

**STUDY OF DEMOGRAPHIC ANALYSIS, CLINICAL CHARACTERISTICS, DIAGNOSIS, MANAGEMENT, AND COMPLICATIONS IN COVID-19 PATIENTS**

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**ABSTRACT**

**Objective:** This study aims to study the demographic analysis, clinical characteristics, diagnosis, and management in COVID-19 patients and assess the complications in COVID-19 patients.

**Methods:** A retrospective observational single centered study is carried out to study the demographic analysis, clinical characteristics, diagnosis, management, and complications in COVID-19 patients.

**Results:** Among 100 COVID-19 patients, 58% were male and 42% were female. Percentages of age group between 60–70 years (27%), 50–60 (20%), 40–50 (16%), 70–80 (16%), 30–40 (8%), 20–30 (5%), 80–90 (4%), and 10–20 (4%). Co-morbidities were diabetes (44%), hypertension (HTN) (28%), coronary artery disease (21%), thyroid (19%), chronic obstructive pulmonary disease (12%), anemia (8%), and renal impairment (4%). Signs and symptoms were fever (88%), cough (80%), shortness of breath (72%), fatigue (68%), myalgia (60%), loss of appetite (52%), cold (24%), loss of smell and taste (20%), diarrhea and vomiting (12%). (97%) of the patients had two or more symptoms. Diagnostic test include reverse transcription polymerase chain reaction (RT-PCR) (100%), high-resolution computed tomography (HRCT) (100%), O<sub>2</sub> saturation (99%), D-dimer (65%), c-reactive (60%), Procalcitonin (60%), and also lactate dehydrogenase, interleukin-6, prothrombin time, international normalized ratio, ferritin, complete blood count, white blood cell. Treatment includes antiviral (100%), antibiotics (100%), corticosteroids (73%), immunosuppressant (54%), and antihypertensive, antidiabetic, antiplatelets, bronchodilators, vitamins, and mineral supplements.

**Conclusion:** COVID-19 infects the males more and average ages of 65 years are at risk. HTN and diabetes were most common co-morbid condition. Fever and cough are major followed by weakness sob and cold. RT-PCR and HRCT are accurate tool to detect COVID-19. Although standard treatment is not yet available antibiotics and antiviral are used followed by corticosteroids. The majority of the patients have mild and moderate injection and with the lowest death rate. Older age and co-morbid conditions are major risk factors.

**Keywords:** COVID-19, Fever, Cough, High-resolution computed tomography, Reverse transcription polymerase chain reaction, Hypertension, Corticosteroids, Interleukin-6, Immunosuppressant.

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**INTRODUCTION**

A coronavirus takes its name from its microscope appearance. The word corona suggests “crown,” and when almost studied, the circular virus has a “crown” of proteins, which in every manner are termed peplomers, sticking away or extending from the center [1]. Mostly, it spreads to people through cough and sneezing outlets. Respiratory failure might occur and cause mortality as the alveolar illness advances. Angiotensin-converting enzyme 2 may also be a way for the virus to attack the heart, which causes acute heart damage. The poorest prognosis is among those with established cardiovascular problems [1]. The causes of re-infection may be short-term immunity or residues of the virus from the initial infection and changes in the genomic sequence of this virus [2]. Pathophysiology of COVID-19 shows the mechanism of severe acute respiratory syndrome coronavirus 2 invasion into host cell using  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$  receptors where the virus attaches to the host receptor through endocytosis and replication of viral RNA takes place after entering into the core leading to production of more viral proteins [3]. Symptoms may occur 2–14 days later. Common symptoms may include: Cough, Fever, Fatigue, and COVID-19 may involve a loss of taste or smell as the principal indication [4]. Contaminated secretions can be provisionally recognized by reverse-transcription polymerase chain reaction (RT-PCR). Chest computed tomography (CT) scanning may be effective in persons with high clinical suspicion of infection for COVID-19 diagnosis. Treatment includes several class of drugs such as anti-retro viral agents, immune enhancing agents, immunosuppressants, non steroid anti-inflammatory

drugs, antibiotics, and other drugs are also used depending on the condition of the patients and co-morbidities which include antiplatelets, anticoagulants, antihypertensive, antianginas, bronchodilators, diuretics, proton pump inhibitors, histamine-2 receptor antagonists, antidiabetic, vitamin-c, vitamin-d3, zinc, and calcium supplements [5].

