



## Understanding The Dynamics Of Covid 2<sup>nd</sup> Wave A Hospital Based Study From ACSR Medical College, Nellore

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### Abstract

**Background:** The most important concern of covid pandemic is fear of recurrence of the disease in form of second wave and third wave. As predicted earlier the surge of second wave overlapped with stepwise unlock process of COVID.

**Objective:** To study the dynamics of onset, spread and mortality of COVID 2<sup>nd</sup> wave.

**Methods:** This is a prospective observational study, wherein data was collected consisting demographic profile, clinical severity requiring oxygen and outcome of the patients who were admitted in ACSR MEDICAL COLLEGE/GOVERNMENT HOSPITAL, NELLORE for a period of three months from April 1<sup>st</sup>, 2021, to June 30<sup>th</sup>, 2021, and analyzed.

**Results:** Total number of cases admitted in April 2021 are n=2526; in May n=3779 and in the month of June were n=1109, With peak in the month of May.

Total number of males admitted were n=4522(60.99%), total females admitted were n=2892 (39.01%) with male to female ratio of 1.5:1.

Total patients admitted in the age group of 0-10 years were n=20 (3%);11-30 were n=858(11,6%);31 to 50 years were n=2984(40.3%);51 to 70 years were n=2956(40%); and above 70 years were n=596(8.1%).

Total patients who needed high flow oxygen showing the severity of the disease were n=4,503 of which n=4,368 (97%) were kept on NRBM (non-rebreathing mask) and n=135(3%) on NIV (non-invasive ventilation). Number of patients discharged in the month of April were n=1449; May were n=3149; and June were 1169 respectively.

Total number of patients who were discharged (i.e., recovered) are n=5767 which is **77.79%** of the admitted patients during this period.

The total number of patients who were succumbed are n= 1556 which is **20.99%** of the total admitted patients during this period.

Total number of patients were n=91 (1.23%) and they were referred to higher centre.

Number of patients died in paediatrics age group were n=06(3%); in the age group of 11 to 30 years were n=85(10%);31 to 50 years were n=490(16%);51 to 70 years were n=703 (24%) and more than 70 years were n= 272(46%).

Total patients requiring high flow oxygen indicating moderate to severe disease were n=4503 (60.8% and of 4503 patients 956 (21.23%) went into critical illness and could not be recovered.

**Keywords:** COVID, 2<sup>nd</sup> wave,

## **Introduction:**

Infectious diseases presenting in multiple wave patterns pose great challenge to the health sector and to the public. Second wave theory dates back to 1918-1920 Spanish flu affecting 500 million people worldwide and claimed lives of almost 20 million to 50 million people. It was observed from the previous pandemics that waves of activity were spread over months. However, there is no proper evidence of distribution along the seasons<sup>1</sup>

Novel Corona virus disease 2019 caused by severe acute respiratory syndrome coronavirus (SARS-CoV-2), is highly infectious with rapid man to man spread. This virus laid a devastating effect on global demography resulting in more than 3.8 million deaths worldwide remembering the Spanish flu pandemic.

second or third wave of outbreaks of this viral illness attributed mainly due to the emergence of mutant variants of the virus.<sup>2</sup>

With step wise unlock process from COVID 1st wave restrictions all over the world there is sudden and rapid surge of cases all over the world. Many social-economical and behavioural patterns of the public have played major role in surge of second wave of COVID 19.

Even with successful implementation of COVID vaccine process country wide there is gradual raise to sudden peaking of cases throughout the country with enormous increase of hospital admissions with increase in oxygen demand abnormally compared to previous wave.

Demographic hospital-based studies are very important for proper understanding of the dynamics of the disease progression, preparing treatment protocols, making public awareness policies, preparedness for the upcoming pandemics and strengthening the health care sector and health care providers.

This article is a small effort to throw light on the demographical profile, treatment protocol and outcome of the patients admitted in a tertiary care state COVID hospital from Andhra Pradesh.

