



(REVIEW ARTICLE)



## COVID-19: Current landscape on global incidence of neurologic features and their restorative strategies

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### Abstract

According to WHO, the SARS-CoV-2 Coronavirus malady to begin with showed up in Wuhan, China in December 2019 and rapidly spread to more than 200 nations, coming about in a worldwide wellbeing widespread. There are over 3.5 million affirmed cases and between 165,000 and 243,000 fatalities. The essential signs are respiratory and cardiac, but neurological highlights have too been detailed in case reports and case arrangement with in the writing. Headache and tipsiness are the ore most detailed side effects, taken after by encephalopathy and daze cerebrovascular mischance, Guillian barre disorder, intense transverse myelitis, and intense encephalitis are among the complications famous. Hyposmia was the foremost common fringe appearance. It ought to moreover be famous that neurological appearances can in some cases go before normal highlights such as fever and hack, and those normal signs create afterward in these patients. Our objective is to advise neurologists and doctors who are treating suspected COVID19cases around the conceivable neurological introductions, plausible neurological complications, and the different treatment options available, to consider the long run of this worldwide widespread, and to distinguish a few potential alternatives that may revolutionize the treatment of this novel infection disease. We provide an outline of the current information concerning neurological appearances related with COVID-19, to the extent that literature is already available as the pandemic is still progressing.

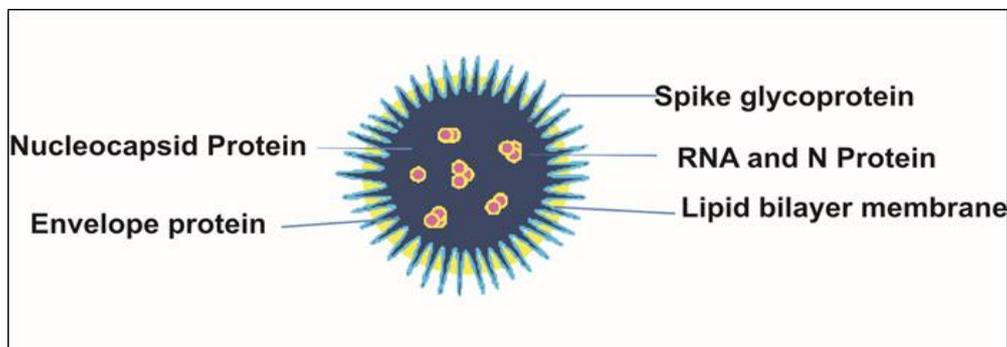
**Keywords:** COVID – 19; Encephalopathy; Hyposmia; Guillian barre syndrome; Neurological

### 1. Introduction

The extreme intense respiratory disorder is caused by the widespread novel coronavirus known as (COVID-19). This virus's side effects incorporate fever, hacking, and weakness. In conjunction, with COVID-19 patients enduring from neurological appearances such as impaired consciousness, stroke, and seizure, have too been detailed with a better rate in those who have had a more serious course of COVID-19 [1, 2]. COVID-19 disease has been connected to a few neurologic complications, counting 1) viral disease, 2) resistant reaction, 3) basic ailment, related treatments, and recuperation. Meningitis, encephalitis, myelitis, and fringe nerve warmth have all been detailed within the setting of COVID-19 in later months, inferring that SARS-CoV-2 can taint apprehensive framework structures specifically. In a retrograde learn of 214 COVID-19 patients from Wuhan, China, analysts found that 36.4 percent of patients had psychiatric indications, including central nervous system (24.8 percent), PNS (8.9%), and skinny force damage (10.7%) [3]. Moreover, the spike (S) protein tie to the have cell of (ACE-2) receptor, which gives critical planning for cell reaction [4, 5]. The transmembrane protease serine 2 (TMPRSS2) is required for viral-host fusion and access of SARS-CoV-2 [6]. The ACE-2 receptor has recently been discovered on neurons and glial cells in the cerebral cortex, striatum, posterior hypothalamic area, substantia nigra, and brain stem [7, 8]. Despite the lack of systematic and experimental studies on SARS-CoV-2 neurotropism [11], several mechanisms are presently being explained to the entry of the brain involving

