Multiple Organ Dysfunction Syndrome (MODS) was responsible for 28% mortalities (Table 10)

IV. Discussion:

The state of Uttarakhand had initial policy of contact tracing and institutional admission till the month of June when the pandemic was at slow pace but once the cases started rising and the hospitals had admission more than their capacities, home isolation for asymptomatic and mildly symptomatic cases (with limitations of age less than 60 years and no comorbidity) was introduced on patient's choice with close monitoring and follow up by state health machinery. A shift in the clinical profile of admitted patient was detectable as shown by figure-1, after the introduction of home isolation policy for asymptomatic and mildly symptomatic patients came into action. Symptomatic cases admitted in month of July was 39% while those in month of August formed 90.3% of total admission ($p < 0.00001$). Severe cases admitted in months from March-20 to July 20 formed 6.72% of total admissions while in months from August 20-February-21 severe cases were 12.6% of total admission ($p < 0.00001$) (Figure-1). Our study thus observes that with advancing pandemic, proportion of symptomatic admitted cases increased along with increase in severe covid cases. Contact tracing and mandatory institutional isolation policy of the government may have a role in this change of clinical presentation of admitted patients. Treatment was being advocated to all institution based isolated covid positive patients in initial phase of pandemic. Once the mandatory isolation of positive cases was ceased and permission for home quarantine was given, severe cases came into rise. There are a number of studies indicating that early treatment does lead to better outcome [7-11].

The elderly population comprising of 60 and above formed 8.02% of total admissions in month of March to July while 23% in the latter half of pandemic ($p < 0.00001$) which again reflected the changing trend of the pandemic due to change in the policy of positive cases isolation and the effect of the unlocking of the lockdowns. Young populations going for the jobs and daily living broke the preventive barrier of transmission of infection to elderly. The study also made an observation that elderly population presented more often in severe covid stage (27.6%) than the younger population (8.54%) ($p = 0 < 0.05$), this may be because of elderly age group have atypical presentation and thus diagnosed late. [12]

Out of 3756 patients 89% patients were discharged to home without any disease morbidity or sequelae. The case mortality rate for covid-19 in our institution was 5% while the cases referred to higher center for further treatment or to other rehabilitation center because of sequelae was 6%. [12,13]. While computing the mortality rate, in our study the proportion of male is to female death was similar to the proportion in which the admission was there (total admissions=3756, male = 2496, female=1260 $p = 0 < 0.05$). The study thus shows that covid infections were common in males than females but gender in itself was not an independent risk factor for mortality which was not as in other studies. [13,14]. This difference may be evident in our study because we not only compared the death ratio on basis of gender, among expired patients but compared the proportion to the admitted patients also.

The Mortality rate for month of July was 1.21% compared to 3.9% for month of August ($p < 0.0001$). The cumulative mortality rate in the first five months of pandemic (March 20-February 21) was 1.20% compared to last seven months of a year of pandemic which was 7.33% which was significant ($p < 0.00001$) (Figure 5). The rise in mortality can be explained with the changing profile of the admitted patients in form of increasing moderate to severe cases and also the people above the age of 60 years which has been proven to be a vulnerable group for covid infections in a number of studies globally. [15-17]. Overall case fatality rate in our institution was 5.44% compared to 1.4% to that of India ($p = 0 < 0.05$) [18]. Higher mortality rate of covid in our institution in reference to national statistics is because of the denominator comprising of large number of moderate to severe cases admitted in the institution and lesser number of mild cases or asymptomatic cases which were not being admitted in later part of pandemic as state covid management policy.