**METHODS**

This is a retrospective observational single centered study conducted for 4 months from March 2021 to June 2021 in 650 bedded Malla Reddy Narayana Multispeciality Hospital-COVID Department. Suraram, Hyderabad, Telangana. The study protocol was prepared, submitted, and approved by the hospital ethics committee (Regd No: ECR/227/Inst/AP/2013/RR-16). The study was initiated after the ethics approval. Evaluation of data was conducted in 100 COVID-19 patients.

**Study criteria***Inclusion criteria*

- Patients with COVID positive
- All patients confirmed by RT-PCR and were diagnosed as having COVID-19 according to WHO interim guidelines
- All patients who underwent chest high-resolution CT (HRCT) and a complete panel of routine laboratory tests include complete blood count, Urine analysis, blood chemistry, and blood coagulation function
- C-reactive protein (CRP)
- In-patients

- Patients of both genders of all age groups.

**Exclusion criteria**

- Patients with COVID negative
- Out-patients
- Pregnancy.

**RESULTS**

**Gender**

In our retrospective study, a total of 100 cases were collected in 4 months of which 42% were female patients and 58% patients were male.

**Age-wise distribution**

A total of 100 cases who have admitted in the COVID department of the tertiary care hospital were examined during the study period based on the inclusion and exclusion criteria.

Age wise distributions of the cases are given in the table with the class interval of 10 years and their percentage.

**Existing comorbid conditions**

Any co-morbid conditions present among the 100 patients were recorded and analyzed. The table shows the most common co morbid conditions present among patients at the time of our study, and they include inflammatory bowel disease, hypertension (HTN), diabetes, coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), and renal disorders. Other existing conditions that were found were thyroid and anemia.

**Clinical presentations**

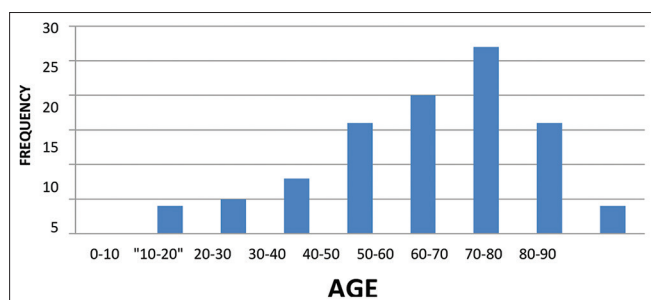
Among 100 patients who were included in the study we found out that majority of the patients were having fever and cough as the main symptom followed by SOB, fatigue, myalgia, cold, loss of appetite and less common symptoms were vomiting, loss of taste and smell, diarrhea.

**AQ4 Table 1: Gender-wise distribution of patients with COVID-19**

Gender	Frequency	Percentage
Female	42	42
Male	58	58
Total	100	100.00

**AQ4 Table 2: Age-wise distribution of subjects**

Age	Number of subjects	Percentage
0-10	0	0
10-20	4	4
20-30	5	5
30-40	8	8
40-50	16	16
50-60	20	20
60-70	27	27
70-80	16	16
80-90	4	4



**Diagnosis**

**RT-PCR**

1. Positive-99%
2. Negative-1%.

**HRCT**

1. Unilateral lung involvement-73%
2. Bilateral lung involvement-27%
3. Single lesions-8%
4. Multiples lesions-5%
5. Ground glass opacities-33%
6. Ground glass nodules-12%
7. Thickened bronchial wall-7%.

