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Review Article

The COVID-19 Pandemic: How far have we come?

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ABSTRACT:

The genesis of novel SARS-CoV-2(COVID-19) started from Wuhan, China and consequently flared-up to every nook and corner covering the entire world globally creating a pandemic and setting off like a ticking time bomb which if not controlled or contained can cause an overall severe acute respiratory syndrome along with a wide range of symptoms which have proven fatal. With increasing risks to public health due to this pandemic, this review literature is aimed to introduce proper effective knowledge of how to prevent transmission among people and mainly projecting on current treatment and clinical data of COVID-19 patients. **Key-words**: Covid-19 management, chloroquine phosphate, clinical trials, Convalescent plasma therapy, ECMO, fusion inhibitor, herd immunity, ICMR, nasopharyngeal, prophylactic vaccination, swab specimen, remdesivir, R0 number, sars-cov-2, virus.

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INTRODUCTION:

The outburst of a potentially severe acute respiratory infection - Coronavirus disease 2019 (COVID-19) flushed its way across countries sparing none. It dawned on a late December 2019 in Wuhan City, Hubei Province, China, and has since attracted increasing attention and public emergency beginning its leisurely and unhurried kill, while spreading up to 215 countries and caused more than 236431 deaths by 3^{rd} may, 2020. Whilst we're still unaware of the pandemic it crept to India and the first case was reported on 30 January 2020. Enforcement although taken in a hasty manner has affected people without distinction. As of 2 May 2020, the Ministry of Health and Family Welfare has confirmed a total of 37,776 cases, 10,018 recoveries, and 1223 deaths in the country¹. Experts suggest the number of infections could be much higher as India's

testing rates are among the lowest in the world². The challenges faced by a developing country with limited health facilities and manpower to tackle this newfound virus have the authority to take unprecedented steps yet timely. Different states across the country have responded and implemented measures to maintain a low mortality rate. They have developed a containment strategy by a total lockdown at all levels, sealing borders to avoid the interstate and inter-district mobilization, use of extensive testing, contact tracing of affected individuals, maintaining isolation centers, and raising awareness and concerns through social media platforms at the earliest. Despite the efforts, a number of deaths have been registered since first recorded till today. The infection rate of COVID 19 in India is reported to be 1.7, significantly lower than in the worst affected countries³. Nevertheless, the desired effects are also appreciated by thousands who have recovered thereby flattening the pandemic curve.

MANAGEMENT:

As this deadly disease (COVID 19)/ Novel Coronavirus takes its toll rapidly worldwide triggering a pandemic and creating a public health emergency of international concern, it demands that we develop urgent yet effective measures to protect people from risks of transmission.

Various researches by WHO is being carried out for ratifying the available potential treatment regime, vaccines, and therapeutics and for developing newer ones.

Non-pharmacological interventions focusing on infection control and transmission of this novel coronavirus outbreaks include isolation at home, voluntary quarantine at home, a social distancing of the entire population especially of the elderly and temporary closure of schools, universities, and workplaces. For avoiding exposure to the virus people are advised to⁴⁻⁵.

- Wash hands often with soap and water for at least 20 seconds or an alcohol-based hand sanitizer (that contains at least 60% alcohol), especially after being in a public place, blowing their nose, or coughing/sneezing. Touching the eyes, nose, and mouth with unwashed hands should be avoided.
- Avoid close contact with people (i.e., maintain a distance of at least 1 meter [3 feet]) including shaking hands, particularly those who are sick, have a fever or are coughing or sneezing. A recommended distance should be maintained which may differ between countries (for example, 2 meters is recommended in the US and UK) and you should consult local guidance
- Respiratory hygiene to be practiced (i.e., cover mouth and nose when coughing or sneezing, discard tissue immediately in a closed bin, and wash hands)
- Seek medical attention early if they have a fever, cough, and difficulty breathing, and share their previous travel and contact history (travelers or suspected/confirmed cases) with their healthcare provider
- Stay at home if they present with mild symptoms of fever, until they recover (except to get medical care)
- Clean and disinfect frequently touched surfaces daily (e.g., light switches, doorknobs, countertops, handles, phones).

Wearing a mask is another very important mode of preventing the aerosol spread of COVID-19. Based on the emerging observations, the Centre for Disease Control, USA as of 3rd April 2020 is reviewing its policy and is considering a recommendation to encourage broader use of face masks in the community⁶. On 3rd April 2020, the Government of India initiated

the Mission PPE (Personal Protective Equipment), where 5 billion cloth masks, 500 million surgical masks, and 500 million gloves will be procured soon⁶.

