**Original Research Article**

**Study of Covid-19-challenges and outcomes in a tertiary care hospital**

**1. DR.G.SELVARAJ, 2. DR.M.RAVEENDRAN \* , 3. DR.T.RAVIKUMAR**

1. ASSOCIATE PROFESSOR OF MEDICINE, GOVERNMENT MEDICAL COLLEGE AND ESI HOSPITAL, COIMBATORE

2. DEAN & PROFESSOR OF MEDICINE, GOVERNMENT MEDICAL COLLEGE AND ESI HOSPITAL, COIMBATORE

3. MEDICAL SUPERINTENDENT,& PROFESSOR OF MEDICINE, GOVERNMENT MEDICAL COLLEGE AND ESI HOSPITAL, COIMBATORE

\*CORRESPONDING AUTHOR

**ABSTRACT:**

**AIM:**The present study aimed to focus the challenges faced by a tertiary care medical college hospital (exclusive covid-19 care hospital during pandemic) setup in Coimbatore Tamilnadu, India.

 **MATERIALS AND METHODS:**All in patients admitted with RTPCR positive covid-19 in between 1st March2020 to 30th November2021, in GMC ESIC, COIMBATORE, and TAMILNADU are taken for study

**RESULTS:**A total number of 24,639patients with RTPCR POSITVE COVID-19 were included in the study. Details of co morbidity collected by a questionnaire and confirmed by clinical assessment as well as laboratory methods , highly un predictable outcomes in the initial period of first wave was the most difficult challenge , but during second and third waves, availability of newer drugs and vaccines for immunisation considerably reduced the morbidity and mortality

**CONCLUSIONS:** controlling of all chronic diseases like diabetes mellitus, hypertension, COPD, liver diseases, and reducing weight, life style modification, healthy diet with standard guidelines ,Early testing, and admission in right time will prevent morbidity and mortality**.**  Patients with co-morbidities should get fully vaccinated as early as possible as per government guidelines

**KEY WORDS:** COVID-19, CHALLENGES, CO MORBIDITIES, OUTCOMES

**INTRODUCTION**

COVID 19 has disrupted routine medical care. Life saving drugs, equipments like ventilators, continuous oxygen supply is diverted to the COVID 19 patients. The entire workforce was diverted towards management of COVID 19 cases, compromising the management of other diseases, All these led to increase in morbidity and mortality Patients admitted between1st March2020 to 30th November2021, are taken for study. The patients with co-morbidities are analyzed and treated for covid-19 as well as co morbid conditions poly pharmacy and drug interactions are taken care by a special team and closely observed and prevented. we are discussing most challenging things faced during Covid-19in a tertiary care covid-19 hospital which followed WHO , ICMR,CENTRAL, AIIMS, STATE GOVERNMENT and INSTITUTIONAL GUIDELINES for treating the covid cases in and around Coimbatore district .Many of the patients admitted are having co- morbidities ,required more complex clinical management, resulted in increased morbidity and mortality.Team approach with daily zoom meeting with experts all over the country , telemedicine guidelines from state and central government, ICMR, WHO guidelines are really useful to tackle the situation

It is a team work. Planning andconstituting the right team with right persons for every activity is the first challenge, A team for training,(training the trainers at state level district level and college level ) A team for support , food and accommodation during duty, post duty quarantine. A Team to procure and distribute the personal safety equipments, sanitizers. From various government and non government agencies, a team to arrange transport of staff during lockdown. A Team to disinfect, fumigate the wards, outpatient and inpatient departments, laboratories, theatres, and A team to ensure proper disposal of biomedical wastages which include enormous amount of personal protective equipment kits, gloves, goggles, caps and masks, team to arrange ,transport to provide and serving hot food, water and support diet to thousands of in patients , workers, doctors, nurses, and entire supporting staff involved in patient care during pandemic lockdown. One of the most challenging in pandemic is to mentally prepare The Health Care workers in a very short period, though all the materials are available in social media, like Google and guidelines by various authorities, almost all the messages in whatsapp or face book or in news channels are creating panic in the name of awareness programmes and lot of misinformation, wrong treatment advices, herbal, food, natural remedies (?) a even one person advertised to take covid cure laddu (a sweet)to cure covid and got arrested by police after complaint , anti canvass for treatment and testing, anti vaccination campaigns prevented the real patients to get treatment in right time during the pandemic.