## **material and methods::**

All the patients who were admitted to ACSR GOVERNMENT HOSPITAL with COVID RAPID or RTPCR positive with significant clinical symptoms from the 1st of APRIL 2021 to 30th JUNE 2021. Patients who had clinical symptoms with decreasing saturations were admitted and RTPCR was done. Their clinical data, vitals were noted during admission and Inflammatory markers were done. All the patients were treated depending on the severity of the disease based on Oxygen saturations, vitals, inflammatory markers, and CT severity score in those available.

Patients were categorised into mild, moderate, and severe disease and were treated accordingly.

All the patients were monitored clinically daily, pulse rate and oxygen saturations were noted regularly, Blood sugar levels were monitored regularly for all the patients with Diabetes and those kept on steroids. CRP, CBP, D-DIMER were done, ECG, Chest X ray/CT chest was done to all patients.

Patients with mild clinical symptoms, with no comorbidities and maintaining saturations >96% with room air considered as having mild disease.

All the patients with mild disease were treated either in wards or home isolation.

Tab.Paracetamol 650mg thrice /four times daily; Tab.Ivermectin 12mg once daily for 5 days; Tab.Doxycycline 100mg twice daily for 5 days; Tab. Zinc/Vit C/Vit BC; Tab.Cetirizine 10mg once or twice daily till symptomatic relief.

Patient with severe persistent cough, high grade fever, difficulty in breathing with saturations falling below 94% with room air, increased pulse rate and those with associated comorbidities were considered under moderately severe disease, were treated as per figure 1.

Falling saturations despite of oxygen; Increasing/decreasing heart rate. (>100 /<50 beats per minute); Increasing Blood sugar levels; New ECG changes; Dyselectrolytemia; Raising inflammatory markers - CRP >5 times (0-6 mg/dl), D-DIMER >2 times ULN

(<0.5); Increasing /decreasing Blood Pressures; Changes in conscious levels; CT severity score >15.

These were being observed as poor prognostic indicators for severe disease and treated as indicated in figure 2.

Clinical progression and outcome were noted data collected was analysed and results were noted.

### Results And Discussion::

Figure 3 illustrates the month wise distribution of COVID admissions of COVID-19 patients from the month of January 2021 to June 2021. It is obviously clear that during the starting months of the year 2021 (January and February) the cases were fading so the number of patients that have been admitted were less. But we can see the sudden and dramatic rise in the cases showing the surge of Second wave of COVID-19 starting from the mid of March,2021. Coincidentally it was the same timeline during which the first wave of COVID-19 has raised and the whole country went into a complete lockdown. The pinnacle was observed with sudden peaking in the month of the May 2021 with maximum admissions n=3779. At present it seems as if second wave is on rapid fall compared to the first wave where the cases slowly came down from March to October. Total number of cases admitted in April 2021 are n=2526; in May n=3779 and in month of June were n=1109.

Figure 4 shows that prevalence of COVID is slightly more in males compared to females. Total number of males admitted were n=4522(60.99%), total females admitted were n=2892 (39.01%) with male to female ratio of 1.5:1. Depicting the social and behavioural aspects playing a role in spread of COVID.

Figure 5 is showing the age-wise distribution of patients who were admitted during the months of April, May, and June. Age group was taken at a span of 20 years except for paediatrics age group. Total patients admitted in the age group of 0-10 years were n=20 (3%);11-30 were n=858(11,6%);31 to 50 years were n=2984(40.3%);51 to 70 years were n=2956(40%); and above 70 years were n=596(8.1%). It is clear from the above figure that common age group involved fell between 30 to 70 years. The least affected were children.

Figure 6 describes the total number of patients that have been recovered and discharged during the

period April,2021 and June,2021. Number of patients discharged in the month of April were n=1449; May were n=3149; and June were 1169 respectively.

For total 7414 admitted patients 5,767 patients were discharged after recovery with 77.78% patients being recovered as per this study in this hospital. Most of the patients with mild disease and moderate disease were recovered, but some of the patients with moderate disease landed in severe COVID disease and succumbed.

Figure 7 indicates total patients who needed high flow oxygen showing the severity of the disease were n=4,503 of which n=4,368 (97%)were kept on NRBM(non-rebreathing mask) providing 10-15 litres of oxygen to patient and n=135(3%) on NIV (non-invasive ventilation) supplying 25-60 litres of O<sub>2</sub>.Due to unexpected rise in need and consumption of oxygen ,the hospital has to face a very great fluctuations and pressure variations in oxygen flow at various levels, making maintenance of BIPAP difficult at some point of time.