Hence it is of utmost importance for the doctors, health care providers, policymakers and laypeople to have a proper knowledge of which masks to wear, how to wear and how to remove as it significantly reduces the chances of spreading the aerosol route of transmission, and also because it offers protection against catching the infection. A 3-layered surgical mask is an ideal mask for the common man to wear but as it is usually either not effective or not available, a 3-layered cotton mask is a reasonable alternative, in spite of the fact that it isn't as effective. A surgical mask is recommended for doctors, nurses, and all paramedics in routine clinical practice. Those doctors and healthcare providers who take throat swabs/nasal swabs of suspected COVID-19 patients or perform aerosol-generating procedures should wear an N95 mask. Masks should be worn properly and disposed off properly with good hand hygiene practices.

- N95 mask 99% protection, decrease transmission by 70%
- Surgical mask 75% protection, decrease transmission by 50%
- Cloth mask -67% protection, decrease transmission by $40\%^6$

No particular medications are known to be compelling for COVID-19 yet; therefore, the mainstay of management is early recognition and optimized supportive care to relieve symptoms and to support organ function in more severe illness. Patients ought to be overseen in an emergency hospital setting where conceivable; nonetheless, home consideration might be appropriate for chosen patients with mild illness except if there is concern about rapid deterioration or a inability to promptly come back to the hospital setup if urgency arises⁷.

Several possible drugs and novel agents, which have not been clinically tested, are available through compassionate use, or as repurposed antiviral and immune-modulating pharmacotherapies⁸.

Supportive care being the cornerstone of the treatment can be achieved with the use of acetaminophen, external cooling, oxygen therapy, nutritional supplements, and anti-bacterial therapy⁹. In-vitro studies have suggested that chloroquine, an immunomodulant drug traditionally used to treat malaria, is effective in reducing viral replication¹⁰ Hydroxychloroquine received an emergency use authorization from the FDA as of 3 April 2020, but there are still a lot of questions about optimal doses and treatments for COVID-19¹¹.

Critically ill patients require high flow oxygen, extracorporeal membrane oxygenation (ECMO), glucocorticoid therapy, and convalescent plasma⁹. The administration of systemic corticosteroids is not recommended to treat ARDS¹². Moreover, unnecessary administration of antibiotics should also be avoided. ECMO should be considered in patients with refractory hypoxemia despite undergoing protective ventilation¹². Patients with respiratory failure may require intubation, mechanical ventilation, high-flow nasal oxygen, or noninvasive ventilation¹². Treatment of septic shock requires hemodynamic support with the administration of vasopressors. Organ function support is necessary for patients with multiple organ dysfunction¹². Therapeutically, aerosol administration of alphainterferon (5 million units twice daily), chloroquine phosphate, and lopinavir/ritonavir have been suggested¹². Other suggested anti-viral include ribavirin and abidor⁹. The utilization of three or more anti-viral drugs simultaneously is not recommended. Ongoing clinical studies suggest that remdesivir (GS5734) can be used for prophylaxis and therapy 12 . Furthermore, a fusion inhibitor targeting the HR1 domain of spike protein is reported to have the potential to treat COVID-19¹³. Major research has focused on identifying antibody molecules targeting spike proteins as they mediate viral entry, and their potential to induce host immune responses and cause protective antibody responses in infected individuals¹¹. In the absence of validated treatment and tested vaccine, localized herd immunity can help in slowing down its spread at sensitive locations¹⁴. Herd immunity or herd protection is an age-old concept. It is indirect protection conferred by immune individuals to the susceptible ones in a given population against a specific pathogenic infestation. Herd immunity protects by limiting the spread of the disease¹⁵. R0 number determines the minimum percentage (Y) of the population required to be immune to achieve the herd immunity for the entire population¹⁵. Here,

$Y=(R0-1)/R0 \ X \ 100 \ [12] \\ As described before, R0 = 2-3 as per recent reports. \\ If R0=2, then \ Y=[(2-1)/2]X100=50 \ \% \\ Similarly, when R0=3, then \ Y=[(3-1)/3*100=66.66 \ \% \\ \end{cases}$

Therefore, for R0 = 2-3, nearly 50 to 66.66 percent* (threshold) of the population is required to be immune against COVID-19 for the protection of susceptible individuals in a given population through herd immunity¹⁴.

