ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 09, 2022

COVID-19: Statistical Review and Medical Manifestation

Miranji Katta[1], Yamini Komati[2], V. UMA MANIKANTA[3]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Sir C R Reddy College of Engineering, Eluru, West Godavari District -534007, India;
miranji.katta@gmail.com*

[2]Assistant Professor, Department of Electronics and Communication Engineering, Pondicherry Engineering College, Pondicherry, -534007, India,
Yamini.komati@gmail.com

[3]STUDENT, B.TECH, ECE , V.K.R ,V.N.B & A.GK COLLEGE OF ENGINEERING ,GUDIVADA

Abstract:

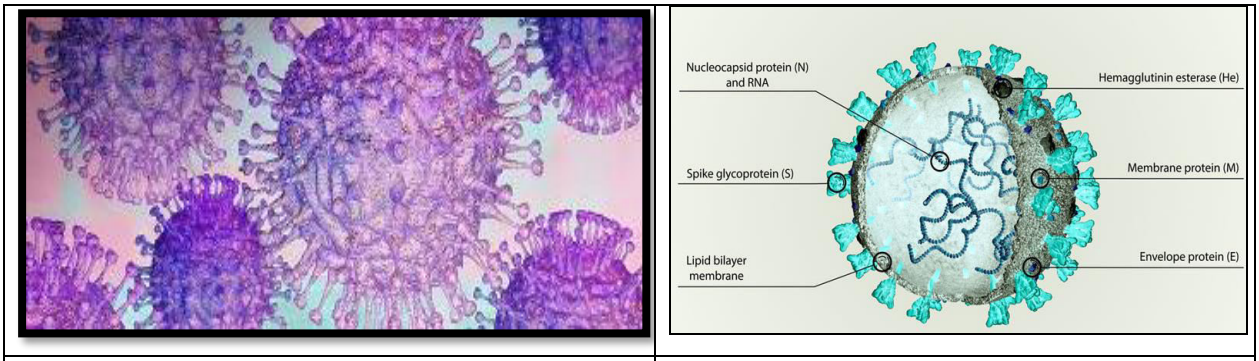
Coronavirus is abbreviated as "CoV" are huge folks of viruses causing a wide range of diseases such as typical cold to most life-threatening conditions such as the Middle East Respiratory Syndrome (MERS-CoV) and (SARS-CoV), i.e., Severe Acute Respiratory Syndrome. These viruses are mostly seen among animals. In some rare cases, these viruses may be propagated to human beings for animals. The title, 'corona virus,' is given because of its structure having spikes protruding from the surface membrane of the virus, which resembles the sun's corona. These Coronaviruses (CoV) are originated from the corona species having a high mutation rate from Coronaviridae. A keen study about how the virus is being transmitted and spread of this virus throughout the world has been stated. The preliminary motto and objective of this review article is to improve the ways of general treatment, and a fundamental analysis regarding this disease and suggest some precautionary measures that have to be taken during this COVID-19 epidemic.

Keywords: COVID-19, SARS-CoV, MERS-CoV, nCoV-19, Corona Virus

1. Introduction:

The famous city "Wuhan" in China is said to be the native place for the origin of this COVID-19 disease, which is caused by the Coronavirus (SARS-CoV-2) [1]. The World Health Organization has named this novel coronavirus as "COVID-19" in February 2020 [2,3]. The name COVID-19 itself has its abbreviation such that "Co" donates "Corona," "vi" denotes "Virus," and "d" stands for "disease," whereas "19" was stated to urge its year of the calendar. This corona epidemic was first identified in late 2019, i.e., on December 31, 2019 [4]. This virus is not previously observed in humans and given the name 2019-nCoV when identified in China. WHO stated that it might become a new burden on human life. By late January 2020, an outbreak of this epidemic took place. WHO and US Centres for Disease Control and Prevention (CDC)declared a public emergency, and WHO categorized it as a pandemic in March 2020. A total of 12,625,155 confirmed cases of the coronavirus COVID-19 have been reported in 213 countries and territories throughout the world and causing a death toll of 562,769 deaths until July 11, 2020, 10:00 AM [4]. For the development of diagnostic tests, trials on vaccines, and improve medication facilities, these viruses are named based on their genetic structure. These Viruses are designated by the International Committee on Taxonomy of Viruses (ICTV). And this particular coronavirus is thought of as "severe acute respiratory coronavirus two" or SARS-CoV-2 [5]. This structure of this virus is spherical or in the shape

of pleomorphic wrought particles, which comprise a single-stranded positive-sense RNA, which includes nucleoprotein in a capsid related to matrix protein [6]. The envelope of this virus bears club-shaped glycoprotein projections shown in Figure-1 (a)& (b)



(a) (b)