High mortality was seen in age group of more than 60 years (54.07% of total deaths) while in age group of 40 to 60 years it was 34.44% comparable to national data as reported by Union Health Ministry. Case Fatality Rate in age group of more than equal to 60 years 16% while in less than 60 years it was 3.2% ($p < 0.00001$). We also observed that as the pandemic progressed, with the increase in the admissions of the old age people (>60 years), the case fatality rate of institution also increased, thus highlighting the old age as an independent risk factor for covid mortality (Figure 6). Comorbidities were associated with 68.8 % (n=209) of deaths, of which predominant was diabetes (44%). 60 deaths of these were of individuals with 2 or more than 2 comorbidities (29%, $p < 0.00001$) (Figure 7,8,9). Other comorbidities associated with death were Chronic Kidney Disease, Chronic Lung disease, Carcinoma which is comparable to the published data till date [15,16,17,19]. Acute Respiratory Distress Syndrome/Respiratory failure, Cardiac events, and Sepsis emerged as the most important cause of deaths in hospitalized patients which is comparable to the published data till date [20,21]. Cardiac events were the leading cause in the elders above 60 years while respiratory failure/acute

respiratory distress (ARDS) was an important cause of mortality in less than 45 years. Sepsis was an important cause of delayed deaths in hospital settings.

V. Conclusions:

Our study reaffirms the existing studies finding, that mortalities are high in individuals with comorbidities and is directly correlated with the number of comorbidities coexisting. Age >60 years came out an independent risk factor for severe form of covid disease and also for high mortality. Our study did not support male gender as an independent risk factor for high mortality though it was observed that the covid infection rate was higher in males than female as ratio of males admitted was higher than females. Case Fatality is associated with the disease severity at presentation as evident by high mortality rate in the latter half of pandemic with increase in admissions with severe form of covid-19. Sepsis has emerged as an important cause of mortality in our study in prolong hospital stay cases. The study exhibits the favorable outcome in days of lockdown and institutional isolation probably due to easy contact tracing, early detection and early treatment. Home isolation policy of the covid positive cases with the advancing pandemic over the months had an impact on the clinical profile, demographic profile and the mortality rate of the admitted patients.

The weakness of the study is its' observational retrospective nature with no control group. It is a descriptive study and biasedness while analyzing the data cannot be ruled out though all efforts have been made to minimize this problem. The strength of study is its large sample size, and data collection from single site which was reporting to the health authorities.

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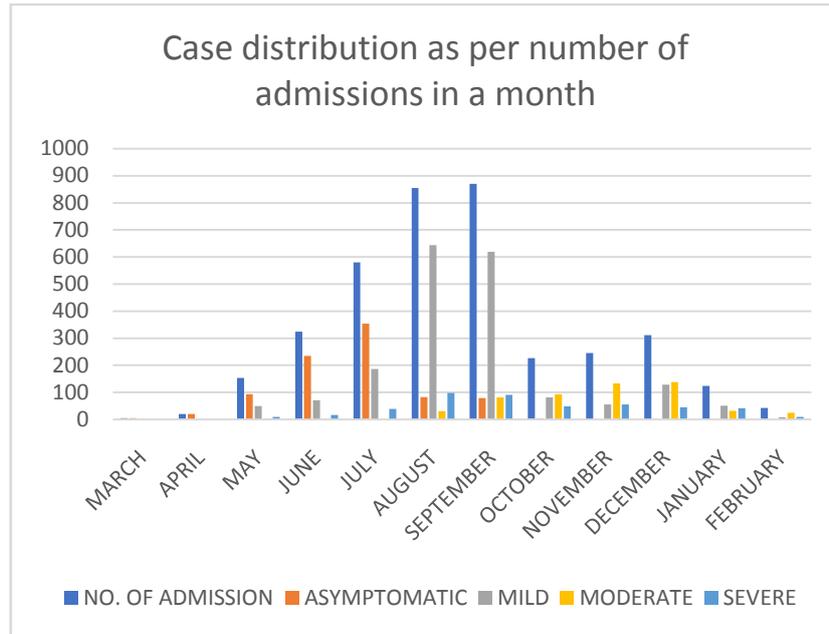


Figure 1 showing the changing trend of pandemic clinical profile in admitted patients with advancing months attributed to the change in the home isolation policy for covid -19 positive cases. With advancing months moderate to severe cases admissions increased compared to earlier months of pandemic.