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pathways like, a) transcribed route [12, 13], b) axonal transport, and c) trans-synaptic transfer [14], and also the lymphatic pathway [15]. Infection of the olfactory epithelium is followed by successional transmission through the cribriform plate to the subarachnoid space in the transcribrial route of CNS invasion. Axonal transport and trans-synaptic transfer, on the other hand, would entail infection of several PNS nerve terminals and spread along neurons in the respiratory or gastrointestinal tract, such as the olfactory bulb, trigeminal nerve, or vagus nerve [16, 17]. SARS-CoV-2 infiltrates the CNS via the bloodstream or lymphatic system, according to a third route [15]. Through direct infection of the PNS or CNS, all of these pathways have the potential to cause neurological damage. We're focusing on the potential neurological manifestations, pathophysiology, and existing drugs in this review, and there are several trials underway to find the most revolutionary one.



**Figure 1** Schematic representation of SARS-COVID 2 Structure

## 2. Origin and transmission of covid-19

The novel infection is an encompassed single-stranded RNA infection of the coronaviradae family. Infinitesimal examination of COVID -19, which shows up to have a crown-like structure due to the surface covering of little bulbar viral spike (S) polymers. It has been illustrated that it spreads through respiratory globules, vehicle, and crown persistent contact to another individual together with stool desquamation has too been set up as a mode of transmission, but the prove is constrained [18].

## 3. Significance of Monoclonal antibodies in Omicron variation

This variant was first reported from Botswana and very soon thereafter from South Africa in November 2021. In South Africa, it was associated with an increase in regional infections, and it was promptly identified in multiple other countries. The genome of the SARS- CoV Omicron variation was released on November 22, 2021, which has caused a whirlwind of media consideration due to the huge number of transformations. It contains auxiliary data nor the tentatively determined counter acting agent interaction of this variation are accessible, we have turned to prescient computational strategies to show the changed structure of the spike protein's receptor-binding space and positive potential changes to immunization adequacy.

It's made up of lab proteins that mimic the resistant system's capacity to battle off hurtful antigens like infections. Sotrovimab may be a monoclonal counter acting agent that ties to an epitope on the SARS-CoV-2 infection and has been appeared to neutralize the infection in vitro, murder contaminated cells, give a tall barrier to resistance, and accomplish tall concentrations within the lungs. It's too made to halt the infection from connecting to human cells and tainting them. Moreover, this monoclonal counter acting agent was inferred from a parent counter acting agent found in 2003 in memory B cells from a person who had recuperated from SARS-1.G.S.K.and Vir have declared a collaboration to investigate and create Vir's exclusive monoclonal counter acting agent stage innovation to speed up the advancement of existing antiviral antibodies and recognize unused ones. The emergency use authorization EUA grants healthcare suppliers to disseminate and regulate sotrovimab intravenously as a 500mg single measurement. According to the EUA, when utilizing sotrovimab to treat COVID-19, wellbeing care suppliers, patients, guardians, and caregivers must be given truth sheets that incorporate dosing enlightening, potential side impacts of sotrovimab such as anaphylaxis and infusion-related responses, hasty and loose bowels, and sedate intelligent.

#### 4. Epidemiology of coronavirus

Taking after the December COVID-19 episode in Wuhan, China, the disease rapidly spread to other parts of the world, and the developing number of cases demonstrates that the sickness is still spreading. A few cases of COVID-19-related intense pneumonia (including more than 50 individuals) have been detailed in China, and they have been connected to a fish advertise within the Wuhan territory. Since at that point, the number of individuals contaminated has risen to around ten million, in spite of the fact that this figure may still be belittled due to untraced exposures and asymptomatic people. The causative specialist has been recognized as a novel crown infection based on arrangement investigation of quiet confines. These discoveries suggested that the infection might be transmitted from individual to individual, which was afterward affirmed in more than 200 nations around the world. Moreover, progresses in sequencing innovation and other procedures have enormously progressed the precision of diagnosing viral contaminations [19].