**Oxygen saturation**

1. 98-100-68%
2. 93-98-12%

**Table 3: Existing co-morbid conditions among COVID-19 patients**

Co-morbidities	Number (out of 80)	Percentage
IBD	0	0
HTN	22	28
DM	35	44
CAD	17	21
Thyroid	15	19
Anemia	6	8
COPD	10	12
Renal disorders	3	4

IBD: Inflammatory bowel disease, HTN: Hypertension, DM: Diabetes mellitus, CAD: Coronary artery disease, COPD: Chronic obstructive pulmonary disease

**Table 4: Table representing clinical characteristics of COVID-19 patients**

Symptom	Percentage
Loss of appetite	52
Vomiting	12
Myalgia	60
Fatigue	68
Fever	88
Cough	80
SOB	72
Cold	24
Loss of taste and smell	20
Diarrhea	12
Two or more symptoms	97

SOB: Shortness of breath

**Table 5: Table showing the percentages of different laboratory findings in COVID-19**

Diagnosis	Percentage
RT-PCR	100
HRCT	100
Oxygen saturation	99
D-Dimer	65
CRP	60
Procalcitonin	60
Serum ferritin	60
IL-6	43
LDH	31
PT and INR	25
Others	53

RT-PCR: Reverse transcription polymerase chain reaction, HRCT: High-resolution computed tomography, CRP: C-reactive protein, LDH: Lactate dehydrogenase, IL: Interleukin-6, PT: Prothrombin time, INR: International normalized ratio

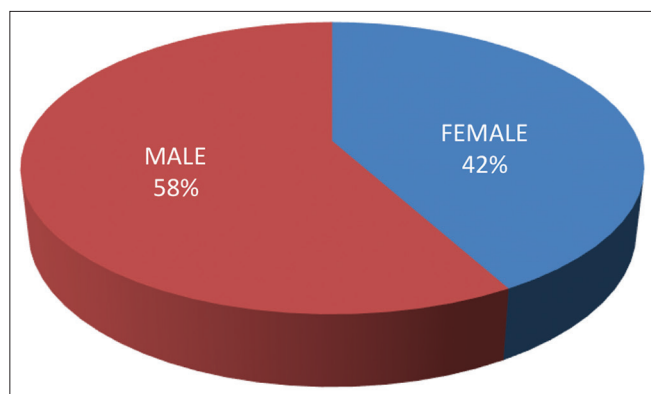


Figure 1: Pictorial representation of the gender-wise distribution

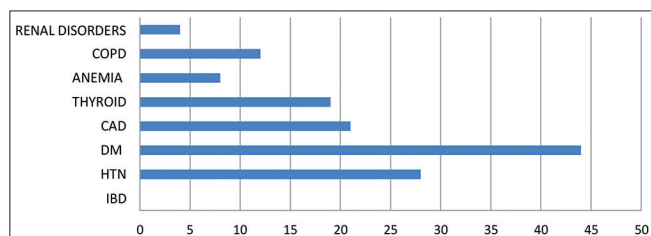


Figure 2: Graphical representation of existing co-morbid conditions among COVID-19 patients

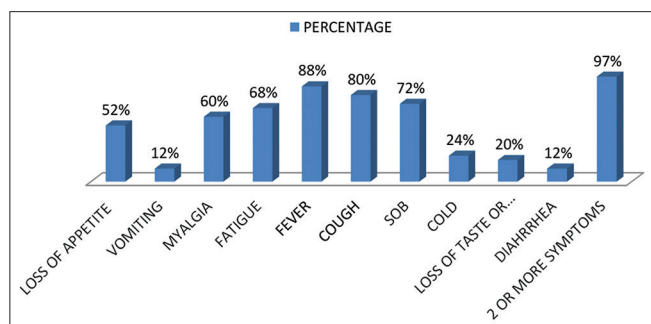


Figure 3: Graphical representation of clinical characteristics of COVID-19 patients

- 85-93-19%
- <85-1%.

**HRCT**

- Unilateral lung involvement- 73%
- Bilateral lung involvement- 27%
- Single lesions- 8%
- Multiples lesions- 5%
- Ground glass opacities- 33%
- Ground glass nodules- 12%
- Thickened bronchial wall- 7%.

**Oxygen saturation**

- 98-100-68%
- 93-98-12%
- 85-93-19%
- <85-1%.