Figure 1: Coronavirus (a) Physical structure and shape of the coronavirus (b) Internal RNA structure and various parts of Virus

Source:https://relief.unboundmedicine.com/relief/view/Coronavirus-Guidelines/2355000/all/Coronavirus_Disease_2019__COVID_19_#1)

"Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" is the name given by the ICTV for this epidemic virus. WHO stated that "from the probability of communications perspective, the title SARS can haven't premeditated consequences which create unnecessary anxiety for a few populations, mostly in Asia, which had faced the worst suffering from the SARS outbreak in 2003" [7,8]. Hence, it is termed as the 'Covid-19 virus'; the effect of 'COVID-19' on different people is in different ways. Symptoms that are most common when affected by this virus are fever, dry cough, tiredness. It may also include having mild-moderate upper respiratory tract diseases, loss of smell, taste, etc. Propagation time for the virus in secondary cases that are related to Human- Human propagation is five days, but typically it varies from 2-13 days. Whereas, the time for inception to hospitalization is four days in MERS-COV [9,10].

1.1 Literature Survey:

The 1st case of COVID-19 pandemic was identified in Huanan Seafood Market, Wuhan city, of China on December 12, 2019, after which 27 unpredictable pneumonia cases were registered from the same area, out of which 7 cases have been severed which was officially announced on December 31, 2019 [11]. China declared that a new virus from wild bats had been originated, which belongs to the same group of beta-coronavirus that contains SARS-CoV on January 22, 2020. Still, the genome level of SARS-CoV and COVID-19 is only matched up to 70% even though they both belong to the same subgroup of beta coronavirus [12]. Hence, a new type of virus is found and is named asSARS-CoV-2[13]. Middle East Respiratory Syndrome Corona Virus (MERS-CoV) is another new type of coronavirus that has been identified in September 2012. Social Affairs and Health Department of the French Ministry has confirmed the first case of Human-Human propagation of Virus on May 12, 2013, which was later confirmed and reported by the Ministry of Health in Tunisia. People belonging to the same

cases who have seemed to contain the viral disease from their father visited Qatar and Saudi Arabia, resulting in the spread of the virus. Similarly, the virus severe acute respiratory syndrome (SARS) was started nearly to the Hong Kong border, china's Guangdong province, on November 16, 2002. The case of infection was a farmer from Foshan of Shunde district 1st case of disease [14]. Figure 2 shows the origin of the novel coronavirus.

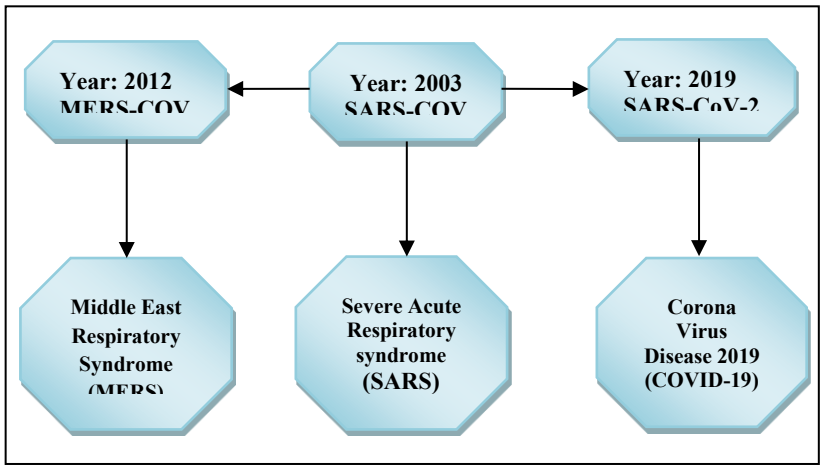
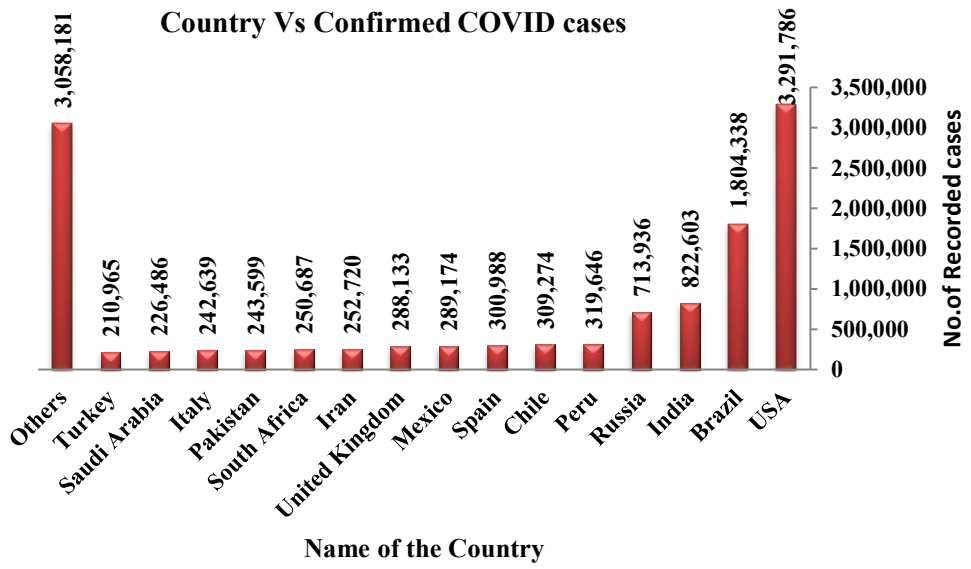