*As discussed previously, it can be higher as cases are most likely under-reported.

The recovered individuals if placed in high enough numbers at a sensitive location can act as a source of indirect immunity¹⁶ and protect the target population. The coronavirus cannot reinfect the recovered subjects. Localized herd immunity can help in further impeding the spread of COVID-19¹⁴.

One of the investigational treatments being researched is the administration of convalescent plasma collected from recovered patients to COVID-19 patients. Here, convalescent plasma from recovered patients (or survivors) contains neutralizing antibodies against COVID-19. Most effective convalescent plasma with a high titer of neutralizing antibodies as determined by ELISA assays should be stored in blood banks. Previously, it has been shown that convalescent plasma transfers from recovered patients to critical subjects helped in recovering from dreadful infections such as Ebola and Influenza¹⁷. In China, Shen et al and Duan et al have shown that convalescent plasma therapy could help in the prognosis of severe cases of COVID-19¹⁸⁻¹⁹, and large scale clinical trials are being conducted to validate their findings at several locations in the United States and Europe²⁰. The clinical trials conducted by Shen et al and Duan et al were convincing but the administration of convalescent plasma was not done in a randomized clinical trial manner and it is necessary to re-validate their findings²¹. Still considering the success history of plasma therapy against Ebola and Influenza, and recovery reports from China, it looks very promising²². As per US FDA guidelines²³, clinically asymptomatic survivors who have been tested negative twice should be considered for potential convalescent plasma donation. The survivor should not display any symptoms for at least 28 days after discharge OR for at least 14 days after discharge and should be negative results for COVID-19 as determined by nasopharyngeal swab specimen or molecular diagnostic tests like realtime PCR or antibody-based assays. The records of recovered subjects should be stringently checked before considering them for potential donation. Importantly, antibody titer should be checked for each of the donated convalescent plasma. Detailed guidelines given by US-FDA (United States-Food and Drug Administration) over the inclusion and exclusion criteria for the selection of recovered patients should be considered for collection procedures and for convalescent plasma therapy²³.India also reported the use of Convalescent Plasma Therapy (CPT), Kerala getting the first nod to treat those who are critically ill²⁴. Though Indian Council of Medical Research(ICMR), the apex health research body of India in its recent press release said "Plasma therapy is no silver bullet - To recommend it without undertaking a robust scientific study may cause more harm than good" and it requires further randomized controlled trial to evaluate it for both safety and efficacy²⁵. Also, the optimal dosage of convalescent plasma, a timeline of administration, and overall efficacy need more validation by larger randomized clinical trials¹⁴. Another milestone achieved by India as ICMR has successfully isolated the COVID-19 virus strain²⁶. Isolation is always the first step towards expediting the development of drugs, vaccines and rapid diagnostic kits in the country²⁶. The other countries that have isolated the virus are Japan, Thailand, United States of America and China²⁶. ICMR has been closely working with the Ministry of Health, and other departments to coordinate the effort to tackle COVID- 19^{26} .

CONCLUSION:

The COVID-19 pandemic is spreading across the globe at an alarming rate. It has caused more infections and deaths as compared with SARS or MERS. Based on R0 values, it is deemed that SARS-CoV-2 is more infectious than SARS or MERS. Elderly and immunocompromised patients are at the greatest risk of fatality. The rapid spread of disease warrants intense surveillance and isolation protocols to prevent further transmission. No confirmed medication or vaccine has been developed. Current treatment strategies are aimed at symptomatic care and oxygen therapy. Prophylactic vaccination is required for the future prevention of COV-related epidemic or pandemic¹⁰. Knowledge of the treatment of patients with COVID-19 is rapidly evolving. As clinical data are continually being reported and trials being done information will continue to emerge regarding pharmacologic therapy for SARS-CoV-2. The immediate challenges that wait for as long as the vaccine is still to be developed, is a call for a long term change in the health care system globally which will very much determine our future. A reformation in the health care system by realizing the importance of primary care centers and community health centers will help tackle the virus at the grass-root level.

REFERENCES:

- 1. Ministry of Health and Family Welfare. www.mohfw.gov.in Retrieved 2 may 2020
- Coronavirus: India defiant as millions struggle under lockdown.https://www.bbc.com/news/world-asia-india-52077395
- One COVID-19 positive infects 1.7 in India, lower than in hot zones.

https://indianexpress.com/article/coronavirus/coronavirusindia-infection-rate-china-6321154.