**D-dimer (80-650 ng/ml)**

- Increased- 63%
- Normal- 37%.

**CRP (<6 mg/dl)**

- Negative- 93%
- Positive- 7%.

**Procalcitonin - (0.5-2 ng/ml)**

- Increased- 39%
- Normal- 61%.

**Serum ferritin - (30-400 pg/ml)**

- Increased- 23%
- Normal- 77%.

**Interleukin (IL)-6 (up to 4.4 pg/ml)**

- Increased- 19%
- Normal- 81%.

**Lactate dehydrogenase - (98-192 IU/L)**

- Increased- 84%
- Normal- 16%.

**Prothrombin time - (13.4-16.6 s)**

- Decreased- 8%
- Increased- 27%
- Normal- 65%.

**International normalized ratio: (2-3)**

- Decreased- 5%
- Increased- 16%
- Normal- 79%.

**Others**

Complete blood count (CBC) which includes hematology, white blood cells, dendritic cell, platelet count, urine analysis, renal function tests, liver function test.

**Severity**

Severity of the COVID-19 patients was categorized according to the computed tomography (CT) severity score.

**Treatment**

**Antibiotics: (100%)**

Cephalosporins such as ceftriaxone, cefoperazone, doxycycline, azithromycin, metronidazole, clindamycin, linezolid, and colistimide sodium.

**Combination:**

- Sulbactam+cefoperazone
- ticarcillin+ clavulanic acid
- piperacillin + tazobactam.

**Antivirals: (100%)**

Remdesvir, oseltamavir, hydroxychloroquine, lopinavir, favipiravir, ivermectin.

**Corticosteroids: (73%)**

Methyl prednisolone, perdnisolone, dexamethasone.

**Immunosupressants: (54%)**

Perfinadone, toclizumab.

**Symptomatic treatment**

- Anti-platelets: aspirin, clopidogrel. Ticagrelor
- Anti-coagulants: heparin, enoxaparin, rivaroxaban. (63%)
- Anti-hypertensive: statins, beta blockers, alpha blockers, sildenafil. (28%)