**MATERIALS AND METHODS:**

All in patients admitted with RTPCR positive covid-19 in between 1st March2020 to 30th November2021, in GMC ESIC, COIMBATORE, and TAMILNADU are taken for study

**RESULTS:**

A total number of 24,639patients with RTPCR POSITVE COVID-19 were included in the study. Details of co morbidity collected by a questionnaire and confirmed by clinical assessment as well as laboratory methods , highly un predictable outcomes in the initial period of first wave was the most difficult challenge , but during second and third waves, availability of newer drugs and vaccines for immunisation considerably reduced the morbidity and mortality

**TRAINING CHALLENGES**

 PPE, Donning and doffing to all are new to government hospitals. They are using PPE only for conducting delivery in labour ward for HIV patients or in theatres while operating on Hepatitis B or C positive patients. Donning and doffing guidelines and hands on training given to each and every individual healthcare workers daily three times for three months. Irrespective of the cadre all ( From dean to last grade cleaning staff )attended. All are advise to maintain social distance, proper segregation of biomedical wastage,

 Long working hours and unaccustomed PPE dress which ,made them drenched with sweat, producing rashes in many ,not able to drink water or eat food for 8-10 hours or till the reliever comes and takeover , not even able to address the nature calls , isolation after the work, quarantine after the duty days, staying away from family for months together, Frequent testing for symptoms, lot of inconvenience for family members especially mothers of infants and toddlers who require mother’s care all the time , very old bedridden parents ,who require continuous monitoring , while the care giver relative spend the entire month in hospital and quarantine , preventing depression for home sick of each and every staff with emotional support and family support. But majority of the family members accepted with glad irrespective of their problems. This courage made us to work effectively and efficiently

MANPOWER CHALENGES:Arranging staff nurses and doctors on contract basis for pandemic is another challenge. Personally calling various nursing college principals all over the state and nearby states and organizing transport for them , arranging, food, accommodation, salary , quarantine arrangements all are equally important and challenging .keeping the staff in comfortable is the only way to keep the patients care, comfortable and cure

There was shortage of medical personnel due to various reasons like, quarantine, rotation duty, infection, post infection quarantine, infection of family members etc. Many health care personnel including doctors were asked to vacate their rented houses by their landlords for fear of getting infection.( even incidences of not allowing the bodies of doctors died in covid to cremate in some areas It is an Irony that those who are life savers, are facing threat of their lives. There are loss of lives of many medical personnel, is definite loss to the community.

LOGISTICS CHALLENGES: Arranging the PPE, and other materials which are very new to the government hospitals in India, and logistics, equipments are taken care by the central and state government and non government organizations like lions, rotary and other individual philanthropists

LAB CHALLENGES:Collecting the samples , 24x7 for outpatient and inpatient departments, for RTPCR ,and entering the data and entering the results uploading the results to government portals , uploading the results to patient portal for SMS messages , calling the patients and informing the results informing the name list to health authorities and get them to admit, isolation or quarantine , Enormous work load managed efficiently by laboratory department faculty with help of technicians and data entry operators .They collected more than 10, 46,232 samples and processed it for RTPCR during this study period out of which more than 56,000 positive. 72 hours before, domestic and international travelling time scheduled Travel mandate rules resulted in heavy rush and marginal increase of workload of RTPCR testing labs.

