

## A Study to Evaluate Risk Factors associated with COVID-19 Intensive Care Unit Admissions and their in Hospital Outcome - “An Observational Study”.

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### ABSTRACT

**Background :** The novel coronavirus and the COVID19 infection it causes, has led to a global pandemic. From its first case in Wuhan, China in December 2019. Patients with risk factors like hypertension, diabetes, COPD, cardiovascular disease, cerebrovascular disease, liver disease, malignancy, renal disease are vulnerable to develop serious disease with higher morbidity and mortality and they need special monitoring.

**Material and Methods :** A total of 150 patients who were admitted for COVID 19 infection during period of March 2021 to May 2021 were included in this study. They were divided into two groups; Group A (patients admitted in ICU-75) and Group B (patients admitted in HDU-75). The clinical presentation, risk factors, laboratory parameters, Chest X ray & Chest CT severity score, were evaluated in the two groups and their in-hospital outcome was evaluated. The parameters were also compared in Survivors (102) and Non-survivors (48).

**Result :** Mean age of the study subjects was  $54.68 \pm 14.79$  years. The mean age of patients admitted in ICU and HDU was comparable however mean age of non survivors was significantly more than survivors ( $59.45 \pm 13.70$  vs  $52.43 \pm 13.70$  years). Hypertension (36%) and diabetes (27.33%) were most common comorbidities found in the study subjects associated with Covid19 infection, and were equally found in subjects admitted in ICU and HDU; as well as Survivors and Non-survivors. Fever and breathlessness were most common symptoms with which patient presented to covid casualty. Patients admitted in ICU and Non-survivors had significantly higher CRP, LDH, D Dimer, Ferritin, N/L Ratio and lower SPO2 on admission with Higher Scores on Xray Chest and HRCT thorax. All patients needed oxygen on admission. 69 patient required NIV support during their hospital stay. Of these 21 patients survived and were successfully discharged, 48 were later put on Invasive mechanical ventilation under sedation. However all these patients on sequential invasive mechanical ventilation succumbed during hospital stay.

**Conclusion :** All patients hospitalised during these peak times were hypoxic. Patients stationed in ICUs had higher Inflammatory markers and scores on Imaging and lower SPO2 on admission as compared to those stationed in HDUs. A total of 32% mortality was observed, of which 28% occurs in ICU and 4% in HDU. Hypertension and diabetes were the common comorbidities seen. Non-survivors had significantly lower SpO2 on admission, higher inflammatory markers and Scores on imaging and their random blood sugars were also high as compared to survivors..

**Keywords :** COVID 19, Risk factors, Inflammatory Markers, CT Severity Score, Outcome.

### Introduction :

The novel coronavirus and the COVID19 infection it causes, has led to a global pandemic. From its first case in Wuhan, China in December 2019, it has spread to Europe, USA and India, among other countries, with devastation. A robust scientific and medical literature emerged to provide information on patients vulnerable to succumbing to the

infection. The second wave with increasing number of cases in extensive geographical locations has been a cause for widespread world wide concern.

On the onset of COVID 19 infection, typical symptoms are fever, cough, myalgia and fatigue, diarrhoea. In the course of disease a subset of patient show pneumonia with abnormal findings on Chest CT or Chest X ray. Cases are stationed in intensive care unit (ICU) and HDU/WARD according to their clinical status and availability of beds. The presence of hypertension, diabetes, COPD, cardiovascular disease, cerebrovascular disease, liver disease, malignancy, renal disease are major risk factors for patients with COVID-19<sup>1</sup>.

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Patients with risk factors are vulnerable to develop serious disease with higher morbidity and mortality and they need special monitoring<sup>2,3,4,5</sup>.

With the second wave, GMCH Nagpur, witnessed large number of patients hospitalised for COVID 19 infection. This research is aimed to assess the risk factors, clinical characteristics, underlying comorbid conditions, biochemical and radiological parameters, in-hospital patient stay and the outcome of patients admitted in Intensive Care Unit and High definition Units.

#### **Aims :**

- To evaluate the Risk factors / Co-Morbidities present in COVID -19 Patients hospitalised in Intensive Care Units and High definition Units.
- To study the in hospital outcome of these patients.
- To compare the Risk factors / Co-Morbidities in Survivors and NonSurvivors.