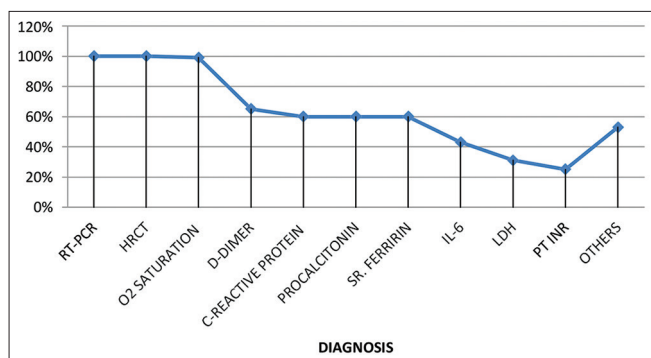


Figure 4: Line chart showing the diagnostic tests used for COVID-19

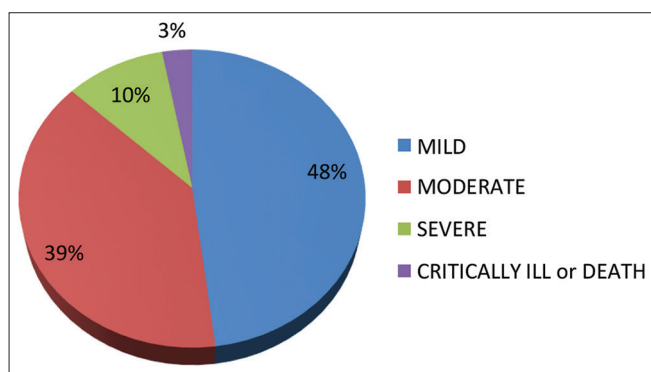


Figure 5: Pie chart representation showing the severity of COVID-19 patients

- iv. Anti-anginal: nitroglycerine, amiodarone, nicorandil. (23%)
- v. Diuretics: furosemide, spironolactone. (4%)
- vi. Bronchodilators: budesonide, levosalbutamol, n-acetylcysteine, ambroxol + levosalbutamol, acetylcysteine + acebrophylline, glycopyrronium. (12%)
- vii. Anti-diabetics: human octrapid insulin, metformin hydrochloride. (44%)
- viii. Anti-fungal: amphotericin-B, fluconazole. (rare)
- ix. PPI and H2RA: pantoprazole, omeprazole, rabeprazole, ranitidine. (100%)
- x. Vitamins and minerals: vitamin-c, vitamin-d3, zinc acetate, calcium supplements (100%).
- xi. Intensive care treatment:
  1. O<sub>2</sub> Therapy: 35%
  2. Non invasive ventilation: 6%
  3. Invasive ventilation: 5%
  4. HNFO: 1%
  5. ECMO: 0%
  6. Continued Renal Replacement Therapy (CRRT): 1%.

**Clinical outcome**

Outcome	Frequency	Percentage
Hospital stay	97	97
death	3	3

**Complications**

The majority of the complications were related to respiratory and cardiovascular systems which are categorized as shown in Table 8.

**DISCUSSION**

In our study, we found that men were most affected with COVID-19 than women who were comparable with the research by J.M. Casas-Rojo and others. 2020 [6]. The majority of the subjects were found within the age

Table 6: CORADS scaling for COVID-19

CO-RADS	Level of suspicion for COVID-19 infection	
CO-RADS 1	Highly unlikely	Normal
CO-RADS 2	Unlikely	Abnormal, infection other than COVID-19
CO-RADS 3	Indeterminate	Not clear whether COVID is present or not
CO-RADS 4	High	Abnormalities suspicion for COVID-19 infection
CO-RADS 5	Very	Typical COVID-19
CO-RADS 6	PCR+	

Table 7: Table representing the CT severity score of COVID-19 patients

CT severity score	Severity	Percentage
(1-8)	Mild	48
(9-15)	Moderate	39
(>15)	Severe	10
	Critically ill or death	3

CT: Computed tomography

Table 8: Complications of COVID-19

Category	Complications
Primary	Cardio-pulmonary arrest, respiratory failure
Secondary	ARDS, septic shock, COVID pneumonia, lung fibrosis.
Tertiary	Co-morbid conditions which majorly include DM and HTN.

HTN: Hypertension, DM: Diabetes mellitus, ARDS: Acute respiratory distress syndrome

group of 60–70 years. Diabetes mellitus and HTN were the most common co morbidities among the individuals infected with COVID-19 which was similar to other study [7]. Fever and cough were the major clinical presentations followed by SOB, myalgia, cold, and also loss of taste and smell along with some other symptoms were reported. Almost 97% of the individuals have been presented with two or more symptoms. RT-PCR and CT scan are the standard diagnostic tests for detecting COVID-19.

COVID-19 standard therapy is still not available, although most patients are administered with antibiotics and antiviral medicines. Corticosteroids and immunosuppressants respectively with a proportion. Antiplatelets, anti-hypertensive medicines, anti-angina medicines, diuretics, bronchodilators, anti-diabetic medicines, pump-proton inhibitors, histamine-2 antagonists receptor, vitamins and mineral supplements such as vitamin C, vitamin-D3, zinc and calcium are also administered. The majority of patients received oxygen therapy followed by non-invasive ventilation, invasive air ventilation, high nasal flow oxygenation, CRRT. According to the CT severity score, the severity of patients with COVID-19 was found to indicate a moderate (48%), intermediate (39%), severe (10%), and critically sick patients (3%) leading to death.

From the clinical results we can show that (97%) of the patients were released and (3%) of the patients were killed. The average hospital stay time might be 15–20 days. During this investigation, it has been observed that significant cardiopulmonary arrest and respiratory failure are major consequences of COVID-19 during hospital stays which lead to serious responses or even death. There may also be involvement of acute respiratory distress syndrome, COVID pneumonia, lung fibrosis, and septic shock. These difficulties that have been observed in our investigation may potentially be caused by existing morbid illnesses such as DM and HTN. These findings were likewise comparable in the Lin Huang *et al.* investigation [8].

