Covid 19: A comprehensive Review

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***Abstract*: The 2019 novel coronavirus (2019-nCoV) or severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) expanded from its origin in Wuhan, Hubei Province, China, to other nations across the world. Coronaviruses, a family of viruses within the nidoviruses superfamily, were further classified according to their genera, alpha-, beta-, gamma- and delta- coronaviruses. COVID-19 is a disease triggered by the SARS-CoV-2 virus that can cause a respiratory tract infection. It can affect either your upper or lower respiratory system (sinuses, nose, and throat) (windpipe and lungs). Infections can minor or fatal. The purpose of this review is to provide brief information on the coronavirus (Covid-19), Introduction, History, Structure, Epidemiology, Pathophysiology, Transmission, Symptoms, Preventions, Diagnosis, and Treatment of coronavirus (Covid-19).**

***Keywords*: Coronavirus, Pathophysiology, Treatment, Vaccines.**

I. INTRODUCTION

Coronavirus features a spherical or organic phenomenon form. organic phenomenon structures will alter their form in response to environmental factors. Coronavirus is created of fibre ribonucleic acid that's wrapped during a club-shaped compound protein. Viruses having spike-like attachments on their surface that provide them a crown-like look underneath associate degree microscope, so that they were named coronavirus [1].

Coronaviruses, a family of viruses among the nidoviruses taxonomic group, were more classified per their genera, alpha-, beta-, gamma- and delta coronaviruses (α-, β-, γ- and δ-). Among those, alpha and beta species square measure capable of contaminating solely mammals, whereas the opposite 2 genera will infect birds and will additionally infect mammals [2].

II.HISTORY

The first case of coronavirus (COVID-19) was known and isolated from respiratory disorder patient from metropolis, China in late December 2019 subsequently cases augmented worldwide. China aucourant the planet Health Organization of the pandemic, and also the metropolis food market was shut on January 1, 2020. The planet Health Organization known SARS-CoV-2 as a brand-new variety of coronavirus. COVID-19 could be a unwellness triggered by the SARS-CoV-2 virus which will cause a respiratory tract infection [6].

III.STRUCTURE

Coronaviruses square measure composed of 4 structural proteins: the spike (S), membrane (M), enwrap (E), and nucleocapsid (N). Spike may be a transmembrane trimetric compound protein that extends from the infective agent surface and determines coronavirus variability and host reaction. Spike is created of 2 useful fractional monetary units: the S1 subunit is responsible of attaching to the host cell receptor, whereas the S2 fractional monetary unit is responsible of focusing the infective agent and cellular membranes.

Attachment, penetration, synthesis, maturity, and unharness square measure the 5 processes within the virus's life cycle with its host. Viruses enter host cells via endocytosis or membrane fusion once they need connected to host receptors. Infective agent RNA reaches the nucleus for replication once the infective agent contents are discharged into the host cells [3].

IV.EPIDEMIOLOGY

In Wuhan town, the various respiratory disorder cases were according in Dec 2019, and also the origin for that shown as Huanan food Market searched. On Dec 12, 2019, the primary case of the COVID-19 epidemic was according with surprising respiratory disorder and there have been twenty-seven viral infection cases with seven being severe. On New Year's Eve, 2019, the COVID-19 epidemic was declared globally. The infection originated from wild cracked and belonged to cluster two of beta-coronavirus that contains Severe Acute metabolic process Syndrome Associated Coronavirus (SARS-CoV) were declared as novel CoV on Jan 22, 2020.

Although COVID-19 and SARS-CoV belong to an equivalent beta coronavirus subgroup, similarly at order level is merely seventieth, and also the novel cluster has been found to point out genetic variations from SARS-CoV, like the severe acute respiratory syndrome epidemic, tis eruption has occurred throughout the Spring pageant in China, throughout that nearly three billion folks travel nationwide. These conditions caused favourable conditions for the transmission of this extremely contagion and severe difficulties in hindrance and management of the epidemic. Similarly, there was a speedy increase in COVID-19 cases between Jan 10-22, 2020. The condition for the spread of this difficult to control sickness [7].

V.PATHOPHYSIOLOGY

Coronavirus first of all attacks the body and goes to the alveoli. Then, it affects the kind a pair of pneumocytes (the impact of wetter production). S-spike macromolecule of virus (ssRNA) attack to the kind and unharness ssRNA. Polymer hijacks the ribosomes. Then a pair of mechanisms happen, one is it makes the molecule of a virus and another one virus use accelerator i.e. polymer dependent polymer enzymes, and multiplication of polymer molecules happen, in our body replication of virus begins, by these two mechanisms the whole virus particles area unit get fashioned within the body. Then this entire virus particle injury varieties a pair of pneumocytes and that they unharness IL-1, IL-6, and IFN. They activate alveolar macrophages and came into the capillary close alveoli. swish muscle relaxation and epithelial tissue cell contraction happens and area unit followed by dilation. It will increase the capillary porousness, wherever the fluid gets accumulated in alveoli and therefore the laundry to the wetter and reduces the assembly of wetter. In differently, it accumulates fluid encircled by the alveoli and alveoli get compress; alveolar collapses and reduces physical phenomenon in alveoli sac, there's one condition that's fashioned referred to as drive.