Figure 8 illustrates the total number of deaths that have occurred during the months April to June,2021 due to the COVID-19 second wave. The number of patients died in the month of April were n=315; May were n=950; and June were n=291 respectively.

To summarise, the total number of patients that were admitted during the second wave of COVID-19 in the ACSR government medical college, Nellore are 7414 and the total number of patients who were discharged (i.e., recovered) are n=5767 which is 77.79% of the admitted patients during this period. The total number of patients who were died are n= 1556 which is 20.99% of the total admitted patients during this period. The remaining were n=91 patients which is 1.23% of the total admitted patients during this period were sent to higher care centre (LAMA)

Figure 9 compares the number of males and females died due to COVID-19 during the period of April to June 2021 from total admissions of 7174, maximum number of deaths occurred in month of May n=950 in which Male were 1013 and Female were 543.

Figure 10 compares the percentage of deaths that have occurred in specific age ranges due to COVID-19 second wave during the period of April to June 2021, total deaths recorded during these months were n=1556. Number of patients died in paediatrics age

group were n=06(3%); in the age group of 11 to 30 years were n=85(10%);31 to 50 years were n=490(16%);51 to 70 years were n= 703 (24%) and more than 70 years were n= 272(46%). Most of the aged people were succumbed to the disease again showing age to be one of the risk factors. Total patients requiring high flow oxygen indicating moderate to severe disease were n=4503 (60.8% and of 4503 patients 956 (21.23%) went into critical illness and could not be recovered.

As per our observation patients of older age group with associated risk factors like hypertension and diabetes progressed rapidly to critical disease. Some young individuals who presented late to the hospital also could not be saved, even with antivirals, high flow oxygen and steroids. Most of the patients who were stable in the first five days were rapidly deteriorated and the cause could not be evaluated. In some patients' early initiation of steroids during viral replication phase also became a cause for deterioration.

#### **Limitations:**

- We had insufficient data regarding comorbid conditions and clinical presentation at time of admission.
- We could not repeat inflammatory markers at regular intervals due to insufficient availability of reagents.
- CT chest could not be done in the months of May and June due to unavailability of CT machine at that time.
- Sudden drop and fluctuations of pressures in oxygen flow at different levels was observed in the month of May when oxygen demand has increased tremendously.
- Very late presentation of the patients either self or shifting from private hospitals with critically low saturations and in very poor condition and patient immediately succumbing to death gave us very less time in some patients to intervene.
- Hospital authorities could not implement strict restrictive measures on patients' attendants visiting the hospital, due to insufficient monitoring by security staff, which also had effect on disease spread for some extent among the family members.

#### **Suggestions:**

- Every teaching hospital should have a research wing to collect data and to evaluate the epidemics and pandemics for future planning and implementation epidemiological and treatment protocols to strengthen health care sector.
- Well-equipped 24-hour laboratory facility should be available for proper and complete evaluation.
- Multidisciplinary approach to the critically ill patients in ICU will help to reduce mortality and morbidity.
- ICU trained in sufficient numbers should be posted in all shifts in ICU for better patient monitoring and care.

#### **Conclusions:**

We conclude that step wise unlock process before complete decrease in COVID cases, due to socio-psychological and economical behaviour of the people, there is sudden surge in cases. During the month of May 2021 there is unexpected rise in COVID cases posing a challenge to health care system. This time there is enormous need of oxygen and due to mutant variants unpredictable number of lives were claimed. Again, old age, comorbidities, late presentation to the hospitals in severe conditions played major role for increased mortality.

Strict implementation of preventive measures will help in reducing the spread of the COVID. Intensive education of the patients to avail medical facilities available early in the course of disease would help to reduce the number of patients going into severe disease.

Timely intervention and multidisciplinary approach, good lab facility and technical support for planned demand-based oxygen supply with good nursing care can reduce mortality rate.

#### **References:**

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2. Marco Cascella; Michael Rajnik; Abdul Aleem; Scott C. Dulebohn; Raffaella Di Napoli; FEATURES AND TREATMENT OF CORONAVIRUS (COVID-19); NCBI resources; 17th July 2021.