Figure 2: Origin of novel Coronavirus Disease COVID-19[31]

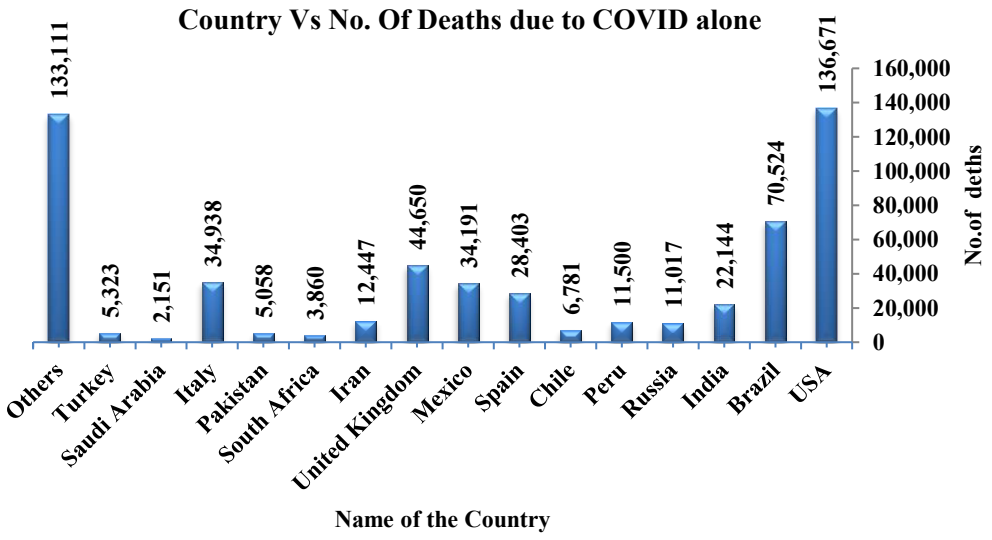
2. Statistics on Coronavirus (From December 31, 2019, to July 10, 2020):

Time to time diagnosis and the statistical modeling performance of COVID-19 cases according to the World meter data is stated below. Quarantine and implementation of strict lockdown are very much necessary to control this pandemic. The ratio of the present registered cases to the number of death because of coronavirus is taken as the present growth factor, which is approximately 5.8%, and the number of infected people versus recovered people is 79% [14].

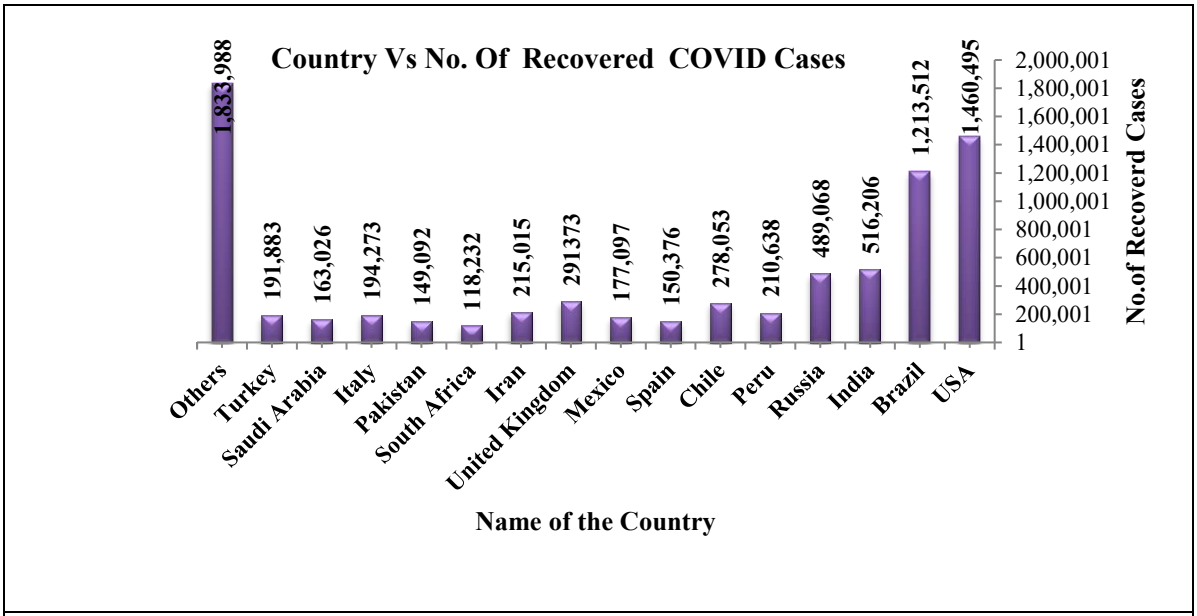
ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 08, 2022