**CONCLUSION**

From our study, based on the data collected from initial demographics of the patients till the discharge, we conclude that the frequency of infection is due to males' predominance over females which means males are more infected than females. While the most affected people fall under the age group of 60–70 years with an average age of 65 years. HTN and diabetes mellitus were major among all other existing co morbidities. Most commonly occurring clinical presentations are fever and cough along with fatigue, loss of appetite, SOB, myalgia, and cold. Less common symptoms include loss of taste and smell, diarrhea, and vomiting. The most used and accurate diagnostic tests for COVID-19 detection are RT-PCR and HRCT. Although there is no standard treatment for COVID-19, antiviral and antibiotics are majorly used followed by corticosteroids and immunosuppressants. Furthermore, vitamin and mineral supplements play a major role as a supportive treatment. Severe cases are treated majorly with oxygen supply and ventilation.

Majority of the patients recovered with the lowest death rate of 3% and average length of hospital stay with 15–20 days. Older age and existing chronic co morbid conditions may be the major risk factors for COVID-19 infection.

**ACKNOWLEDGMENT**

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**AUTHORS' CONTRIBUTIONS**

M Pavan Kumar was involved in the collection of data from the patients, preparation, and editing of the manuscript. Dr. K Sechana was involved in the organizing and reviewing of the manuscript. G Revathi and K Supraja were involved in the collection of the data from the patients.

**CONFLICTS OF INTEREST**

The authors declare no conflicts of interest.

**AUTHORS' FUNDING**

Nil.

**REFERENCES**

1. Sheydaei M, Alinia-Ahandani E. Overview of the novel coronavirus introduction (Covid19): A review. *Med Sci J* 2020;6:14-20.
2. The Indigenous EXPRESS December 2020, Wondering what the Latest Strain of the Corona Virus is? The Doctor Said that, on the 11 January 2021, "New Delhi," a Doctor had seen. Available from: <https://indianexpress.com/art/lifestyle/health-new-coronavirus-strain-doctor-explanations-7119843>
3. Yuki K, Koutsogiannaki S. Pathophysiology COVID-19: A review. *Clin Immunol* 2020;215:108427.
4. Azin T, Arbabi M, Farsi Y, Jamshidi P, Hasanzadeh S, Calcagno MJ, et al. Clinical characteristics, diagnosis, and management of COVID-19 in patients in the hospital: Systematic analysis of case reports and case series. *Med Front* 2020;7:231.
5. Sahebnaasagh A, Avan R, Saghafi F, Mojtahedzadeh M, Sadremomtaz M, Tanzifi A, et al. COVID-19 pharmacological therapies. *Pharmacol Rep* 2020;20:1-33.
6. Azer SA. COVID-19: Pathophysiology, diagnosis, complications and research therapy. *New Microbs New Infect* 2020;37:100738. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, et al. Epidemiology, aetiology, clinical manifestosis and diagnosis, coronavirus disease prevention and control (COVID-19) during the early outbreak: A scope study. *Infect Dis Poverty* 2020;9:29.
7. Casas-Rojo JM, Antón-Santos JM, Cortés JM, Lumbreras-Bermejo C, Ramos-Rincón JM, Roy-Vallejo E, et al. Clinical characteristics of patients hospitalized with COVID-19 in Spain: Results from the SEMI-COVID-19 Registry. *Rev Clin Esp* 2020;220:480-94. Cummings MJ, Baldwin MR, Abrams D, Jacobson SD, Meyer BJ, Balough EM, et al. Epidemiology, clinical course and results of persons in New York city who suffer from serious illnesses with COVID-19: Future cohort research. *Lancet* 2020;395:1763-70.
8. Huang I, Lim MA, Pranata R. Increased mortality and severity of illness in COVID 19 pneumonia a comprehensive review, meta-analysis and meta-regression are connected with diabetes mellitus. *Diabetes Metab Syndr* 2020;14:395-403.