WHO detailed on current worldwide audit information as of May 25, 2021, with over 4.1 million unused cases and 84 000 modern passings detailed, speaking to a 14% and 2% diminish, individually, from the past week? The European Locale saw the most noteworthy drop in unused cases and passings within the past week, taken after by the Southeast Asia Locale. The Western Pacific Locale saw the most prominent increment in passings, whereas the other locales saw diminishes or numbers that were just like the past week. In spite of a worldwide decrease over the final four weeks, the number of COVID-19 cases and passings remains tall, with critical increases in numerous nations around the world. For case, within the final seven days, India had 1 846 055 unused cases, a 23% diminish, Brazil had 451 424 unused cases, a 3% increment, Argentina had 213 046 unused cases, a 41% increment, the Joined together States of America had 188 410 unused cases, a 20% diminish, and Colombia had 107 590 modern cases, a 7% diminish. This was confirmed by solid clinical prove in January 2020. SARS-CoV-2 transmission from individual to individual [20].

The virus's relative high infectivity, upper respiratory mode of transmission (which may too incorporate contact transmission), moderately long incubation period, and long viral shedding period, combined with the current worldwide travel design, make all the conditions for it to quickly advance into a widespread [21, 22].

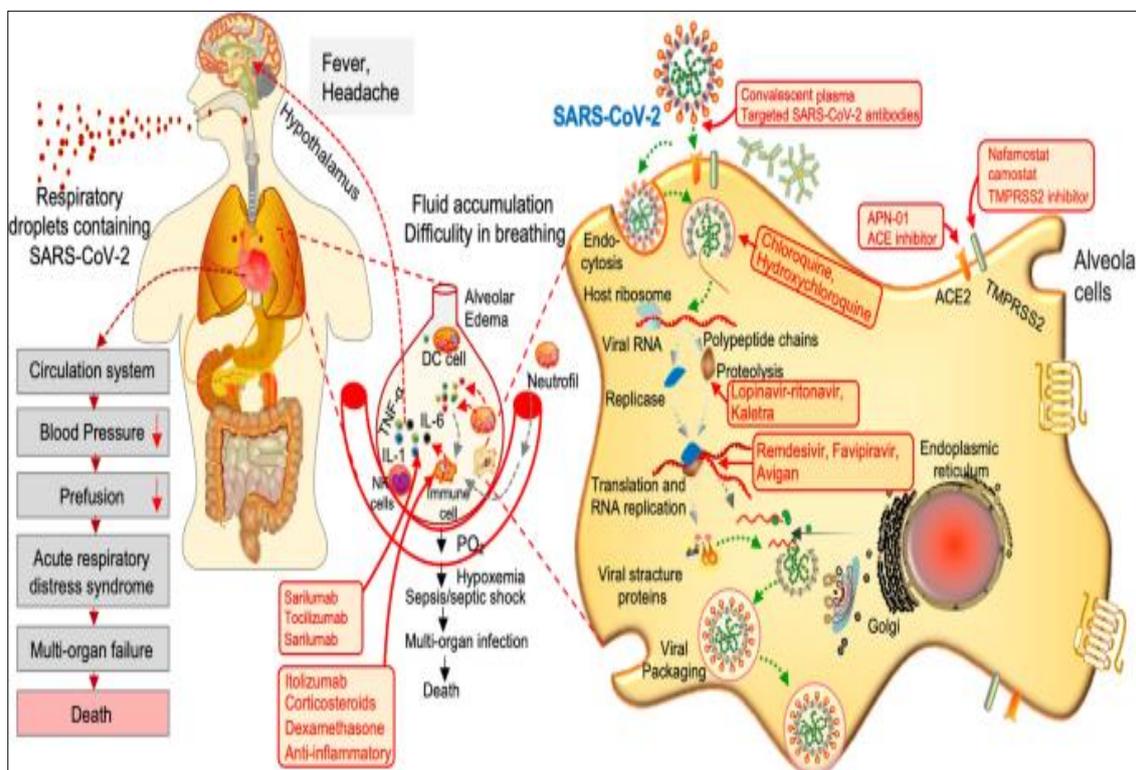
The community wellbeing suggestions of the covid-19 widespread are boundless. This destructive infection has conspicuous over 210 nations, and numerous of them are still executing virus control measures such as isolation, lockdown, recommended or obligatory common facemask utilized, conjointly takes after open removing in community places. More than 100 million people had been confirmed to have SARS-CoV-2 contamination as of 1 February 2021 by means of atomic test that distinguish viral nucleic acids. When asymptomatic or gently symptomatic subjects are included, as well as those who may not have been tried for various reasons, the full number of SARS-CoV-2 contaminated subjects is likely to be much higher than 100 million. It is additionally worth noticing that SARS-CoV-2 disease, too known as COVID-19, has killed over 2 million individuals [23].