Treatment protocols followed in ICU  
FOR MODERATE CASES: requiring low oxygen

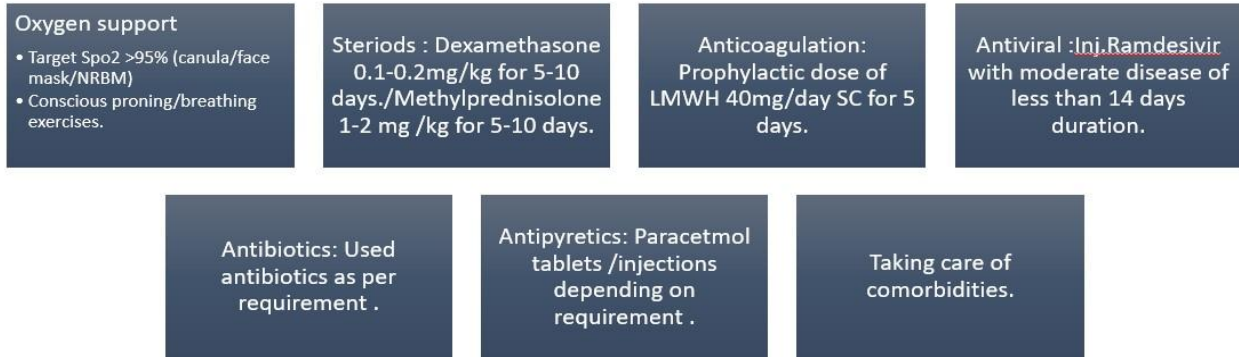


Figure 1

TREATMENT FOLLOWED FOR SEVERE DISEASE.  
REQUIRING HIGH OXYGEN

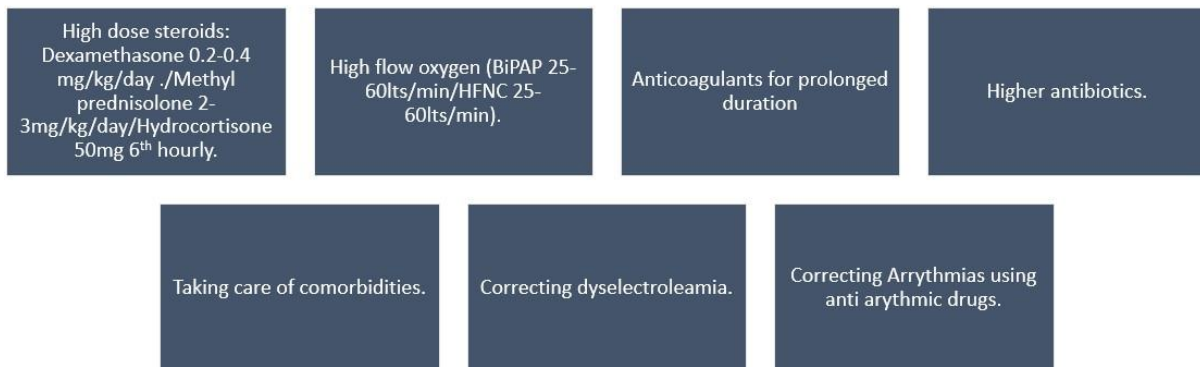