(a)



(b)



(c)

Figure 3: Statistics of COVID-19 in most affected countries (a) Number of registered cases (b) Number of deaths (c) Number of Recovered cases so far in Different Countries

If the current situation continues, the number of virus-infected people and Deaths may be expected to reach peak value at the beginning of April 2020. The analysis is observed from the above Figure 3(a), 3(b) &3(c) with exponential Trend line. The Normal mean gap between the inception of symptoms and separation is about 5 to 6 days, and it is projected that everyday decrease at this time will decline the size of peak population by 72-85% and collective infected and deaths by 55-70% [15]. It is expected that by maintaining self-disciplinary Precautionary programs like "Janata Curfew" (Stay within the home at least 14hours in a day, which is started by Prime minister of India – Sir Narendra Modi – March 23, 2020) and integrated interventions like promoting face masks and reduced traveling, each precautionary technique may reduce 10% of propagation rate, hence the range of peak population will diminish to 20-47% and infected, and deaths will decrease by 23-49% [16].

Several countries have implemented "Lockdown" for several months, which led towards the reduction of virus spread to some extent. Leading economists have already revealed their forecasts for the year 2020 about the downfall of the global economy from around 3.0 percent to 2.4 percent.

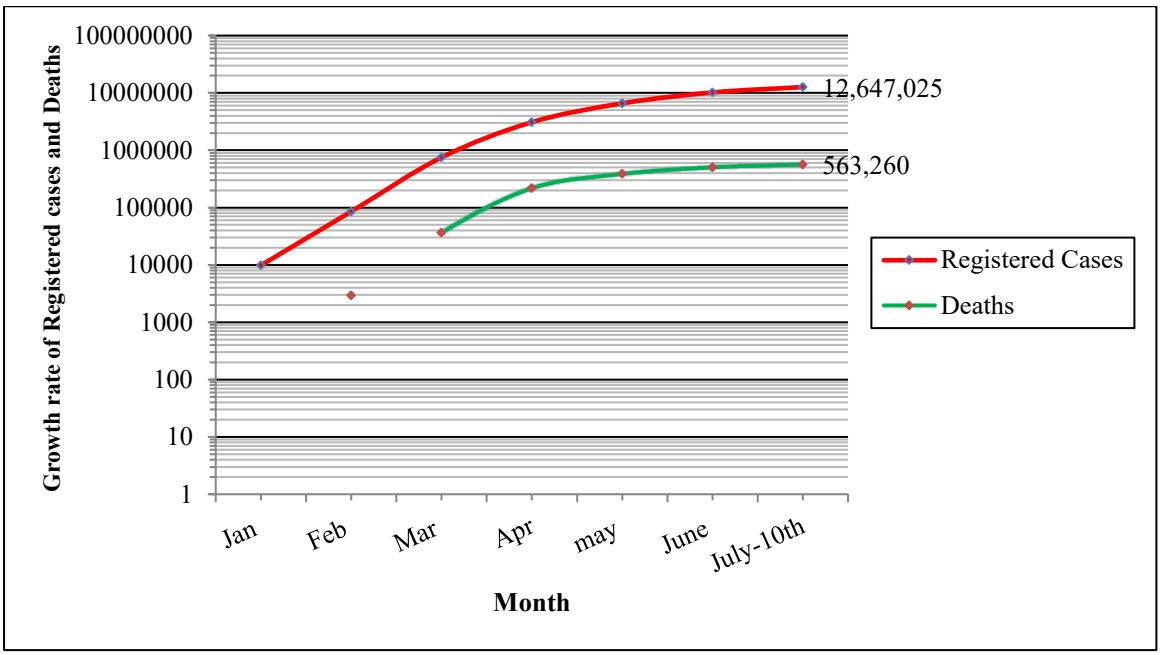


Figure 4: The growth rate of registered cases and deaths due to Covid-19

(Source:https://www.statista.com/statistics/1104054/india-coronavirus-covid-19-daily-confirmed-recovered-death-cases/

2.1 Mortality rate of Corona Virus Disease:

To calculate the mortality rate, here, we need to estimate the number of updated registered cases that may have an outcome of either status as positive or negative, recovered, or death. Similarly, calculate the number of original deaths due to COVID-19 alone.