##### 4.1. Pathogenesis

There is a growing body of evidence demonstrating neurological symptoms and consequences 19 (COVID-19) in individuals with coronavirus disease (COVID-19). Furthermore, a quarter of COVID-19 patients experienced neurological symptoms ranging from headaches and dizziness to more serious medical conditions such as seizures and stroke. In recent studies, hyposmia has been identified as a likely early criterion of COVID-19 infection [24]. According to COVID-19 pathophysiology, hyposmia is one of the critical early symptoms of infection. According to Mao and colleagues, people who are significantly influenced are more likely to sustain neurological injury than those who are not significantly influenced. It's worth noting that a small percentage of COVID-19 patients had life-threatening diseases like acute ischemic stroke (5%), cerebral venous sinus thrombosis (5%), and cerebral hemorrhage (5%). According to post-mortem findings, COVID-19 patients had brain tissue edema and partial neuronal degeneration. Furthermore, SARS-CoV-2 was found to infect the central nervous system (CNS) of a patient suffering from viral encephalitis. The pathogenic process of SARS-CoV-2 via human neuronal damage. SARS-CoV-2 has now been shown to be capable of entering the CNS. It is assumed that invasion requires both a cell surface receptor for the viral spike (S) protein to attach to and priming of the S protein by cell proteases. SARS-CoV-2 uses ACE2 as an entrance receptor and TMPRSS2 as a cell protease for S protein priming [25].

The ACE-2 receptor has recently been discovered on neurons and glial cells in the cerebral cortex, striatum, posterior hypothalamic, substantia nigra, and brain stem, among other brain areas (Fig. 1). While systematic and experimental studies on SARS-CoV-2 neurotropism are lacking, several mechanisms are currently being discussed as possible viral access routes to the brain, including the transcribrial route, axonal transport, and trans-synaptic transfer, and lymphatic route [26]. Infection of various (peripheral) nerve terminals and spreading along neurons, such as the olfactory bulb, trigeminal nerve, or vagus nerve in the respiratory or gastrointestinal tract, would be examples of axonal transportation

and trans-synaptic transfer. [27, 28, 29]. According to a third theory, SARS-CoV-2 enters the CNS through the circulatory or lymphatic systems. Direct infection of brain microvascular endothelial cells (BMEC) and abluminal virus release into the CNS parenchyma [28] or endocytosis via virally infected leukocytes or damaged tight junctions on BMECs could cause migration across the brain endothelium. All of these mechanisms have the potential to cause neurological damage via direct infection of the PNS or CNS. All neurodegenerative symptoms or problems need direct illness of CNS. Immune-mediated pathogenesis, coagulation dysfunction, cardiovascular comorbidities such as hypertension or diabetes, altered glucose and lipid metabolism, disturbances in the lung-brain cross talk such as hypoxic encephalopathy [26], or an imbalanced gut-brain axis due to disruptions of the gut microbiome during gastrointestinal SARS-CoV-2 infection may all cause indirect neurodegeneration effect [24].



**Figure 2** The pathogenesis of covid-19 and image adapted by journal of translational medicine (Kumar et al.,2020)

#### 4.2. Vaccines and their production

- Covaxin the covaxin for the COVID-19 vaccine is being developed by Bharat Biotech in collaboration with the Indian Council of Medical Research (ICMR) and the National Institute of Virology (NIV). It's a two-dose vaccine with 28-day intervals between shots. Vaccines with immuno-potentiators are added to improve their immunogenicity. These vaccines don't need to be stored at sub-zero temperatures, don't have to be reconstituted, and come in ready-to-use liquid form in multi-dose vials that are stable between 2 and 80 degrees Celsius. They include latent viruses that are unable to infect humans but can teach the immune system to mount a defensive response in the event of infection. In this preclinical study, 18-year-old volunteers will be tested for covaxin's efficacy, safety, and immunogenicity. It is 93.4 percent effective in treating COVID-19 disease with severe symptoms. The safety research found that the adverse effects were comparable to placebo, with 12 percent of participants experiencing minor side effects and less than 0.5 percent experiencing serious adverse events [27, 28].
- Covishield was invented by India's Serum Institute. The Oxford-AstraZeneca COVID-19 vaccine, also known as Vaxzevria, is a two-dose immunization developed by the Oxford Vaccine Group and pharmaceutical firm AstraZeneca to combat the SARS-CoV-2 virus. It will be released on March 25, 2021. The gene that codes for the spike protein on the surface of the SARS-CoV-2 virus is included in this viral vector vaccine. In the presence of the spike protein, the protective system develops antibodies to target it, preparing the body to resist SARS-CoV-2 if it enters the human body. The vaccine exhibited a 76 percent effectiveness rate after two doses, according to AstraZeneca's major analysis of phase 3 trial data [29, 30].