#### **Methodology :**

**Study Design :** Hospital Based Prospective Observational Study.

#### **Material and Methods :**

**Place of Study :** Tertiary Care Hospital in central India

**Duration of Study :** From March 2021 to May 2021

**Sampling Method and Sample Size :** The Study was approved by Institutional Ethical Committee. A total of 150 hypoxic patients that were RTPCR positive for SARs COV-19 and admitted in the ICUs and High Definition Wards of the tertiary care centre were evaluated for Symptoms on admission, presence of Risk factors, Co-morbidities, Laboratory parameters, Duration of Hospital Stay and In-Hospital Outcome in this prospective observational study. The criteria for ICU admission included; “severe disease”, defined as tachypnoea (RR >30/m), or saturation < 90% on room air, and/or patients with hemodynamic instability and/or encephalopathy. However during the peak surge non- availability of ICU beds turned the admissions towards High Definition Units with availability of oxygen, ventilatory support and health care

professional teams caring for them round the clock. The various parameters were also evaluated in Survivors and Non-Survivors.

Percentage of patient had HTN in covid + patient reported in published article<sup>1</sup>

- 1) Percentage of patient had HTN in covid + patient = 49.5%
- 2) Absolute precision = 8
- 3) Desired confidence level = 95
- 4) Sample size = 150

Demographic, Inflammatory markers, lab parameters were presented as Mean ± SD and categorical variables were expressed in frequency and percentage. Categorical variables were compared between two groups by performing CHI Square test. Demographic, inflammatory markers, lab parameters were compared between two groups by performing independent “t” test. For small numbers fisher exact test was used, wherever applicable. “p” value < 0.05 was considered statistically significant. Statistical software “STATA” version 14.0 was used for data analysis.

**Exclusion Criteria :** RT-PCR negative SARI patients

**Conflict of Interest :** None

**Risk Factors :** None

#### **Results :**

150 patients that were RTPCR Positive for covid 19 infection and were hospitalised in GMCH Nagpur were included in the study. They were divided into two groups - GROUP A - n = 75 ICU admissions, GROUP B - n = 75 HDU admissions.

**Table 1 : Clinical Profile & Risk Factors of Study Subjects**

	<b>Total Cases n = 150</b>	<b>Group-A n = 75</b>	<b>Group-B n = 75</b>	<b>p-value</b>
Mean Age in years	54.68 ± 14.79 (22 - 85)	55.41 ± 14.98 (22 - 85)	53.94 ± 13.38 (22 - 81)	0.5283
Gender (Male / Female)	99/51	46/29	53/22	0.228, NS
Fever	101 (67.33 %)	56	45	0.055, NS
Cough	63 (42 %)	42	21	0.001, HS
Breathlessness	87 (58%)	48	39	0.137, NS
Weakness	21	5	16	0.010, S
Body ache	5	4	1	0.367, NS
Sore throat	5	1	4	0.367, NS
Chest pain	3	2	1	1.000, NS
Hypertension	54 (36%)	34 (45.33%)	20 (26.66%)	0.017, S
Diabetes	41 (27.33%)	24 (32%)	17 (22.66)	0.001, HS
IHD	4	2	2	1.000, NS
CKD	2	2	0	0.497, NS
CVE	3	1	2	1.000, NS
Seizure disorder	2	2	0	0.497, NS
Others	6	4	2	--
Total	112	69	43	
HTN+DM	25	14	11	
HTN+DM+IHD	4	2	2	
Duration of stay in days	16.69 ± 8.10	16.94 ± 9.17	16.44 ± 6.93	0.7034, NS

The mean age and gender distribution in the two study groups was comparable. Patient were admitted with complaints of fever, cough, breathlessness, weakness, body ache, sore throat, chest pain. Fever (67.33) & breathlessness (58%) were the most common complaints on admission and were comparable in both the groups. Mean duration of in hospital in both groups was comparable.

Of the total 150 patients included the study, On history Comorbidities were present in 69 patients hospitalised in ICU as compared to 43 in HDUs. Most common comorbidities present were Hypertension (45.33%) followed by Diabetes (32%) in ICU admissions and Hypertension (26.66%) followed by Diabetes (22.66%) in HDU admissions.