 Microbiology ,Pathology and Biochemistry labs handled samples for D-dimer, ferritin, IL 6,CRP ,complete haemogram ,blood sugar, renal function tests ,liver function tests, lipid profile and urine analysis all together handled about 20,54,263 samples during this study period **.**

**RESULTS**

**TABLE- 1 SYMPTOM**

|  |  |
| --- | --- |
| **Symptoms** | **NUMBERS (Percentage)** |
| **High fever /rhinitis**  | **20,204(82%)** |
| **Head ache** | **16,754(68%)** |
| **Numbness or tingling** | **12,812(52%)** |
| **Loss of taste**  | **14,290(58%)** |
| **Loss of smell** | **15,768(64%)** |
| **Muscle pain**  | **21,682(88%)** |
| **dizziness** | **10,348(42%)** |
| **Blurred vision** | **5,913(24%)** |
| **Tinnitus**  | **4,435(18%)** |
| **Non specific pains** | **2,957(12%)** |
| **Fatique**  | **18,972(77%)** |
| **Depression or anxity** | **15,769(64%)** |
| **Abdominal discomfort** | **11,088(45%)** |

 **Table -2 COMORBIDITY CHALLENGES:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No** | **Co morbidity** | **Male** | **Female** | **total** | **% total** | **Icu admi** | **death** | **x2 value** | **P Value** |
| 1 | DM | 3632 | 1918 | 5550 | 36 | 2341 | 234 | 213.7 | <0.001 |
| 2 | OBESITY | 4435 | 2459 | 6894 | 28 | 3211 | 211 | 674.9 | <0.001 |
| 3 | SHT | 2467 | 1122 | 3589 | 14 | 829 | 89 | 222.4 | <0.001 |
| 4 | CAHD | 673 | 153 | 826 | 3.3 | 118 | 87 | 148 | <0.001 |
| 5 | COPD | 1110 | 968 | 2078 | 8.4 | 617 | 109 | 18.76 | <0.001 |
| 6 | PREG | - | 336 | 336 | 1.3 | 32 | - |  |  |
| 7 | CRF | 49 | 6 | 55 | 0.04 | 23 | 3 | 16.61 | <0.001 |
| 8 | DM&SHT | 1112 | 643 | 1755 | 7 | 98 | 8 | 679.9 | <0.001 |
| 9 | O,DM,SHT CAD | 112 | 11 | 123 | 0.4 | 58 | 5 | 211.4 | <0.001 |
| 10 | O,DM,SHT CAD ,CRF | 148 | 14 | 162 | 0.6 | 134 | 16 |  |  |
| 11 | O,DM,SHT, | 1463 | 516 | 1979 | 8 | 379 | 37 |  |  |
| 12 | O,COPD, | 911 | 618 | 1529 | 6 | 311 | 29 |  |  |
| 13 | O,HT,COPD,CAD | 168 | 112 | 280 | 1.1 | 115 | 2 |  |  |
| 14 | O,HYPOTHYROID | 19 | 26 | 45 | 0.18 | 1 | - |  |  |
| 15 | O,CVA | 11 | 2 | 13 | 0.05 | 13 | 2 |  |  |
| 16 | PREG,SHT/ECLAM | NA | 41 | 41 | 0.16 | 49 | - |  |  |
| 17 | PREG,ABORTION | NA | 19 | 19 | 0.07 | 42 | - |  |  |
| 18 | PREG DM, | NA | 56 | 56 | 0.22 | 6 | - |  |  |

*x2 value and p value are calculated which are found very significant >0.001*

Total number of covid-19 positive patients admitted and treated are 24,639 of them 5550 are known diabetic,1725(7%) are new onset diabetic patients , of the new onset diabetics 1173(68%) males 552(32%)females, after 60 days 121 males and 88females remains hyper glycemic. stress , drug induced , viral inflammation on pancreases, toxic effects of inflammatory markers like IL-6 are responsible for covid induced diabetes. further studies and follow up are necessary for fully understand long term complications of covid 19. Diabetes mellitus, type 1 and type 2 gestational diabetes, new onset hyperglycemia with previous normal HBA1C, all are challanging in presence of covid , all of them had steroids (resulting in hyper glycemia) ,all required insulin titration even after stopping steroids .