In hypoxia, respiration will increase and PO2 level decreases owing to that stimulation of the sensory receptor and sympathetic system. By the stimulation the rise in pulse rate and respiration. Suddenly, the cytokines releases of IL-1, IL-6 and IFN will increase and that they attract the neutrophils; Neutrophils reactive gas species and peptidase enzymes kill the virus and infected cells by differently it damages the kind one and a couple of pneumocytes followed by it damages cells and virus particles soft into the alveoli and assortment of cellular scrap and fluids in alveoli, consolidation of alveoli happen thus, decrease in gas exchange, hypoxemia and mechanical irritation happen it results in cough. Sometimes, by the discharge of cytokines, they trigger the neural structure and by stimulation, they unharness autocoid and that cause the fever [4].

VI.TRANSMISSION

Coughing and innate reflex while not covering the mouth will disperse droplets into the air. Touching or shaking hands with an individual. United Nations Agency has seen the virus will pass the virus between people. Creating contact with the surface or object that has the virus so touching the nose, eyes, or mouth. Some animal coronaviruses, like feline coronavirus (FCoV), could unfold through contact with feces. However, it's unclear whether or not this additionally applies to human coronaviruses.

The National Institutes of Health (NIH) recommend that many teams of individuals have the highest risk of developing complications of COVID-19 [9].

These groups include

- Teen age children's
- 65 year or older peoples
- Pregnant women's
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VII.SIGNS AND SYMTOMS

The following are the most common signs and symptoms:

- Fever
- Coughing
- Fatigue
- Breathing problems
- Aches on body
- Headache
- Throat irritation
- Runny nose/congestion
- Loss of olfactory or gustatory perception
- Nausea
- Diarrhoea
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VIII.PREVENTION

It is advised that suspected or confirmed cases of mild sickness should be isolated at home. To enable for viral elimination, sufficient ventilation and sunshine should be provided at home. Patients should be advised to wear a basic surgical mask and maintain good cough hygiene. When in the same room as a patient, healthcare workers should be instructed to wear a surgical mask and practise good hand hygiene [7].

- Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- Maintain a safe distance from anyone who is coughing or sneezing.
- Wear a mask when physical distancing is not possible.

IX.DIAGNOSIS

- **Chest x-ray:**

  In the early stages of the illness, a chest X-ray is mostly unclear and should not reveal any necessary data. Bilateral multifocal alveolar opacities develop because the infection develops, which can be accompanied with serous membrane effusion.

- **CT Scan:**

  High-resolution CT (HRCT) is that the most well-linked technique for police investigation COVID-19 respiratory disorder, particularly within the early stages of the illness.

- **RT-PCR:**

Samples square measure taken from the highest tract victimisation bodily cavity and cavity swabs. Then they were kept at 4°C at that time they were submitted to laboratories for reverse-transcription amplification of the infective agent genetic material. By victimisation reverse transcription PCR (RT-PCR) or period of time RT-PCR, a double-stranded DNA molecule is synthesised from the present infective agent RNA.

- **Rapid antigen test:**

This COVID-19 take a look at detects sure proteins within the virus. Employing a long nasal swab to urge a fluid sample, some matter tests will manufacture leads to minutes. Others is also sent to a research lab for analysis.

X.TREATMENT

- **Antibiotics:**

Azithromycin, for example, was very successful in preventing pulmonary infections in patients with viral cases of pneumonia, as well as having a strong anti-inflammatory impact on the airways [11].

- **Corticosteroids:**

The first and only steroid recommended was methylprednisolone, at a dosage of 0.5-1 mg/kg/day for severe cases. The use of higher dosages was not advising in severe and critically infected patients, dexamethasone has also been proven to be beneficial in lowering mortality [9].

- **Antiviral drugs:**
  - **i. Remdesivir**

Remdesivir is a broad-spectrum antiviral drug that works by inhibiting viral RNA-dependent RNA polymerase. In individuals with moderate illness, a loading dosage of 200 mg intravenous over 1-2 hours on day one followed by 100 mg intravenous daily for 5-10 days may be recommended. Remdesivir is contraindicated in children, pregnant or lactating women's, and individuals with severe hepatic or renal impairment [10].

  - **ii. Favipiravir**

Favipiravir inhibits the RNA viruses by being converted into the ribofuranosyl triphosphate derivative by host enzymes and then selectively inhibiting the viral RNA-dependent RNA polymerase. The drug has also demonstrated efficacy in the treatment of avian influenza and may be a potential therapeutic option for illnesses caused by viruses such as the Ebola virus and COVID-19.