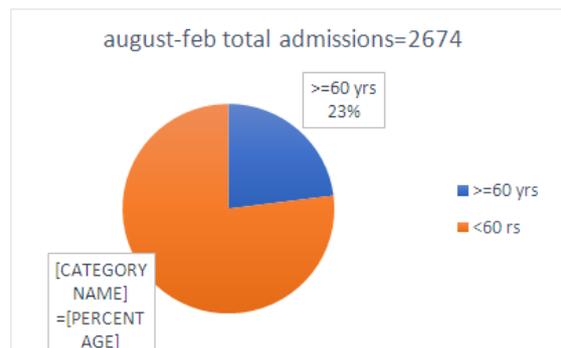
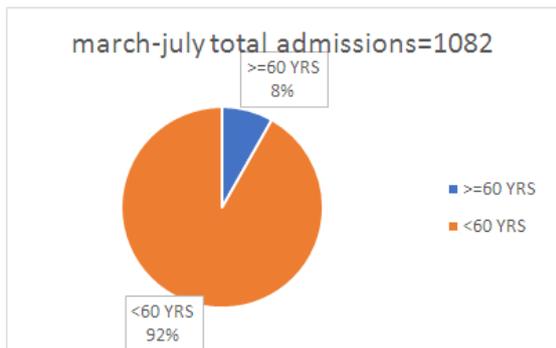


Figure 2 and Figure 3 showing the significant increase in admission of the elderly in age group of more than 60 years again attributed to the changing policy of state government with regard to the home isolation policy.