**DISCUSSION**

Morbid obesity patients always have dyspnoea, and low levels of oxygen saturation even at rest . when they become positive and require oxygen therapy in intensive care units , it is very difficult to intubate and maintain oxygen saturation, keeping the patients in prone position which is the best and affordable way of improving the oxygen saturation is every patient , which is not possible in very obese patients. Patients with renal failure, congestive cardiac failure, and massive ascities

Patients with severe anaemia, pan cytopenia , bleeding disorders, haemoglobinopathies, all varieties with positive covid admitted here, required blood transfusions, but there are no clear guidelines for blood donation and screening of blood for covid, later they gave instructions and accepted blood donation if donors are asymptomatic ,and need not screened for COVID19. Surgical emergencies, acute appendicitis, bowel gangrene, acute abdomen, forneires gangrene all attended in emergency department with COVID -19. Conducting delivery in RTPCR positive patients , medical termination of pregnancy, miscarriages, premature delivery. Special situations in delivery like pre eclamsia, pregnancy induced hypertension and ,diabetes mellitus ,previous LSCS, normal delivery, previous history of bad obstetric outcome all require special attention RTPCR negative infants and positive mothers, breast feeding issues, and requiring isolation of infants and supplemental feeding . Handling of very old, fragile and dementic patients without attendees is a big issue, same issue with hemiplegic patients , physically challenged patients, mentally retorted children and adolescents who require special attention.

After first dose of vaccination,: Admissions in general covid ward: 612(diabetes 79)12.9% I.C.U admission, 95(diabetes 18) 18.9% deaths 20(diabetes 6) 30%. After second dose ; admissions in general covid ward 382(diabetes 43)11.2%, I.C.U admissions 42(diabetes 8) 19%and death 5(diabetes 2) 40% diabetic patients have the same percentage in patient admission but ICU admissions ,prolonged hospital stay and death also significantly more in diabetic patientsThe death rate and hospital I.C.U admission is significantly reduced in patients with vaccination when compared with non vaccinated persons . In addition, high levels of IL-6 were observed in patients with COVID-19 and might serve as a predictive biomarker for disease severity .IL-6 acts as a critical cytokine in the systemic inflammatory response ,research showing that vitamin C inhibited the production and release of proinflammatory cytokines from human monocytes (IL-1, IL-2, IL-6, and TNF-α) [42]. Previous animal studies on SARS-CoV also demonstrated that inhibiting NF-κB, together with reduced IL-6 levels, could increase the survival rate in infected animals .more than 67% of individuals in all age groups were showing improvement in cytokines 54% REDUCTION IN CRP , 64% REDUCTION IN SERUM FERRITIN in five days and 82 % in 10 days that shows there will be reduction in the chance of getting life threatening cytokine storm, multi organ failure and death in covid 19.

 In our institution almost All the patient were given high dose oral vitamin C in a palatable drink form as liposomal Vitamin C and symptoms improved much faster in 70percent of the patients. The drink was sponsored by a philanthropist which cost him more than one crore rupees. four grams of oral liposomal vitamin c equal to 16 grams of intravenous vitamin c. is given to all patients . The main reason was based on two aspects: the efficacy and safety. The metabolism of vitamin C (VC) in the blood is very fast, only large dose and long course of VC supplement can maintain an adequate concentration in blood. In a previous study 4 days VC treatment showed a significant benefit in sepsis or ARDS patients. Similar daily doses were used in the Fowler paper (JAMA), which was associated with an improved outcome . Re infection in hospital workers, caregivers and staff nurses and doctors in spite of vaccines and PPE due to various reasons. Though medico legal cases are less compared to pre lock down period due to road traffic accidents, domestic violence, suicidal, and poisoning deaths are more during covid-19 pandemic. There are special arrangements made for postmortem of covid cases ,after conducting post-mortem of non covid cases covid cases autopsies are done with PPE KIT and universal precaution as per WHO guidelines and bodies handed over to public authorities and disposed accordingly. No relatives were allowed to touch the body but for doing rituals only family members allowed without much crowd