- Viral vector vaccine the Oxford-AstraZeneca vaccine is one of the mRNAs and viral vector vaccines being developed. It's relatively simple to develop RNA vaccines and viral vectors since all you must do are create a new piece of DNA in our instance, or RNA in Pfizer and Moderna's situations, and then insert it into the revolutionary vaccine. The results of Johnson & Johnson's phase 3 clinical trials, which were undertaken in preparation for the FDA's emergency use approval for its single-shot viral vector COVID-19 vaccine, were recently announced. When the data was broken down by location, the company claimed 72 percent efficacy against moderate to severe sickness in the United States, 66 percent in Latin America, and 57 percent in South Africa, indicating that COVID-19 efficacy has decreased [30, 31].
- Moderna the National Institutes of Health (NIH) has received the first batch of this innovative vaccine candidate, which will be evaluated in a new phase 1 experiment. The first step will be to test the variant-matched vaccine candidate in its existing clinical trial cohort as a booster. The second study will compare the new experimental immunization to the licensed Moderna vaccine as a booster. A multivalent vaccine is a term used by scientists to describe such a mixture [32].
- Subunit vaccine novavax has also produced a vaccine candidate that has shown a lot of potential against SARS-CoV-2. According to from January 29, 2021, the vaccine candidate was 89.3 percent efficient against the original strain in the context of a phase 3 experiment conducted in the United Kingdom. Importantly, the date of the experiment corresponded with the appearance of the 'U.K. variant,' and over half the U.K. cases had this strain: the vaccine demonstrated 86 percent efficacy in these patients. It is effective at protecting against disease caused by two varieties, B.1.1.7 and B.1.351, first detected in the U.K. and South Africa, respectively [33].
- Sputnik-V Gamaleya National Research Centre for Epidemiology and Microbiology (Moscow, Russia) was responsible for the formulation of the sputnik-V. The vaccine involves a heterologous recombinant adenovirus technique that uses adenovirus 26 and adenovirus 5 as vectors to create the severe acute respiratory syndrome coronavirus 2 spike proteins [34]. They can carry huge genetic payloads and, despite their incapacity to reproduce, they excite the innate protection receptors sufficiently to ensure robust immune system engagement. As a result, they do not require contributory and can produce immunity with one dose [35]. With a predicted research power of 85 percent, individuals recruited were 18 and older, roughly 60 percent male, and virtually exclusively white. A time-resolved plot of the incidence rate in the two group's one is controlled and another one is treated group established that the requisite resistance to avoid sickness developed inside 18 days of the first dosing. That protection extended to each age group, counting those over 60, and unreliable case histories of an individual's vaccinated yet afflicted advice that illness sternness reduces as immunity rises. COVID-19 instances are reported to be 91.6 percent from 21 days following the first dose of vaccine, and the suggested decrease in sickness severity after one dose is highly encouraging for current [36].