Around total 25 patients has more than two comorbidities (hypertension + DM) and 4 has more than three comorbidities (hypertension+IHD+DM)

**Table 2 : Clinical and Biochemical Parameters in Study Subjects admission**

	<b>Total Cases n = 150</b>	<b>Group-A n = 75</b>	<b>Group-B n = 75</b>	<b>p-value</b>
SPO2 on adm	84.14 ± 9.56	81.81 ± 11.05	86.46 ± 7.14	0.0026, HS
SBP (mmhg)	122.07 ± 14.23	122.12 ± 17.72	122.02 ± 9.69	0.9681, NS
DBP (mmhg)	79.04 ± 10.32	79.45 ± 10.37	78.62 ± 10.32	0.6255, NS
Resp Rate	24.95 ± 5.20	27.65 ± 5.59	22.25 ± 2.91	<0.0001, HS
Pulse Rate	80.81 ± 11.79	84.22 ± 13.27	77.4 ± 8.96	0.0003, HS
Hb (gm/dl)	12.06 ± 2.09	12.06 ± 2.24	12.07 ± 1.95	0.9787, NS

WBC	9556.03 ± 4651.45	10800 (7800 - 19800)	7600 (5800 - 16100)	<0.0001, HS
N/L ratio	3.95 ± 0.46	4.27 ± 0.42	3.63 ± 0.19	<0.0001, HS
Sr. Bilirubin (mg%)	1.049 ± 0.3519	1.12 ± 0.39	0.98 ± 0.29	0.0134, S
SGOT (u/L)	55.88 ± 29.95	56.08 ± 33.30	55.69 ± 26.63	0.9375, NS
SGPT (u/L)	91 ± 42.86	97.32 ± 44.74	84.68 ± 40.20	0.0111, S
Creatinine (mg%)	1.093 ± 0.538	1.16 ± 0.71	1.01 ± 0.24	0.0864, NS
Urea (mg%)	50.47 ± 18.73	57.84 ± 21.13	43.09 ± 12.23	<0.0001, HS
CRP (mg/L)	86.05 ± 62.56	122.76 ± 64.65	49.33 ± 31.11	<0.0001, HS
D-Dimer (mg/L)	1.42 ± 1.13	2.15 ± 1.16	0.69 ± 0.34	<0.0001, HS
Sr. Ferritin (ug/L)	710.36 ± 552.93	1103.32 ± 544.50	317.4 ± 78.09	<0.0001, HS
LDH (u/L)	1115.82 ± 1370.49	1493.26 ± 1859.23	738.37 ± 190.69	0.0006, HS
FBS (mg/dl)	163.46 ± 74.12	159.0 ± 58.10	167.93 ± 87.45	0.4624, NS
RBS (mg/dl)	200.08 ± 59.06	208.36 ± 66.41	191.8 ± 49.72	0.0860, NS
HbA1C%	6.40 ± 1.37	6.49 ± 1.50	6.31 ± 1.23	0.4279, NS

Respiratory Rate, Pulse rate, WBC Count, Crp, N/L ratio, D DIMER, Sr. Ferritin, LDH were higher in ICU patients as compared to those hospitalised in HDUs. Two patient admitted in ICU care had WBC count more than 2 lakh and before evaluation of the cause, they succumbed. Hence their value were excluded while calculating Mean count of WBC.

Only 44 (29.33%) of Study Subjects had and HBA1c < 5.7%. In 34.66% of Study subjects the HBA1c was between 5.7 - 6.5. 36% of patients had an HBA1c of > 6.5%. Postprandial blood sugar > 200 mgm% was found in 50% of patients during hospitalisation and between 140-200 in 31.33% of study subjects. Only 28 subjects (18.66%) of study subjects had a

postprandial sugar of less than 140 mgm%. Subjects having sugars more 140 mgm% were on additional sliding scale of insulin doses in addition to the Basal insulin doses twice a day as required and oral hypoglycaemic drugs required. These being the peak times patients with normal oxygen saturations were being referred to Covid Care Center - CCC for treatment and observation. Only patients with Hypoxia and complications were hospitalised in our Tertiary Care Center. However more hypoxic patients were stationed in ICUs. Mean SPO2 on admission was 84.14 ± 9.56, it being significantly lower in ICU subjects 81.81 ± 11.05 % as compared to 86.46 ± 7.14 % in HDU subjects.