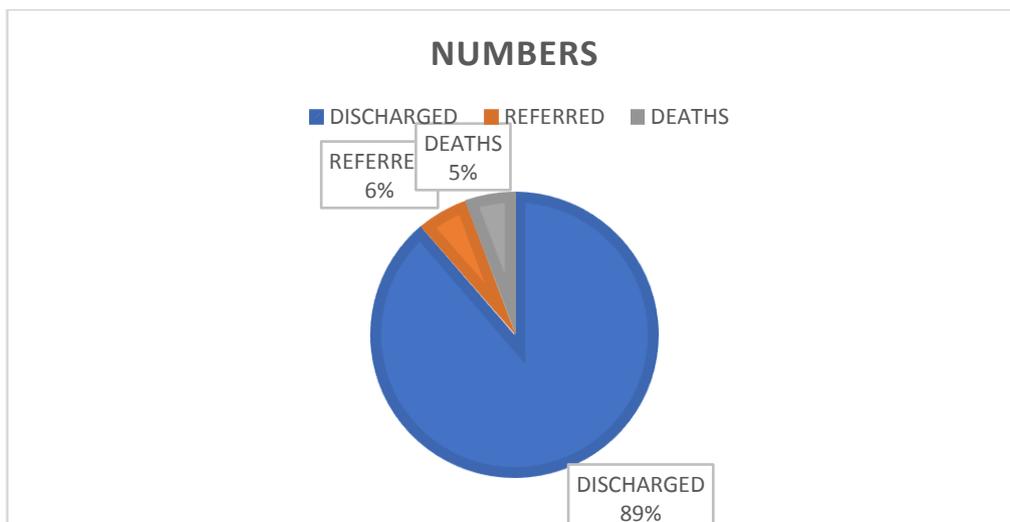


Figure 4: Showing the outcome of admitted patients in tertiary level center

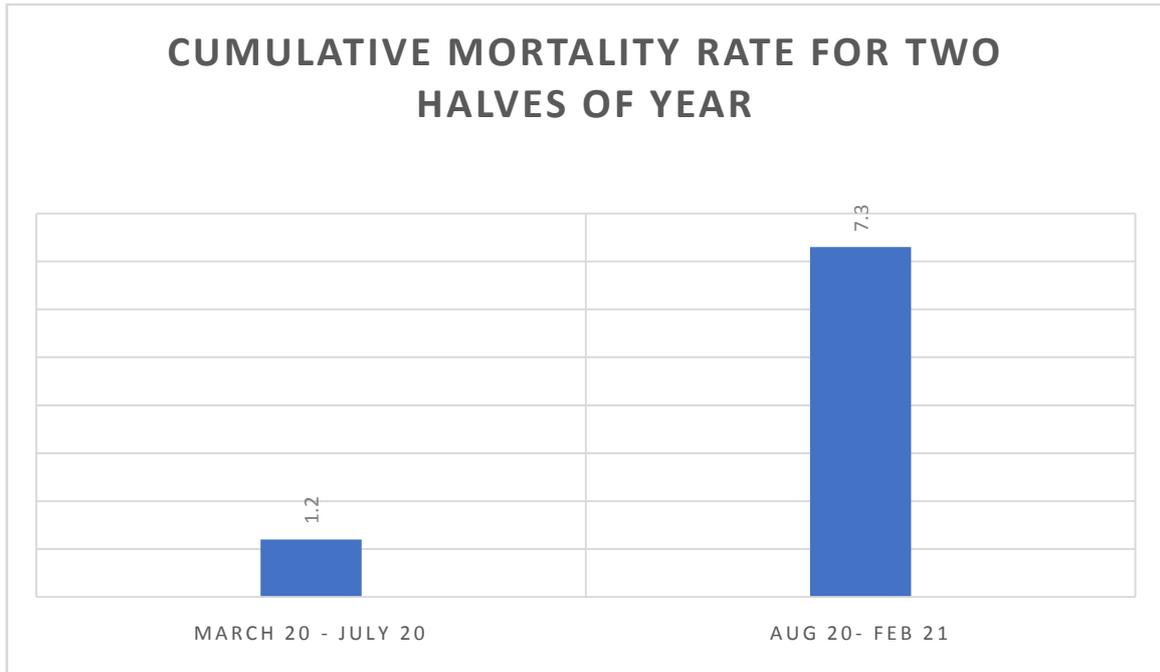


Figure 5 showing the cumulative mortality rate of two halves of year ($p < 0.00001$) showing significant increase in case fatality rate in later aprts of pandemic.