#### 4.3. Therapeutic management for covid 19 patient

- COVID-19 treatment options include immunotherapy, cellular therapy, antiviral therapy, and Chinese herbal medicine. COVID-19 treatment recommendations vary by country, and all of them are still in the early stages of development or research. MERS-CoV and SARS-CoV are coronaviruses that are related to SARS-CoV-2 and share many of the same characteristics. The majority of COVID-19's therapeutic ideas are based on MERS and SARS treatment research. COVID-19 treatment options are depicted in Figure 3 [37].
- Corticosteroids are steroid hormones that play an important role in the immune system and inflammation. Because of the risks of the acute respiratory syndrome and further viral replication, the use of corticosteroids for COVID-19 has been controversial (38, 39). Corticosteroids have typically been used to treat SARS-CoV outbreaks because of their impact on several cytokines [IL-1, IL-6, IL-8, IL-12, and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ )]. Corticosteroids have been shown in human studies to be effective in reducing pathological damage, but their side effects, such as acute respiratory syndrome, are a major concern. The efficacy of systemic glucocorticoids in patients with severe new coronavirus pneumonia will be evaluated in a randomized controlled trial [38]. Excessive cytokine release is caused by SARS-CoV-2 infection, which leads to lung damage and the development of COVID-19. In COVID-19 patients, higher blood interleukin-6 (IL-6) levels are linked to a worse result.
- Tocilizumab is a humanized recombinant monoclonal antibody that targets both the soluble and membrane-bound versions of the IL-6 receptor. It's used to treat severe rheumatoid arthritis, systemic juvenile idiopathic arthritis, giant cell arthritis, and the potentially lethal cytokine release syndrome. Because of its anti-IL-6 characteristics, tocilizumab medication may be clinically useful. However, according to a meta-analysis evaluating the efficacy of tocilizumab for the treatment of severe COVID-19, there is no conclusive evidence that tocilizumab treatment would provide further benefit to patients with severe COVID-19 [40].
- Remdesivir is an adenosine analog that promotes the premature termination of nascent viral RNA chains by integrating them into the viral genome. Transaminase increases kidney damage IV, 200 mg first, then 100 mg every day for 9 days (10 doses) [42, 41].

- Lopinavir/Ritonavir An inhibitor of the HIV-1 type 1 protease (HIV-1) that suppresses HIV-1 maturation and consequently infectivity, as well as SARS-CoV-2 infection. After 10 days, GIT intolerance is typical. Hepatotoxicity and nausea/vomiting anomalies in cardiac conduction in severe pancreatitis [43].
- Chloroquine (CQ)/Hydroxy Chloroquine (HCQ) inhibits viral protein synthesis as well as viral entry and exit from cells. 400 mg HCQ BID 2 doses orally, then 400 mg 4 times per day (five doses) Retinal or visual field abnormalities The therapeutic index of CQ/HCQ is restricted, and it has been related to QT interval prolongation, torsade de pointes, and arrhythmia. Seizures, retinopathy, and myopathy are all signs of bone marrow suppression [44, 45].
- The RNA-dependent RNA polymerase (RdRp) of RNA viruses is inhibited by favipiravir, resulting in chain termination. The dosage is administered orally and varies. Renal and hepatic disorders necessitate dosage adjustments. Neutropenia, hyperuricemia, diarrhea, and increased transaminase levels have all been reported [46].
- Ribavirin is a guanosine nucleoside analog that inhibits RNA polymerase and works as a chain terminator. It is absorbed into the genome and produces mutations, resulting in faulty viral progeny, a condition known as "error catastrophe." Pregnant women, men with pregnant female partners, and patients with hemoglobinopathies hemolytic
- Anemia teratogenic [47, 48]. Oral, 400mg TID (>50 ml/min), 400mg BID (50–30 ml/min), 200mg daily (30 ml/min) for 10 days.
- In vitro, the anti-parasitic medicine ivermectin has been demonstrated to limit SARS-CoV-2 replication, with a several-fold reduction in viral RNA. [49] A rash on the skin, joint pain, or muscle ache.
- When injected into new patients, immunoglobulin antibodies from recovered COVID-19 patients can neutralize the virus. Flushing Renal impairment arrhythmia thrombosis symptoms include headache, fever, and arrhythmia thrombosis [50, 51].