**Table 3 : In-Hospital Outcome in Study Subjects**

	<b>Total Cases n = 150</b>	<b>Group-AICU n = 75</b>	<b>Group-B HDU n = 75</b>	<b>p-value</b>
Non Survivors	48 (32%)	42 (28%)	6 (4%)	<0.0001, HS
Survivors	102 (68%)	33 (22%)	69 (46%)	

The number of patients that succumbed of Covid -19 in hospital was 48 (32%) of which 42 were admitted in ICU and 6 were admitted in HDU. 6 patients (4%) succumbed in HDU during these peak times due to

nonavailability of ICU beds. However HDUs had all facilities and were fully equipped including manpower. 102 (68%) of the patients could be discharged.

**Table 4 : X-Ray Chest Score in Study Subjects**

X-Ray Chest Zone Involvement	Total Cases n = 150	Group-A n = 75	Group-B n = 75	p-value
1	4	0	4	Chi 2 = 91.92 P < 0.001, HS
2	20	0	20	
3	40	15	25	
4	30	5	25	
5	44	43	1	
6	12	12	0	
Mean	3.84 ± 1.28	4.69 ± 0.97	2.98 ± 0.94	< 0.0001, HS

Means X-Ray Chest Zone involvement was 3.84 ± 1.28. The Zone involvement for Subjects admitted in ICU was significantly higher than those admitted in HDUs.

**Table 5 : HRCT Thorax Score in Study Subjects**

HRCT Score out of 25	Total Cases n = 150	Group-A n = 75	Group-B n = 75	p-value
0 - 5	0	0	0	Chi 2 = 60.86 p < 0.0001, HS
6 - 10	7	0	7	
11 - 15	52	7	45	
16 - 20	72	50	22	
> 20	19	18	1	
Mean	16.56 ± 3.53	18.88 ± 2.13	14.24 ± 3.11	< 0.0001, HS

Mean CTSS of the patient was 16.56 ± 3.53. The CTSS for Subjects admitted in ICU was significantly higher than those admitted in HDUs.

**Table 6 : In-Hospital Oxygen Support to Study Subjects**

	Total Cases n = 150	Group-A n = 75	Group-B n = 75	p-value
Nasal Canula	5	0	5	0.023, S
O2 Mask	46	6	40	< 0.0001, HS
NRBM	58	30	28	0.737, NS
NIV	68	47	21	< 0.0001, HS

As per the Clinical status the Oxygen Delivery device was initiated and stepped up in ICU & HDUs. Subjects maintaining saturation above 90% on Nasal Cannula and < 10 L O<sub>2</sub> on mask / NRBM were stationed in HDUs. Significantly more number of subjects were on Simple face Mask in HDU. Subjects on > 10 L O<sub>2</sub> by Simple Face Mask &

NRBM were stationed in ICU. Of total 150 study subjects, 68 patient required NIV support. Of these 47 were in ICU and 21 were in HDU. All patient were put on invasive mechanical ventilation when they failed to maintain on NIV. However none of the patients put on Invasive Mechanical Ventilation survived.