Figure 2

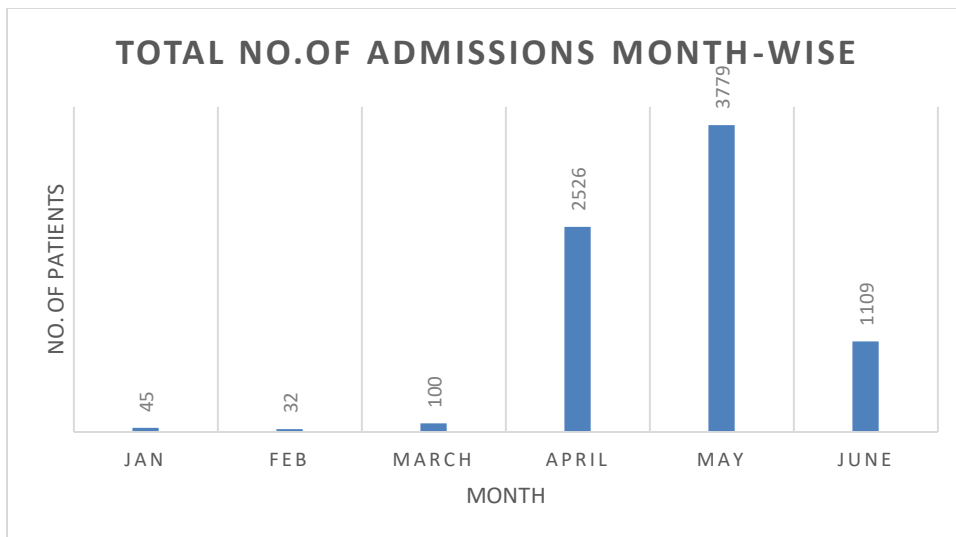


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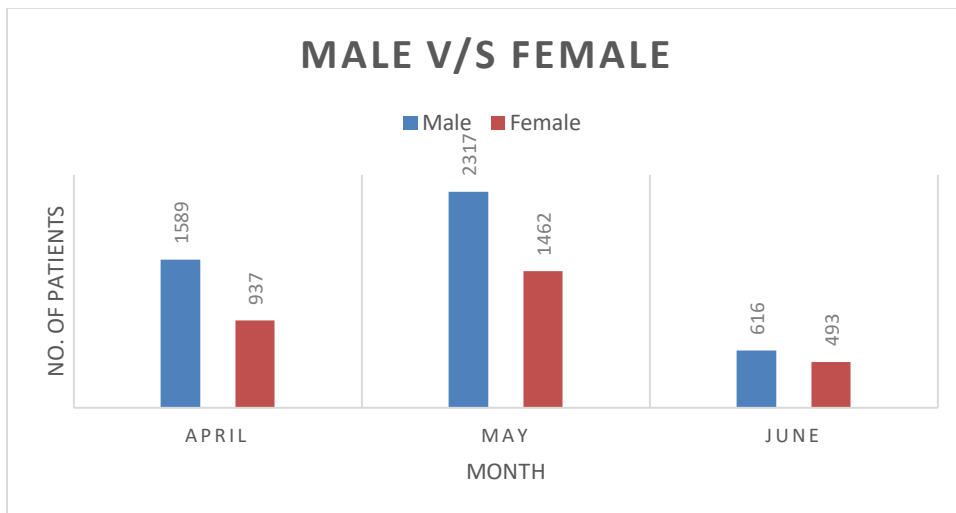


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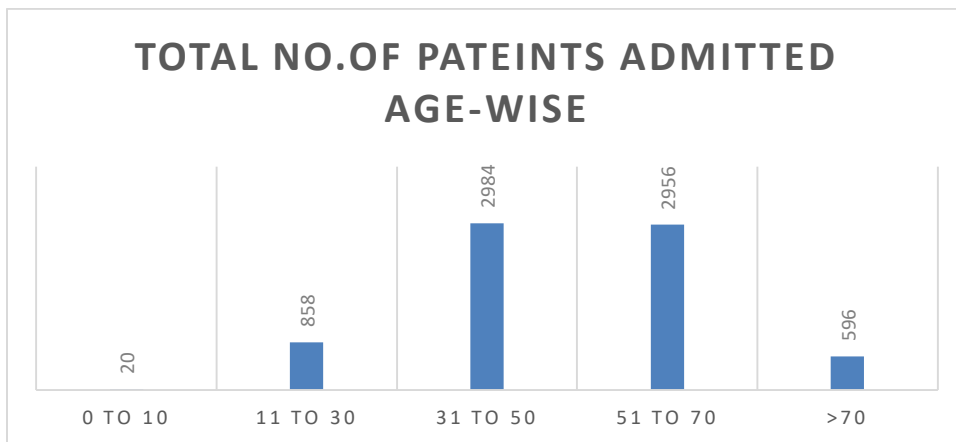