Mortality Rate = Probability of actual Death(Jul 10th 2020)/total Population = 578235/7798049723

is 0.0074% till date.

2.2 Infection fatality Rate (IFR):

Original cases up to July 12th = Recovered cases (**7,799,781**) + Deaths (**578,235**) = **8,378,016**

Infection Fatality Rate (IFR) = Deaths / Cases = 578235 / 8378016 = 6.9% (Fatal Outcome: 6.9% with SARS-CoV-2, while 93.1% recover).

Here the above statistics are based on the data available in Worldometer. Here vast numbers of cases with very mild symptoms, moreover only a small part of the corona infected people is detected and decided through a laboratory test and authoritatively reported as a Corona disease case. The Infection fatality rate is calculated by the monthly report and plotted, as shown in figure 5, along with the recovery rate.

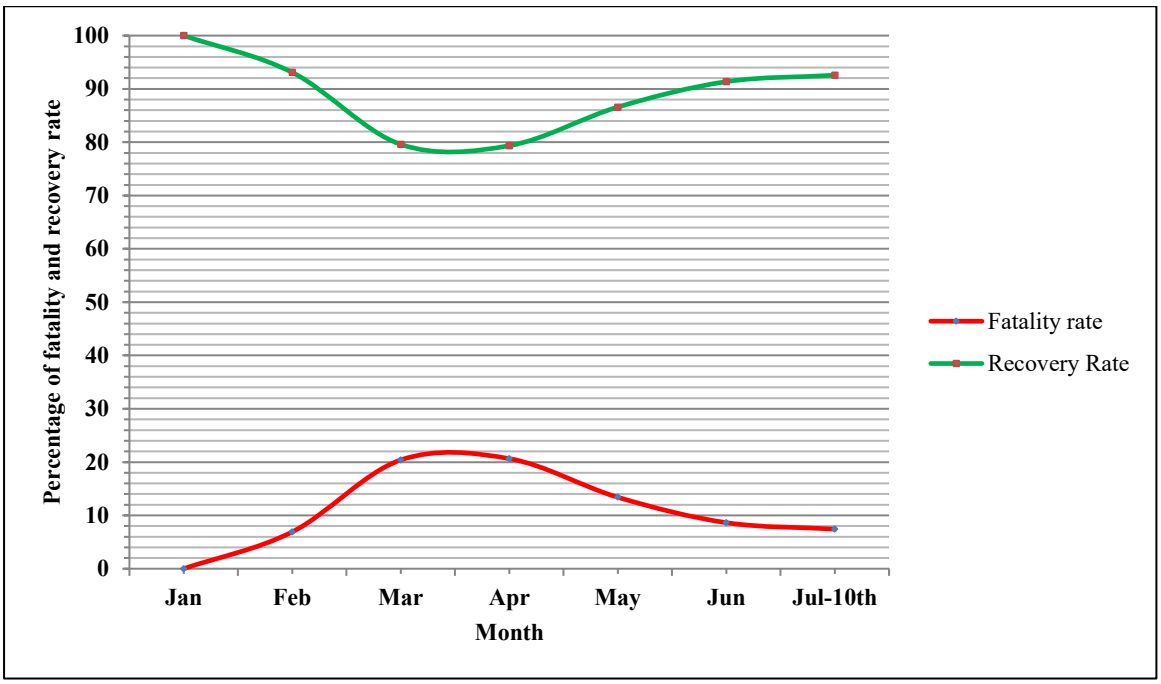


Figure 5: Infection fatality rate and recover rate from COVID-19

3. Novel Coronavirus (nCOV-19) versus SARS-CoV:

SARS (Severe Acute Respiratory Syndrome) is a kind of respiratory disease, i.e., Caused by SARS-CoV. The global SARS outbreak is from 2002 to mid-2003, and MERS-CoV was in 2012. COVID-19 belongs to the family of SARS-CoV[17-19]. Both of these viruses have a lot of similarities from their genome structure itself with single-stranded RNA. Most of the common symptoms for the SARS-CoV and CoV-2 are fever, cough, headache, etc. SARS-CoV also causes a severe effect on the gastrointestinal system and the lower respiratory tract. Some recent studies state that the coronavirus does not resemble closely to the previous known group of viruses. Data from various studies implicate the origin of SARS-CoV and SARS-CoV-2 and their transmission among humans[20-24]. The SARS, which is an airborne virus, transmits efficiently in the same way as the cold and flu do. SARS-CoV virus spreads by an infectious person while coughing or sneezing through the droplets. The person who inhales those droplets or touches the infected surfaces also gets affected by these viruses[25]. Although the World Health Organization has declared that the SARS-CoV-2 can only be transmitted through droplets of the infected person on a one-meter range or contaminated surfaces, some case studies also show the possibility of aerosol transmission [26-29]. CoV-19 was most stable on the plastic covers, i.e., up to 72 hours and up to 48 hours on stainless steel and24 hours on cardboard, which is one of the reasons for the fast spread of the virus among humans. The fact that SARS-CoV-2 can suspend freely in the air for about three hours, having a similar reduction in its infectious rate identical to that of SARS-CoV, is revealed by the New England Journal. Even though the properties of the Virus SARS-CoV and SARS-CoV-2, the affinity of SARS-CoV-2 is nearly ten times more than the effect of SARS-CoV human receptors [29]. COVID-19 is now spreading quickly within communities. SARS-CoV does not show a massive impact on the human body, while SARS-CoV-2, in contrast, may even result in death. Some scientists say that the affected people might have some problems related to the lungs and respiratory

system in their life even if they are recovered from COVID. Here it was not the case with SARS. These viruses can be kept away following specific measures such as social distancing, proper sanitation by using gloves and face masks to avoid contact with the surface contaminated with the virus. Early case detection and isolation should be made to reduce the severe effect of this virus when affected by it [30].

3.1 Medication:

There is no medicine discovered so far, and clinical trials are being carried out through the world in collaboration with several governments and private medical agencies. However, the results that are obtained by performing some initial clinical trials in the United Kingdom are welcomed by the World Health Organization, which shows the use of Dexamethasone, a corticosteroid. It was able to cut the mortality for about one third for the people on the ventilator and reduce the mortality for about one fifth for the patients that require only oxygen [31]. The benefit of this drug is not shown much on the patients with milder disease but has a significant impact on the patients who are seriously ill. This Dexamethasone is being widely used since the 1960s for treating the inflammatory conditions and some cancers. "This is the first treatment to be shown to reduce mortality in patients with COVID-19 requiring oxygen or ventilator support," said Dr. Tedros Adhanom Ghebreyesus, WHO Director-General. Several clinical trials are being made relentlessly which might result in the discovery of vaccines by 2021[31-32].

3.2 Medical Manifestation of Coronavirus:

The general medical manifestation of novel coronavirus nCoV [31]

- The lower tract is not often concerned, even supposing pneumonia may take place.
- Asthmatic kids may experience panting castigate, and respiratory signs could also be exacerbating in old age persons with the unceasing pulmonic illness.
- HCoV-OC43 can transmit a disease to neurons and cause encephalitis.
- 229E - and OC43-related serogroups from HCoV, results in upper respiratory signs and symptoms in Higher and Lower aged persons differ in rate and relentlessness.
- HCoV's roots tract illness like bronchioloalveolar and pneumonia, nevertheless intestinal flu and neurological diseases may also happen.
- The HCoV may end up "common colds," typically afebrile, in adults.
- The signs understand of nasal discharge and malaise.
- Other signs may include chills, malaise, runny nose, headache, and cough.
- The minimum and maximum incubation phase are from 2 to 5 days.
- The significant symptoms last for seven days, with a minimum and maximum range of 3 to 18 days.
- The virus affected person with indicative corona infection confirms an increase in neutralizing and accompaniment complex antibody titers within the blood after immunization that waned after a few days .

3.3 Precautionary Measures to Prevention and control of coronavirus [31]:

S.No.	Precautionary Measures
1	Strictly following social distancing.
2	Using face masks and gloves when going out.
3	Use of sanitizer for cleaning hands.
4	Thoroughly wash your face and hands using soap and hot water.
5	Avoid eating stored food.
6	Do not go outside the house unnecessarily.
7	Do not touch Doorknobs and banisters when gone out.
8	Do not maintain close contact with people having signs of any respiratory diseases.
9	Be aware of people having any illness such as fever, cough, and cold.

Table 1: List of Precautionary Measures [1]

3.5 Laboratory Diagnosis of Coronavirus:

The following are the ways of diagnosis of nCoV [31]:

- Virus separation - The individual HUH7 used as a prime isolator for 229E, OC43and HKU-1 viruses from therapeutic specimens, and NL63 cloistered in LLC-MK2 and Vero B4 cells.
- Using RT-PCR for the Recognition of viral RNA
- For the identification of enteric coronaviruses, e-microscopy is useful.
- For serological diagnosis ELISA assays, immune fluorescence tests are used.
- The infections with strain 229E are feasible, employing a passive hemagglutination test, within which red cells coated with coronavirus antigen reacted with antibody-containing sera. The virions related to HCoV-OC43 express a HE glycoprotein on the surface of the viral envelope are often used to detect by hemagglutination and acetyl esterase assays.