- World Health Organization. Coronavirus disease (COVID-19) advice for the public. 2020 [internet publication]
- 5. Centers for Disease Control and Prevention. How to protect yourself and others. 2020 [internet publication]
- Salvi SS. In this pandemic and panic of COVID-19 what should doctors know about masks and respirators?http://apiindia.org/wp-content/uploads/pdf/coronavirus/review-article-on-mask.pdf.
- MacIntyre C Raina, Chughtai Abrar Ahmad. Facemasks for the prevention of infection in healthcare and community settings BMJ 2015;350:h694.
- Barlow A, Landolf KM, Barlow B, et al. Review of emerging pharmacotherapy for the treatment of coronavirus disease 2019. Pharmacotherapy. 2020. https://doi.org/10.1002/phar.2398. in press.
- 9. Wang Y, Wang Y, Chen Y, Qin Q: Unique epidemiological and clinical features of the emerging 2019 novel coronavirus

pneumonia (COVID-19) implicate special control measures. [Epub ahead of print]. J Med Virol.2020

- A. Cortegiani, G. Ingoglia, M. Ippolito, et al., A systematic review on the efficacy and safety of chloroquine for the treatment of COVID-19, Journal of Critical Care, https://doi.org/10.1016/j.jcrc.2020.03.005
- Kumar GV, Jeyanthi V, Ramakrishnan S, A short review on antibody therapy for COVID-19, New Microbes and New Infections, https://doi.org/10.1016/j.nmni.2020.100682
- Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Napoli RD: Features, Evaluation and Treatment Coronavirus (COVID-19). Statpearls Publishing, Treasure Island, FL;2020
- Hassan S, Sheikh F N, Jamal S, et al. (March 21, 2020) Coronavirus (COVID-19): A Review of Clinical Features, Diagnosis, and Treatment. Cureus 12(3): e7355. DOI 10.7759/cureus.7355
- SyalK. COVID-19: Herd Immunity and Convalescent Plasma Transfer Therapy. doi: 10.1002/jmv.25870
- Fine P, Eames K, Heymann DL. "Herd Immunity": A Rough Guide. Clinical Infectious Diseases. 2011;52(7):911-916.
- 16. Fine P, Eames K, Heymann DL. "Herd immunity": a rough guide. Clin Infect Dis. 2011;52(7):911-916.
- 17. Marano G, Vaglio S, Pupella S, et al. Convalescent plasma: new evidence for an old therapeutic tool? Blood Transfus. 2016;14(2):152-157.
- Shen C, Wang Z, Zhao F, et al. Treatment of 5 Critically Ill Patients with COVID-19 With Convalescent Plasma. JAMA. 2020.
- Duan K, Liu B, Li C, et al. Effectiveness of convalescent plasma therapy in severe COVID-19 patients. Proceedings of the National Academy of Sciences. 2020:202004168.
- Kathleen M. Johns Hopkins gets FDA approval to test blood plasma therapy to treat COVID-19 patients. John Hopkins web. 2020; https://hub.jhu.edu/2020/04/03/blood-plasmasera-covid-19-fdaapproval/
- Roback JD, Guarner J. Convalescent Plasma to Treat COVID-19: Possibilities and Challenges. JAMA. 2020.
- Chen L, Xiong J, Bao L, Shi Y. Convalescent plasma as a potential therapy for COVID-19. The Lancet Infectious Diseases. 2020;20(4):398-400.
- FDA G. Investigational-covid-19-convalescent-plasmaemergency-inds. US Food and Drug Administration. 2020;https://www.fda.gov/vaccinesbloodbiologics/investigational-new-drug-ind-or-deviceexemption-ide-processcber/investigational-covid-19convalescent-plasma-emergency-inds
- 24. Coronavirus cure: India to start plasma therapy; Kerala first off the block. https://www.businesstoday.in /latest/trends/coronavirus-cure-india-to-start-plasma-therapykerala-first-off-the-block/story/401108.html
- 25. Plasma therapy is no silver bullet To recommend it without undertaking a robust scientific study may cause more harm than good. https://www.icmr.gov.in/pdf/press_realease_files/TheHindu_
- DrBhargava_1May2020_V1.pdf 26. https://www.icmr.gov.in/pdf/press_realease_files/Press_Relea se_ICMR_13March2020.pdf (Press release)