 Body disposal issues occurred in the initial phase of first wave after the strict action from the government, time slot allotment in crematorium with the help of corporation, health inspector and revenue staff these issues are solved when all members in a family admitted in ICU or in isolation ward with oxygen support or ventilator support if one of the family member dies, others cannot attend the funeral , or not even know that one of the family member died and informing the relatives getting signature for legal formalities all are real challenge as no transport, fear of infection ,even if they want to come they can come only after getting permission from district authorities , body cannot be transported outside the district , crematorium issues all are real challenges every family faced these emotional issues, stress and depression.patients were given compensation of 50,000 rupees for covid death as per supreme court order . All the patients needed certification but the challenging issue is the cause of death is covid,( and death within 30 days after covid infection) and not for covid patient dies of its complications after one month or incidental covid in patients with RTA,CAHD,

Lockdown effects put the world in a stand still. This lock down had negative impact on human behavior. There were increasing number of domestic violence, loss of job, salary reduction, lack of supply of basic needs, increased time on television, led to depression and psychological imbalance. There was sharp rise in unemployment, stress on supply chains, decrease in the income of the Government, collapse of tourism, reduced consumer activity, plunge in fuel consumption and fall in all trades. Deficiency of oxygen beds, imcu, iccu, ircu beds Deficiency of oxygen supply vs demand experienced by many hospitals in the first wave and managed by the swift action of government ,with proper oxygen Supply of face masks, nasal prongs, oxygen masks non rebreathable masks , high flow oxygen supply devices, invasive and non invasive ventilator, cpap and bipap ,Judicial use of oxygen devices, are real challenge that needs real commitment our anaesthetists and anaesthesia technicians work 24x7 to ensure judicial use of oxygen the role of oxygen staff and staff nurses in icu and All the super speciality doctors ,Dentist, gastro enterologists,ENT procedures all had a setback , mucor mycosis in covid patients results in devastating effect and many lost their eye sights and hearing . Organ retrieval programmes organ donation, eye (corneal) donation , embalming all procedures are almost nil during covid pandemic those who in waiting list to receive organs have to wait for physician, psychiatrist, radiologists, labs have extensive work load and family phycisians and quacks are the only hope for many patients . triage difficulties non serious patients occupy beds and no beds for sick patients occurred in first wave everything managed in second and third waves by admission criteria and discharge criteria guidelines overcrowing one side , refusal to test on other side because of fear , quarantine , isolation (closing of the house and street) panic , depression, suicidal attempts, hesitancy for testing and using mask and sanitisers social distancing except family physicians and quacks no specialists available for consultation tele medicine facility improved a lot but Many COVID 19 positive cases were left alone either at home or at hospitals, with no family and friends support during all three waves