- **Immunomodulatory drugs:**
  - **i. Chloroquine**

Chloroquine is a commonly used antimalarial medication with an antiviral action throughout a broad spectrum. Chloroquine (500 mg every 12 hours) prevents SARS-CoV receptor glycosylation and inhibits viral infection by raising endosomal pH, which is necessary for virus/cell fusion.

  - **ii. Hydro-chloroquine**

Hydro-chloroquine is a chloroquine derivative that has anti-SARS-CoV efficacy in vitro and a superior safety profile. In SARS-CoV-2 infected Vero cells, Hydro-chloroquine was shown to be more effective than chloroquine.

- **Monoclonal antibody:**

Tocilizumab could be a humanised recombinant antibody of the IgG1 k taxonomic group made victimisation deoxyribonucleic acid technology. The protein consists of two serious and a pair of light-weight chains and twelve intra-chain and four inter-chain disulphide bonds with a complete mass of 149 kDa. It acts in COVID-19 by the mechanism of inhibition of IL-6 synthesis from the protein. Dose of tocilizumab is 4 mg/kg intravenous initially; might increase to 8 mg/kg at 4 weeks based mostly clinical response. The dose must not be exceeding 800 mg/dose for 4 weeks.

- **Vaccines:**

As a result of creating an immune response to the SARS-CoV-2 virus, COVID-19 vaccinations provide protection against the virus. This is extremely crucial for persons who are at higher risk of COVID-19 related severe illness, such as healthcare practitioners, the elderly, and those with other medical conditions.

On December 31, 2020, the Comirnaty vaccine from the Pfizer and Biontech was included to the WHO's emergency use list (EUL). On February 16, the emergency use list was issued for the SII/Covishield and AstraZeneca/AZD1222 vaccines (developed by AstraZeneca/Oxford and produced by the Serum Institute of India and SK Bio, respectively). On March 12, 2021, Johnson & Johnson's Jassen/Ad26.CoV-2. S was approved for emergency use list.

Moderna COVID-19 vaccine (mRNA 1273) was approved for emergency use list on 30 April, 2021, and on 7 May, 2021, the Sinophan COVID-19 vaccine was approved for EUL. Beijing Bio-Institute of Biological Products Co. Ltd., a subsidiary of China National Biotech Group, produces the Sinopharm vaccine (CNBG). Sinovac-CoronaVac was approved for EUL on 1 June, 2021 [5].

CONCLUSION:

The first case of COVID-19 was recorded in late December 2019, in Wuhan, China and since then the number of cases has increased around the world. That condition was very critical to control. SARS-CoV-2 virus causes Covid-19, a condition that causes respiratory infection. This virus has the potential to kill the patient. There was no effective treatment available for the

coronavirus that time the antiviral drugs and immunomodulatory drugs like remdesivir, favipiravir and hydro-chloroquine acts as a life saving drugs. After that the different vaccines are made and come into the action against the coronavirus [20].

REFERENCES

[1] Singhal, Tanu, 'A Review of Coronavirus Disease-2019 (COVID-19).', Indian Journal of Pediatrics, 87.4 (2020), 281–86

[2] Almaghaslah, Dalia, Geetha Kandasamy, Mona Almanasef, Rajalakshimi Vasudevan, and Sriram Chandramohan, 'Review on the Coronavirus Disease (COVID-19) Pandemic: Its Outbreak and Current Status', International Journal of Clinical Practice, 74.11 (2020), e13637

[3] Yuki, Koichi, Miho Fujiogi, and Sophia Koutsogiannaki, 'COVID-19 Pathophysiology: A Review.', Clinical Immunology (Orlando, Fla.), 215 (2020), 108427

[4] Parasher, Anant, 'COVID-19: Current Understanding of Its Pathophysiology, Clinical Presentation and Treatment.', Postgraduate Medical Journal, 97.1147 (2021), 312–20

[5] World Health Organization (12 October 2020) Coronavirus disease (COVID-19) (https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19)

[6] Al-Qahtani, Ahmed A., 'Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2): Emergence, History, Basic and Clinical Aspects.', Saudi Journal of Biological Sciences, 27.10 (2020), 2531–38

[7] Chen Z.; Zhang W.; Lu Y et. al. From SARS-CoV to Wuhan 2019-nCoV Outbreak: Similarity of Early Epidemic and Prediction of Future Trends.: Cell Press, 2020

[8] Stratton, Charles W., Yi-Wei Tang, and Hongzhou Lu, 'Pathogenesis-Directed Therapy of 2019 Novel Coronavirus Disease.', Journal of Medical Virology, 93.3 (2021), 1320–42