**Table 7 : Clinical and Biochemical Parameters in Study Subjects admission**

	<b>Total Cases n = 150</b>	<b>Group-A n = 75</b>	<b>Group-B n = 75</b>	<b>p-value</b>
SPO2 on adm	84.14±9.56	81.81±11.05	86.46±7.14	0.0026, HS
SBP (mmhg)	122.07±14.23	122.12±17.72	122.02±9.69	0.9681, NS
DBP (mmhg)	79.04±10.32	79.45±10.37	78.62±10.32	0.6255, NS
RR/min	24.95±5.20	27.65±5.59	22.25±2.91	<0.0001, HS
PR/min	80.81±11.79	84.22±13.27	77.4±8.96	0.0003, HS
Hb (g/dl)	12.06±2.09	12.06±2.24	12.07±1.95	0.9787, NS
WBC	9556.03±4651.45	10800 (7800-19800)	7600 (5800-16100)	<0.0001, HS
Sr. Bilirubin (mg%)	1.049±0.3519	1.12±0.39	0.98±0.29	0.0134, S
SGOT (u/L)	55.88±29.95	56.08±33.30	55.69±26.63	0.9375, NS
SGPT (u/L)	91±42.86	97.32±44.74	84.68±40.20	0.0111, S
Creatinine (mg%)	1.093±0.538	1.16±0.71	1.01±0.24	0.0864, NS
Urea (mg%)	50.47±18.73	57.84±21.13	43.09±12.23	<0.0001, HS
CRP (mg/L)	86.05±62.56	122.76±64.65	49.33±31.11	<0.0001, HS
N/L ratio	3.95±0.46	4.27±0.42	3.63±0.19	<0.0001, HS
D-Dimer (mg/L)	1.42±1.13	2.15±1.16	0.69±0.34	<0.0001, HS
Sr. Ferritin (ug/L)	710.36±552.93	1103.32±544.50	317.4±78.09	<0.0001, HS
LDH (u/L)	1115.82±1370.49	1493.26±1859.23	738.37±190.69	0.0006, HS
FBS (mg/dl)	163.46±74.12	159.0±58.10	167.93±87.45	0.4624, NS
RBS (mg/dl)	200.08±59.06	208.36±66.41	191.8±49.72	0.0860, NS
HbA1C%	6.40±1.37	6.49±1.50	6.31±1.23	0.4279, NS

Respiratory Rate, Pulse rate, WBC Count, Crp, N/L ratio, D DIMER, Sr. Ferritin, LDH were higher in ICU patients as compared to those hospitalised in HDUs. However two patient admitted in ICU care had WBC count more than 2lakh and unfortunately they succumbed before they could be hematologically evaluated. Hence their value were

excluded while calculating Mean values of WBC. The mean HBA1c was 6.40 ± 1.37 in the study subjects and sugars were high in almost all subjects despite Diabetes history being present in 27%

The various parameters studied were also Compared in Survivors (102) and NonSurvivors (48).

**Table 8 : Clinical and Biochemical Profile in Survivors and Non Survivors**

	<b>Non survivors (n=48)</b>	<b>Survivors (102)</b>	<b>p-value</b>
Mean Age in years	59.45±14.12	52.43±13.70	0.0043, HS
Gender (Male / Female)	31/17	68/34	0.802, NS
Fever	38 (79.16%)	63 (61.76%)	0.034, S
Cough	22 (45.83%)	41 (40.19%)	0.514, NS
Breathlessness	30 (62%)	57 (55.88%)	0.444, NS
Weakness	4	17	<0.001, HS
Body ache	3	2	0.328, NS
Sore throat	1	4	0.367, NS
Chest pain	1	2	1.000, NS

CRP (mg/L)	126.37 ± 66.80	67.07 ± 50.60	< 0.0001, HS
N/L ratio	4.32 ± 0.43	3.78 ± 0.36	< 0.0001, HS
D-Dimer (mg/L)	2.23 ± 1.24	1.04 ± 0.84	< 0.0001, HS
Sr. Ferritin (ug/L)	1258.96 ± 620.63	452.19 ± 247.88	< 0.0001, HS
LDH (ug/L)	1434 (1022.5-2141)	829.5 (688-1330)	< 0.0001, HS
FBS (mg/dl)	171.60 ± 61.28	159.63 ± 79.45	0.3581, NS
RBS (mg/dl)	221.39 ± 71.91	190.05 ± 49.20	0.0022, NS
HbA1C %	6.51 ± 1.65	6.34 ± 1.22	0.4906, NS
Duration of stay in days	13.18 ± 6.48	18.34 ± 8.29	0.0002, HS

Mean age of Non-survivors was 59.45 ± 14.12 years as compared to 52.43 ± 13.70 years in survivors This was statistically significant.

The symptoms in Survivors and Non survivors were comparable, except fever that was found in 79.16% of Non survivors as compared to 61.76% of survivors.

Non survivors had significantly more deranged value of Inflammatory markers and had higher random blood sugar levels in comparison with survivors.