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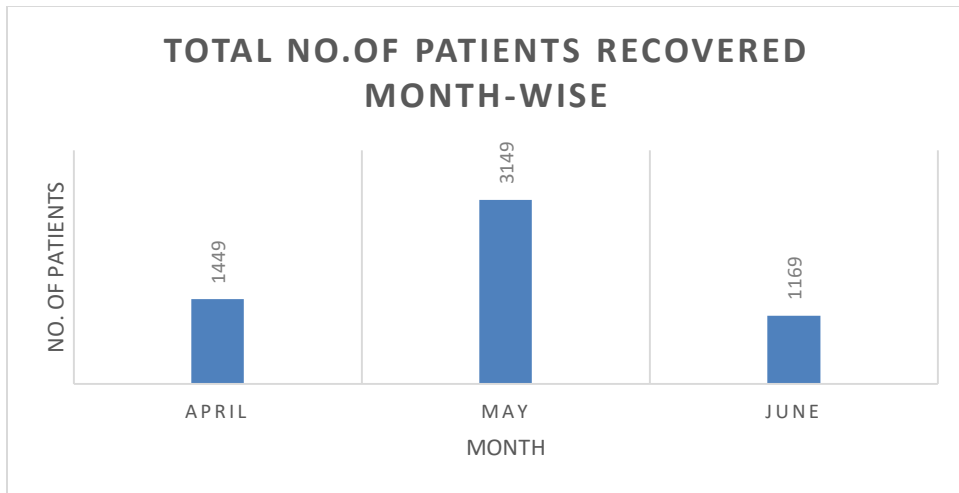


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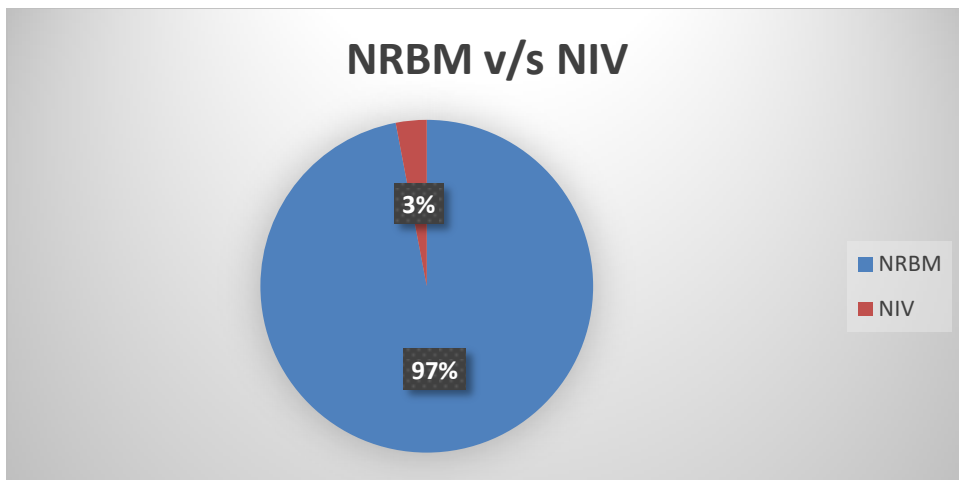


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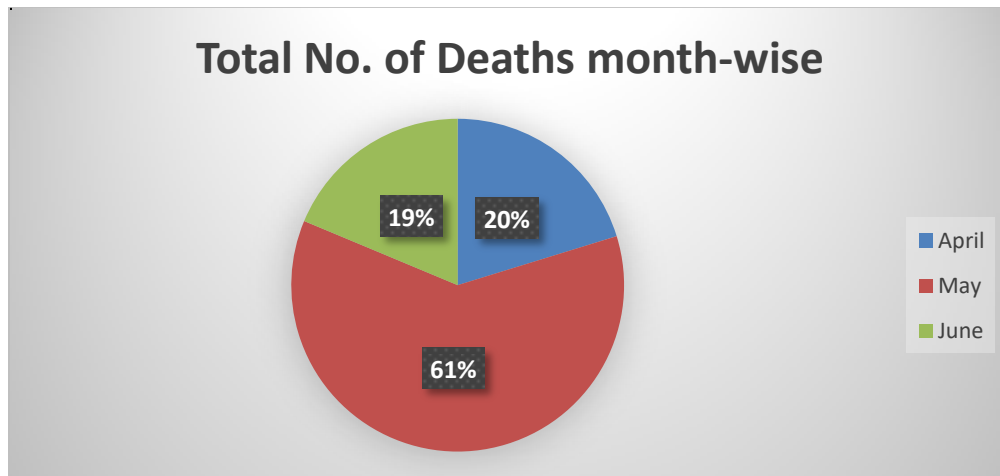