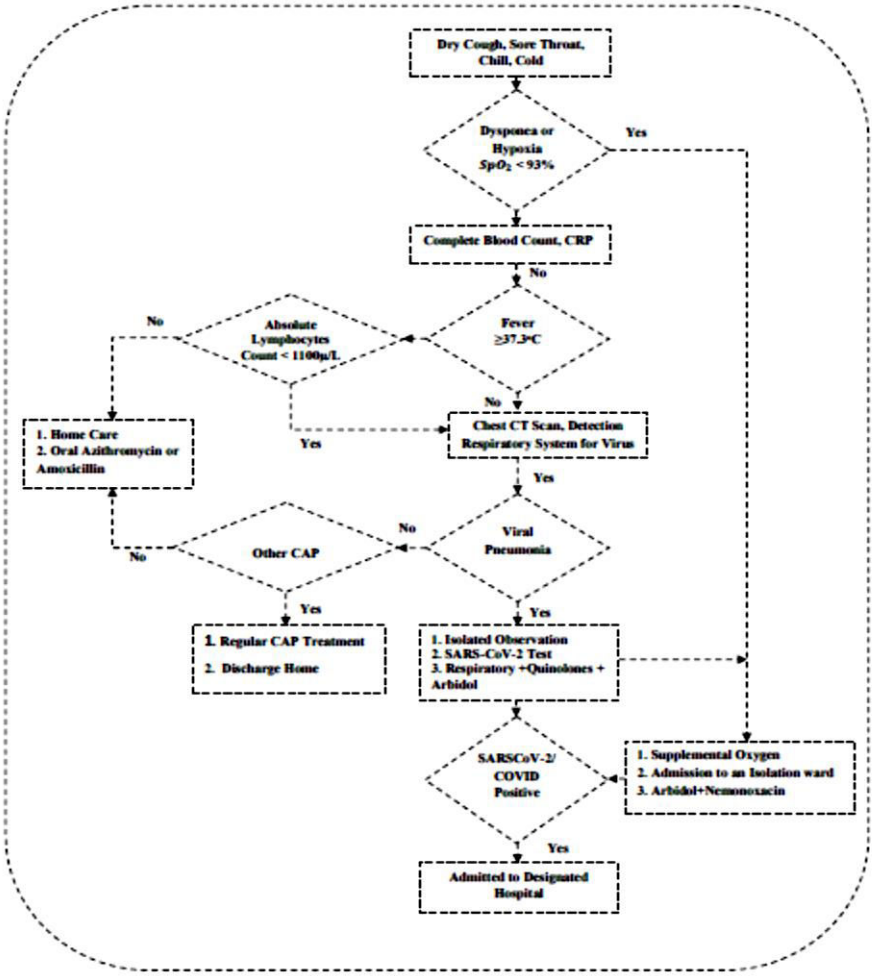


Figure 6: General diagnosis approach of novel coronavirus diseases COVID-19

Conclusion:

COVID-19, which has been reported first on December 12, 2019, was physically originated in Wuhan, a city in China, but was officially announced on December 31, 2019. Due to its wide outbreak situation, an emergency is declared by WHO in March 2020. It has been spread to 216 countries and territories to date, and no medicine is discovered so far. Most of the elderly persons were being affected severely by this virus, and the mortality rate of the whole world is 0.0078%, with the Infection fatality rate as 6.9% and recovery rate 93.1%.

REFERENCES

1. World Health Organization. Novel Coronavirus—China [cited 2020 July 9]. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

2. Giovanetti M, Benvenuto D, Angeletti S, Ciccozzi M. The first two cases of 2019-nCoV in Italy: Where they come from? J Med Virol. 2020; [Epub ahead of print].PubMedExternal Link

3. Information Report from Worldometers - https://www.worldometers.info/coronavirus/coronavirus-cases/

4. Coronavirus (COVID-19) in the U.S. [cited 2020 July 8]. https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html

5. P, Bretzel G, Froeschl G, Wallrauch C, et al. transmission of 2019-nCoV infection from an asymptomatic contact in Germany. N Engl J Med. 2020;382:970–1.PubMedExternal Link

6. Hubei statistical yearbook—2018. Wuhan (China): Hubei Provincial Bureau of Statistics; 2019.

7. CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. J Med Virol. 2020;92:401–2.PubMedExternal Link

8. Ma J; WND News Services. 5 million left Wuhan before lockdown, 1,000 new coronavirus cases expected in city [cited 2020 july 5]. https://ph.news.yahoo.com/coronavirus-pathogen-could-spreading-humans-074739869.html