Duration of hospital stay in Non Survivors was significantly less than in Survivors

**Table 9 : Comorbidities in Survivors and Non Survivors**

Comorbidity	Non survivors (n=48)	Survivors (102)	p-value
Hypertension	22 (45.83%)	32 (31.37%)	0.085, NS
Diabetes	18 (37.50%)	23 (22.54%)	0.055, NS
IHD	2 (4.16%)	2 (1.96%)	0.719, NS
CKD	1 (2.08%)	1 (0.98%)	0.539, NS
CVE	1 (2.08%)	2 (1.96%)	1.000, NS
Seizure disorder	2 (4.16%)	0	0.101, NS
Others	2 (4.16%)	5 (4.9%)	1.000, NS

Of total patient who succumbed to covid 19 infection, 45.83% had hypertension as comorbidity followed by 37.50% had diabetes; similarly history of hypertension (31.37%) and diabetes (22.54%)

were most common co-morbidities seen in Survivors. Others being Ihd, ckd, cve, seizure disorder, hypothyroidism, malignancy.

**Table 10 : SPO2 on admission in Survivors and Non Survivors**

	Non survival (n=48)	Survival (102)	p-value
SPO2 on admission	78.89 ± 12.19	86.60 ± 6.82	< 0.0001, HS

Non survivors had significantly lower SPO2 on admission as compared to Survivors.

**Table 11 : Chest X-Ray score in Survivors and Non Survivors**

Xray Chest Zone Involvement	Non survival (n=48)	Survival (102)	p-value
1	1	3	Chi 2 = 34.56 P < 0.001, HS
2	2	18	
3	6	34	
4	5	25	
5	26	18	
6	8	4	
Mean X-ray score	4.60 ± 1.16	3.48 4.60 ± 1.16	< 0.0001, HS

The mean X- Ray Chest Scores for Non- Survivors was significantly higher than the Survivors.

**Table 12 : HRCT Thorax Score in Survivors and Non Survivors**

HRCT Score out of 25	Non survival (n=48)	Survival (102)	p-value
0 - 5	0	0	Chi 2 = 27.46 P < 0.001, HS
6 - 10	2	5	
11 - 15	3	49	
16 - 20	32	40	
> 20	11	8	
Mean CT Score	18.77 ± 2.83	15.51 ± 3.35	< 0.0001, HS

Mean CTSS in patient who succumbed to covid 19 was 18.77 ± 2.83 as compared to 15.51 ± 3.35. in Survivors and this was statistically significant.

**Table 13 : Oxygen Delivery Devices in in Survivors and Non Survivors**

	Non survival (n=48)	Survival (n=102)	p-value
Nasal Canula	0	5	0.177, NS
O2 Mask	6	40	0.001, HS
NRBM	13	45	0.046, S
NIV	48	20	< 0.001, HS

Of total 48 patients who succumbed to covid 19 infection, 29 patient on day one of admission required NIV support, while 19 patients were put on NIV support during their course of hospital stay, who were initially on NRBM or O2mask. 48 patient who succumbed to covid 19 terminally were on invasive mechanical ventilatory support. None of

the patients put on Invasive Mechanical ventilator could be weaned off.

Of the 102 Survivors, 12 of them required NIV support on day one of admission, while 8 required NIV subsequently during their hospital stay and they were successfully weaned off.



**Discussion :**

The COVID19 infection led to a global pandemic. The second wave with high number of cases with increased morbidity and mortality has been a cause for widespread world wide concern. A robust scientific and medical literature emerged to provide information on patients vulnerable to succumbing to the infection. In this study we have observed the relation between various Clinical, Laboratory, X ray Chest, HRCT thorax findings in COVID 19 Positive patient admitted in GMCH, Nagpur during period of March 2021 to May 2021.

150 subjects with a mean age of  $54.68 \pm 14.79$  years were included in the study. The Non Survivors had higher mean age of  $56.45 \pm 14.12$  years as compared to the survivors -  $52.43 \pm 13.70$  years. *Xiaochen li et al* in their study also found that older age was associated with a higher mortality in Covid 19 infection.

As described in literature, fever followed by breathlessness was the most common presentation in the study population. Other presenting symptoms were weakness, sore throat, myalgia and diarrhea.