[9] Habas, Khaled, Chioma Nganwuchu, Fanila Shahzad, Rajendran Gopalan, Mainul Haque, Sayeeda Rahman, and others, 'Resolution of Coronavirus Disease 2019 (COVID-19).', Expert Review of Anti-Infective Therapy, 18.12 (2020), 1201–11

[10] Aiswarya, Dhanapalan, Venkatesh Arumugam, Thanigachalam Dineshkumar, Natarajan Gopalakrishnan, Tanuj Moses Lamech, Govindasamy Nithya, and others, 'Use of Remdesivir in Patients With COVID-19 on Hemodialysis: A Study of Safety and Tolerance', Kidney International Reports, 6.3 (2021), 586–93

[11] Chedid, Marie, Rami Waked, Elie Haddad, Nabil Chetata, Gebrael Saliba, and Jacques Choucair, 'Antibiotics in Treatment of COVID-19 Complications: A Review of Frequency, Indications, and Efficacy.', Journal of Infection and Public Health, 14.5 (2021), 570–76

[12] Nal B, Chan C, Kien F, Siu L, Tse J, Chu K, Kam J, Staropoli I, Crescenzo-Chaigne B, Escriou N, van der Werf S, Yuen KY, Altmeyer R. Differential maturation and subcellular localization of severe acute respiratory syndrome coronavirus surface proteins S, M and E. The Journal of general virology, 2005; 86(Pt 5): 1423–1434.

[13] Hung IF, To KK, Lee CK, Lee KL, Chan K, Yan WW, et al. Convalescent plasma treatment reduced mortality in patients with severe pandemic influenza A (H1N1) 2009 virus infection. Clin Infect Dis. 2011;52:447-56.

[14] Gralinski L.; Menachery V; Return of the Coronavirus: 2019- nCoV, Viruses, 2020; 12(2): 135

[15] Trivedi, N., A. Verma, and D. Kumar, 'Possible Treatment and Strategies for COVID-19: Review and Assessment.', European Review for Medical and Pharmacological Sciences, 24.23 (2020), 12593–608

[16] Yadav, Ambedkar Kumar, Siwan Wen, Xianghuai Xu, and Li Yu, 'Antiviral Treatment in COVID-19: Which Is the Most Promising?-A Narrative Review.', Annals of Palliative Medicine, 10.1 (2021), 707–20

[17] Majumder, Joydeb, and Tamara Minko, 'Recent Developments on Therapeutic and Diagnostic Approaches for COVID-19.', The AAPS Journal, 23.1 (2021), 14

[18] Mohamadian, Malihe, Hossein Chiti, Alireza Shoghli, Sajjad Biglari, Negin Parsamanesh, and Abdolreza Esmaeilzadeh, 'COVID-19: Virology, Biology and Novel Laboratory Diagnosis.', The Journal of Gene Medicine, 23.2 (2021), e3303

[19] Wang, Chen, Peter W Horby, Frederick G Hayden, and George F Gao, 'A Novel Coronavirus Outbreak of Global Health Concern', Lancet (London, England), 395.10223 (2020), 470–73

[20] Bchetnia, Mbarka, Catherine Girard, Caroline Duchaine, and Catherine Laprise, 'The Outbreak of the Novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2): A Review of the Current Global Status.', Journal of Infection and Public Health, 13.11 (2020), 1601–10

[21] Hozhabri, Hossein, Francesca Piceci Sparascio, Hamidreza Sohrabi, Leila Mousavifar, René Roy, Daniela Scribano, and others, 'The Global Emergency of Novel Coronavirus (SARS-CoV-2): An Update of the Current Status and Forecasting.', International Journal of Environmental Research and Public Health, 17.16 (2020)

[22] Peiris, J. S. M., Lai S. T., Poon L. et. al. Coronavirus as a possible cause of severe acute respiratory syndrome. The Lancet, 2003; 361(9366): 1319- 1325.

[23] Wang, H. J., S. H. Du, X. Yue, and C. X. Chen, 'Review and Prospect of Pathological Features of Corona Virus Disease.', Fa yi xue za zhi, 36.1 (2020), 16–20

[24] Finkelstein, Maxwell T., Adam G. Mermelstein, Emma Parker Miller, Paul C. Seth, Erik-Stephane D. Stancofski, and Daniela Fera, 'Structural Analysis of Neutralizing Epitopes of the SARS-CoV-2 Spike to Guide Therapy and Vaccine Design Strategies.', Viruses, 13.1 (2021)

[25] De León-Rodríguez, Saraí G., Brenda Hernández-Rico, Guadalupe Del Olmo-Vázquez, Iván Cruz-Dávalos, and Laura C. Bonifaz, 'SARS-CoV-2: Previous Coronaviruses, Immune Response, and Development of Vaccines.', Boletin Medico Del Hospital Infantil de Mexico, 77.5 (2020), 252–61