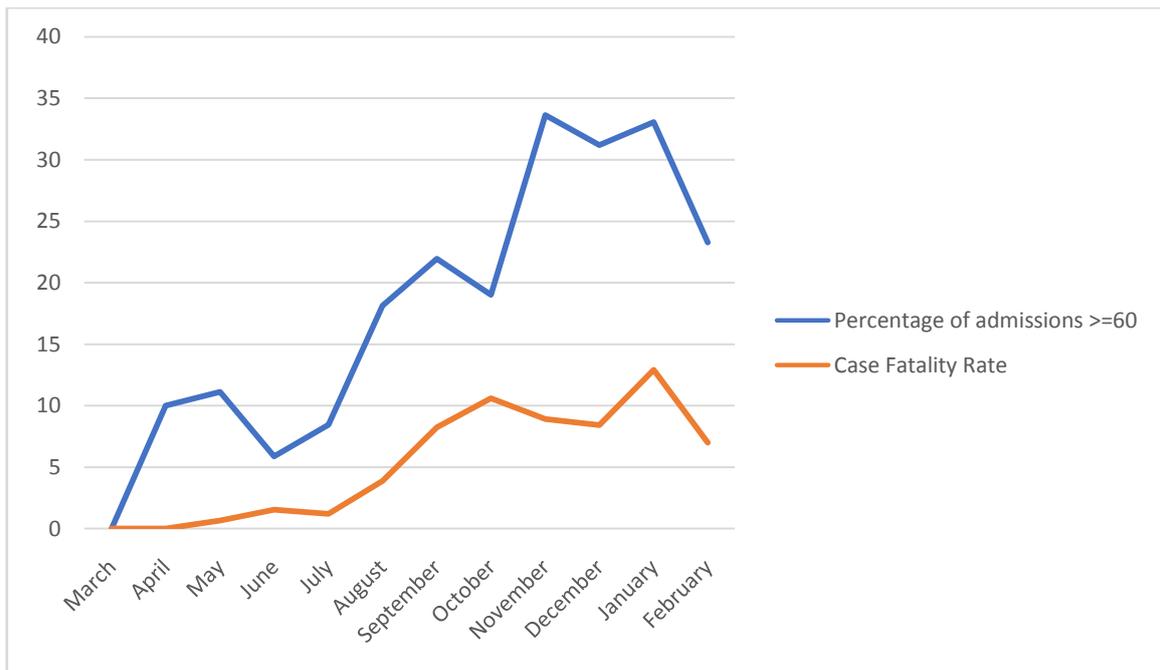


Figure6: representing the positive correlation between the age>60 yrs and case fatality rate. As the number of elderly population admission increased case fatality rate of hospital also increased.

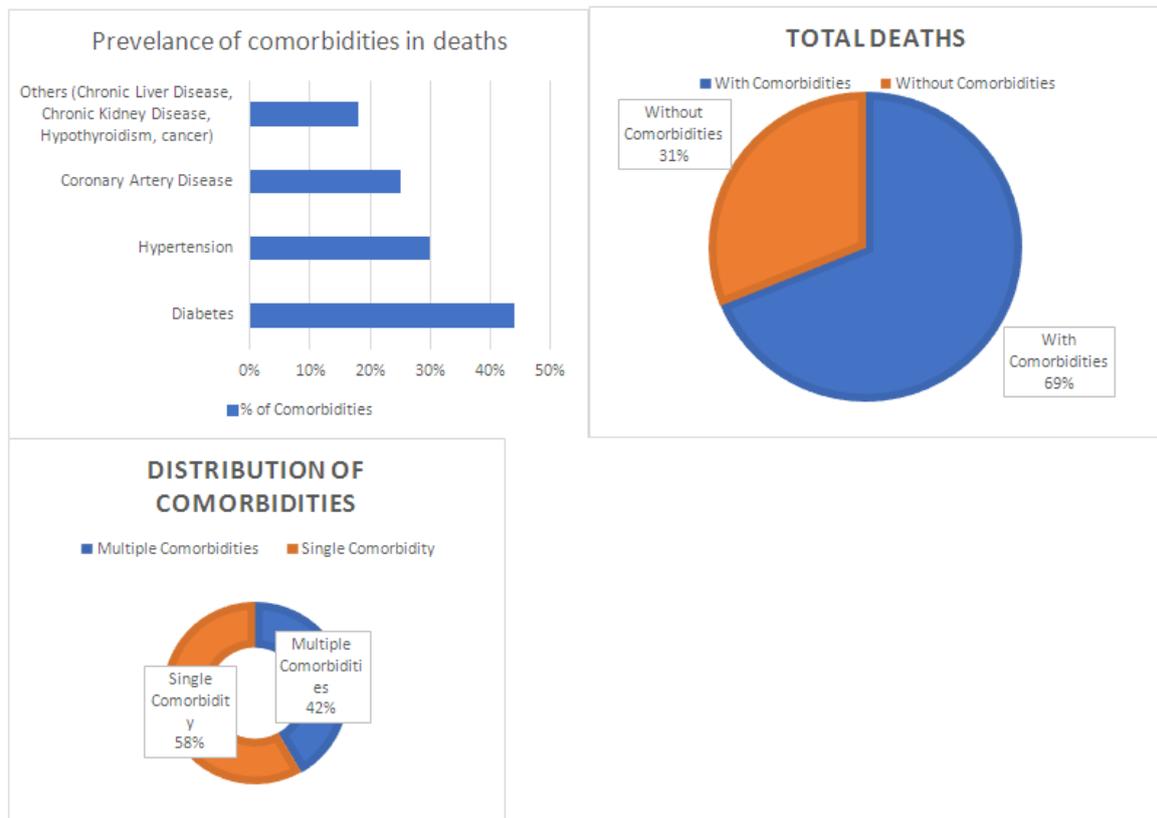


Figure 7,8,9: showing the correlation between comorbidities and mortality

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