Figure 8

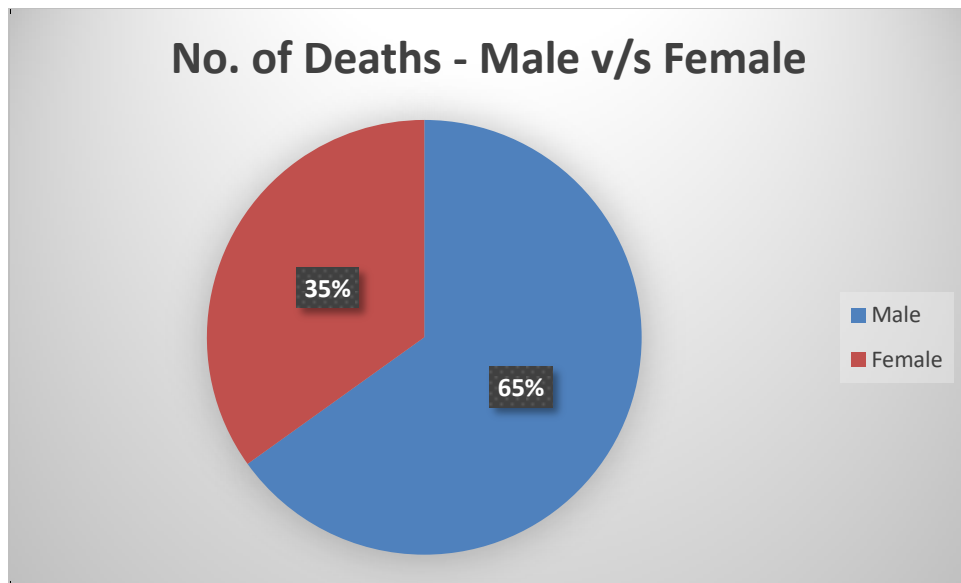


Figure 9

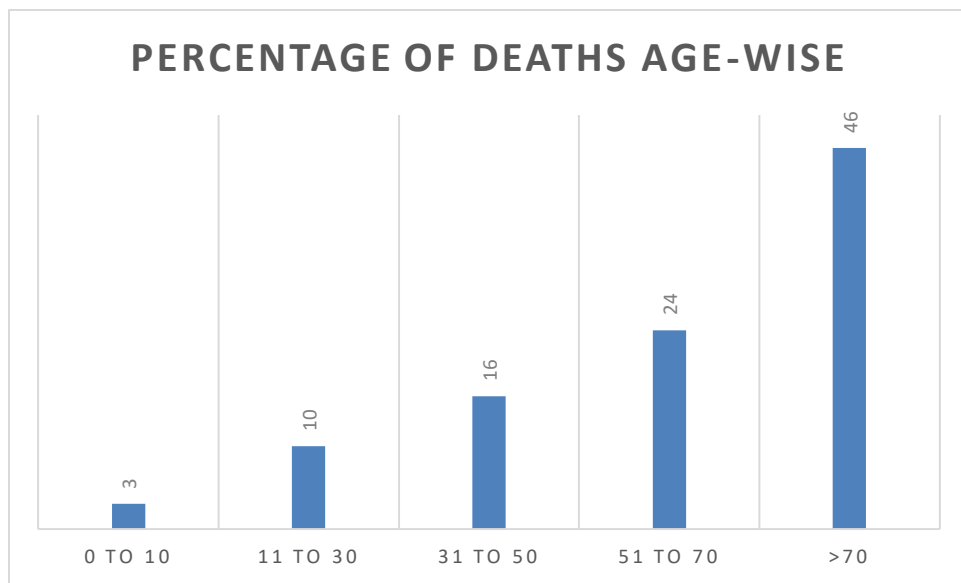


Figure 10