9. Health Commission of Gansu Province. Two cases of novel coronavirus 2019 (2019-nCoV) have been confirmed in Gansu Province [in Chinese] [cited 2020 July 8]. http://wsjk.gansu.gov.cn/single/10910/82997.htmlExternal Link

10. Masks are made mandatory in Wuhan [in Chinese] [cited 2020 June 27]. http://www.gs.chinanews.com.cn/news/2020/01-27/326475.shtmlExternal Link

11. The State Council, The People's Republic of China. China to apply new city classification standards http://english.www.gov.cn/policies/latest_releases/2014/11/25/content_281475015213546.htmExternal Link

12. Gansu Provincial Center of Disease Control and Prevention. Gansu Provincial Center of Disease Control and Prevention outbreak bulletin [in Chinese] [cited 2020 July 4]. http://www.gscdc.net/index.php?s=news&c=category&id=60External Link

13. P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med. 2020; [epub ahead of print].PubMedExternal Link

14. Katta, Miranji, Trinadh Rajanala, Lavanya Nadella, M. Vamsi Krishna Allu, and P. Sowmithri. "Review Of Mems-Based Sensing Technology And Human-Centered Applications In Health Prespective." NVEO-NATURAL VOLATILES & ESSENTIAL OILS Journal| NVEO (2021): 4299-4315.

15. Katta, M., and R. Sandanalakshmi. "A technology overview and future scope of bio-MEMS in tropical disease detection." Rev Int J Eng Technol 7 (2018): 648-651.

16. Katta, Miranji, and R. Sandanalakshmi. "Simultaneous tropical disease identification with PZT-5H piezoelectric material including molecular mass biosensor microcantilever collection." Sensing and Bio-Sensing Research 32 (2021): 100413.

17. Giacobbe DR. The novel Chinese Coronavirus (2019-nCoV) infections: Challenges for fighting the storm. Eur J Clin Invest. 2020;50:e13209.PubMedExternal Link

18. Dept., Chinese Medical Association. Diagnosis and prevention of 2019-nCov infection pneumonia in children [cited 2020 Jul 9]. https://en.cma.org.cn/art/2020/1/29/art_1822_32177.htmlExternal Link

19. Cauchemez S, Xu , Cowling BJ, et al. Risk for transportation of 2019 novel coronavirus disease from Wuhan to other cities in China. Emerg Infect Dis. 2020;26:26; [epub ahead of print].PubMedExternal Link

20. Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020;395:507–13; Epub ahead of print. DOIExternalLinkPubMedExternal Link

21. Kok KH, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. Lancet. 2020;395:514–23; Epub ahead of print. DOIExternalLinkPubMedExternal Link

22. Yang XL, Wang XG, Hu W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature. 2020;579:270–3; [Epub ahead of print].PubMedExternal Link

23. Wu JT, Leung K, Leung GM. Forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study. Lancet. 2020;395:689–97.PubMedExternal Link

24. Katta, Miranji. "1, Sandanalakshmi R2, M Vamsi Krishna Allu3, P." Srinivasulu4, M Greeshma5. Review on Novel Coronavirus (nCoV-19): Defen-sive Measures and Natural Medicine IJCMCR 12, no. 3 (2021): 003.

25. Hem MA. Effect of population density on the level of development [cited 2017 November 1] https://mpra.ub.uni-muenchen.de/82301External Link

26. Wilson H. Travelers give wings to novel coronavirus (2019-nCoV). J Travel Med. 2020;taaa015; [Epub ahead of print].PubMedExternal Link

27. Katta, Miranji, R. Sandanalakshmi, and V. Veerraju. "Microcantilever geometry analysis for array sensor design." Materials Today: Proceedings 50 (2022): 1496-1501.

28. Savran B, Hugenholtz F, Elderman M, Huijskes M, et al. Age-associated impairment of the mucus barrier function is associated with profound changes in microbiota and immunity. Sci Rep. 2019;9:1437.PubMedExternal Link

29. Huang C, Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395:497–506.PubMedExternal Link

30. The Lancet. Emerging understandings of 2019-nCoV. Lancet. 2020;395:311.PubMedExternal Link

ISSN PRINT 2319 1775 Online 2320 7876
, UGC CARE Listed (Group -I) Journal Volume 11, Iss 08, 2022

31. Katta, Miranji, Satish Rapaka, Ramkumar Adireddi, and Jagadeeshwara R. Emandi. "A preliminary review on novel coronavirus disease: COVID-19." Coronaviruses 1, no. 1 (2020): 90-97.

32. Prliminary results abour clinical trials on corona Infected patients https://www.who.int/news-room/detail/16-06-2020-who-welcomes-preliminary-results-about- dexamethasone-use-in-treating-critically-ill-covid-19-patients.