Hypertension was found to be the most common comorbidity associated with covid 19 infection , around 45.33 % of patient admitted in ICU care and 26.66% of patient admitted in HDU had hypertension. *Yanbin Du and Nan Zhou et al*<sup>8</sup> in their meta-analysis suggested that hypertension was independently associated with a significantly increased risk of critical COVID-19 and in-hospital mortality of COVID-19. However in our study no significant effect of history of Hypertension was associated with the outcome. The in hospital Blood Pressures of the study subjects were under control and comparable in Survivors and Non-Survivors .

Though the number of patients with history of known Diabetics were 27.33%. High Blood sugars were found in 82.34% of patients. Random blood sugars were significantly higher in non-survivors as compared to survivors. The mean HBA1c levels were high in study subjects and levels were comparable in survivors and non survivors, accounted by undiagnosed diabetes and pre diabetic

subjects. Stress Hyperglycaemia, Covid Diabetes or Steroids induced hyperglycaemia may be accounting for the increased hyperglycaemia found in our study subjects during hospitalisation, more so in the non survivors. It is imperative to use discretion in use of steroids and effective monitoring and treating hyperglycaemia is warranted. Indiscriminate use of steroids has been incriminated as the precipitating cause for hyperglycaemia, increased morbidity, mortality and further complications like secondary bacterial infections, fungal infection like mucormycosis & aspergillosis and avascular necrosis of hip.

The mean SPO2 on admission was  $84.14 \pm 9.56\%$  in the subjects hospitalised. As per government of India Guidelines and severe shortage of beds during the second peak, it was essential to triage the patients for allotment of ICU and HDU beds. Only Hypoxic patients were hospitalised in our COVID CARE Hospital. The Mild nonhypoxic patients were stationed, observed and isolated at either their homes or Covid Care Centers. The HDUs were also well equipped with Oxygen delivery devices, Ventilators and Man power. The Non survivors were significantly more serious and hypoxic on admission itself as compared to Survivors with a mean SPO2 of  $78.89 \pm 12.19\%$  vs  $86.60 \pm 6.82\%$  in survivors. Hence this brings forth the importance of careful monitoring and timely hospitalisation, triage and support in case hypoxia develops<sup>6,7</sup>.

X-ray Chest and HRCT scores were significantly higher in COVID-19 ICU subjects as compared to HDU subjects and so also in Non survivors as compared to Survivors. Dong son et al in their study said that CT quantitative parameter were significantly correlated with outcome.<sup>10</sup>

Patient with more deranged values of inflammatory markers such as CRP, Ferritin, LDH, D Dimer, were associated with severe disease progress and more mortality<sup>8</sup>. A study done by *Ian Huang et al* and Raymond pranata also found that deranged level of CRP, Ferritin and D Dimer were associated poor outcome and more severe infection.

All patients on admission needed oxygen through Nasal Cannula, Face Mask, NRBM, NIV, or Invasive Ventilation. Of total 150 study subjects, 69 patient required NIV support during their hospital stay. Of these 21 patients survived and were successfully discharged. Of total 48 Non Survivors, all were put on Invasive mechanical ventilation under sedation when they failed to maintaining saturation on NIV. However invasive mechanical ventilation was associated with 100% mortality.<sup>10</sup>

### Conclusion :

All patients hospitalised during these peak times were hypoxic. Patients stationed in ICUs had higher Inflammatory markers and scores on Imaging and lower SpO<sub>2</sub> on admission as compared to those stationed in HDUs. A total of 32% mortality was observed, of which 28% occurs in ICU and 4% in HDU. Hypertension and diabetes were the common comorbidities seen. Non-survivors had significantly lower SpO<sub>2</sub> on admission, higher inflammatory markers and Scores on imaging and their random blood sugars were also high as compared to survivors.

**Limitation of the Study :** Scoring systems like SOFA, APACHE to assess the clinical status have not been applied to compare and evaluate the clinical status of the patients. The treatments and ventilatory settings, though given as per protocols have not been assessed in this study in terms of Antiviral medications, Steroids, Monoclonal Antibodies, Various insulin regimes received by the patients. Further studies with larger sample size, and more study sites are needed to establish the effect of treatment protocols on outcome.

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