 The overall case-fatality rate in Italy (7.2%) is substantially higher than in China (2.3%). When data were stratified by age group, the case-fatality rate in Italy and China appear very similar for age groups 0 to 69 years, but rates are higher in Italy among individuals aged 70 years or older, and in particular among those aged 80 years or older. This difference is difficult to explain. The distribution of cases is very different in the 2 countries: individuals aged 70 years or older represent 37.6% of cases in Italy and only 11.9% in China. In addition, a relevant number of cases in Italy are in people aged 90 years or olderseveral reports about pregnant women with confirmed coronavirus disease 2019 (COVID-19) have been published. However, there are no comprehensive systematic reviews collecting all case series studies on data regarding adverse pregnancy outcomes, especially association with treatment modalities 11 case series studies comprising 104 pregnant women with COVID-19 were included in one review.. The most common treatment for COVID-19 was administration of antibiotics (25.9%) followed by antivirals (17.3%). Cesarean section was the mode of delivery for half of the women (50.0 Regarding obstetrical and neonatal outcomes, fetal distress (13.5%), pre-labor rupture of membranes (9.6%), prematurity (8.7%), fetal death (4.8%), and abortion (2.9%) were reported. There are no positive results of neonatal infection by RT-PCR. (5) Conclusions: Although we have found that pregnancy with COVID-19 has significantly higher maternal mortality ratio compared to that of pregnancy without the disease, the evidence is too weak to state that COVID-19 results in poorer maternal outcome due to multiple factors.This study examined the factors affecting mortality and clinical severity score (CSS) of male and female patients with Coronavirus Disease 2019 (COVID-19) using clinical epidemiological information provided by the Korea Disease Control and Prevention Agency.

 The factors influencing death differed by sex were high heart rate and malignancy in males and chronic kidney disease in females. In addition, the factors influencing progression to severe CSS were high BMI (severe obesity) and older age, low lymphocyte count and platelets, fever, dyspnea, diabetes mellitus, dementia, and ICU admission affected progression to severe stage of covid19. Of 100,902 hospitalized COVID-19 patients included in the analysis (median age 52 years, IQR 36–67; 50.7% female), COVID-19 case fatality rate was 8.5% with majority of deaths in those ≥ 65 years (70.8%). The risk of mortality or ARDS was similar for Blacks as Whites. Larger hospitals also had an increased risk of mortality, greatest in hospitals with 500–999 beds . Outcomes of novel coronavirus disease 2019 (COVID-19) infection in 107 patients with cancer The results of the current study demonstrated that >50.0% of infected patients with cancer are susceptible to severe COVID-19. This risk is aggravated by simultaneous anticancer treatment and portends for a worse survival, despite treatment for COVID-19. In one study The authors showed that successfully extubated COVID-19 patients have significantly less alveolar microbial burden in the lower respiratory tract and significantly less mortality than deceased or intubated patients on day 60 after initiation of mechanical ventilation

**CONCLUSION:**

Unfortunately, how the enhanced microbial burden affected the clinical outcome of COVID-19 patients remains unclear. Several studies have documented the importance of increased systemic and intra-alveolar levels of inflammatory cytokines in the pathogenesis of COVID-19- or sepsis-associated ARDS . It is difficult to determine whether inflammatory cytokines played some pathogenic role in the (deceased or intubated) group of COVID-19 patients with poorer clinical outcomes.

**References:**

1. Schoenbaum SC, Schoen C, Nicholson JL, Cantor JC. Mortality amenable to health care in the United States: The roles of demographics and health systems performance. J. Public Health Policy. 2011;32:407–429
2. Farag M, et al. Health expenditures, health outcomes and the role of good governance. Int. J. Health Care Finance Econ. 2012;13:33–52
3. Alhazzani W, Møller MH, Arabi YM, et al. Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID‐19). Intensive Care Med. 2020;46:854–887
4. World Health Organization, Regional Office for the Western Pacific . Algorithm for COVID‐19 triage and referral: patient triage and referral for resource‐limited settings during community transmission. Manila: WHO, Regional Office for the Western Pacific; 2020
5. Poon LC, Yang H, Kapur A, et al. Global interim guidance on coronavirus disease 2019 (COVID‐19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals. Int J Gynecol Obstet. 2020;149:273–286.
6. Government of India Ministry of Health and Family Welfare . Revised guidelines for Home Isolation of very mild/pre‐symptomatic COVID‐19 cases. May 10, 2020.
7. Huang T, Guo Y, Li S, Zheng Y, Lei L, Zeng X, et al. Application and effects of fever screening system in the prevention of nosocomial infection in the only designated hospital of coronavirus disease 2019 (COVID-19) in Shenzhen, China. Infect Control Hosp Epidemiol. 2020:1–10