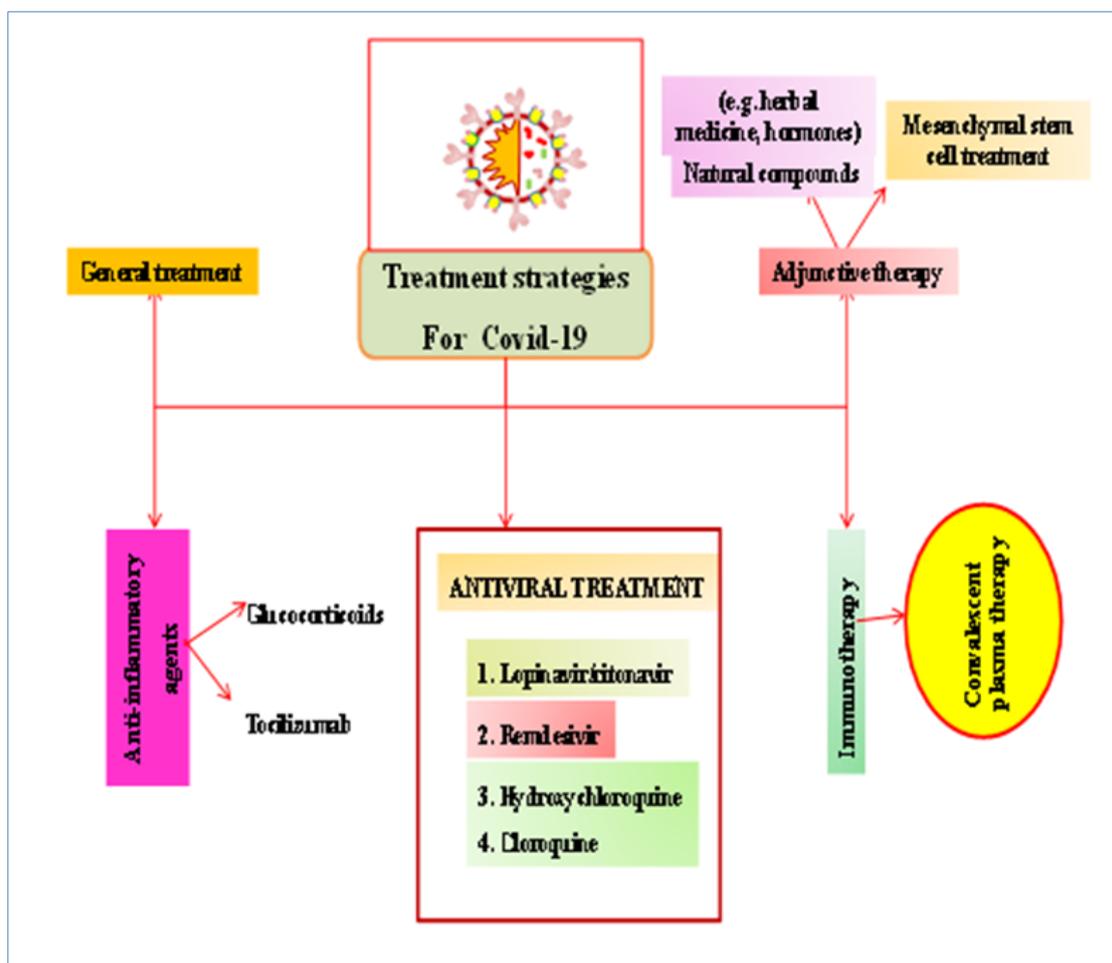
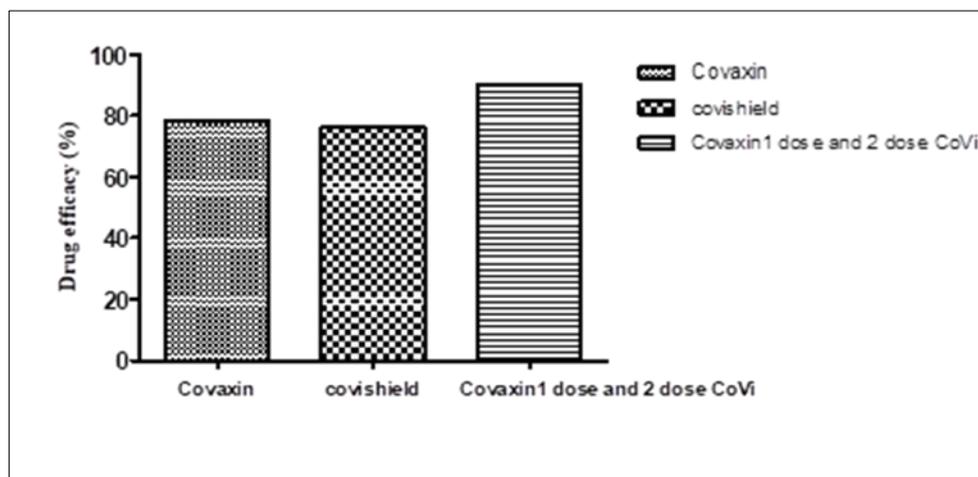


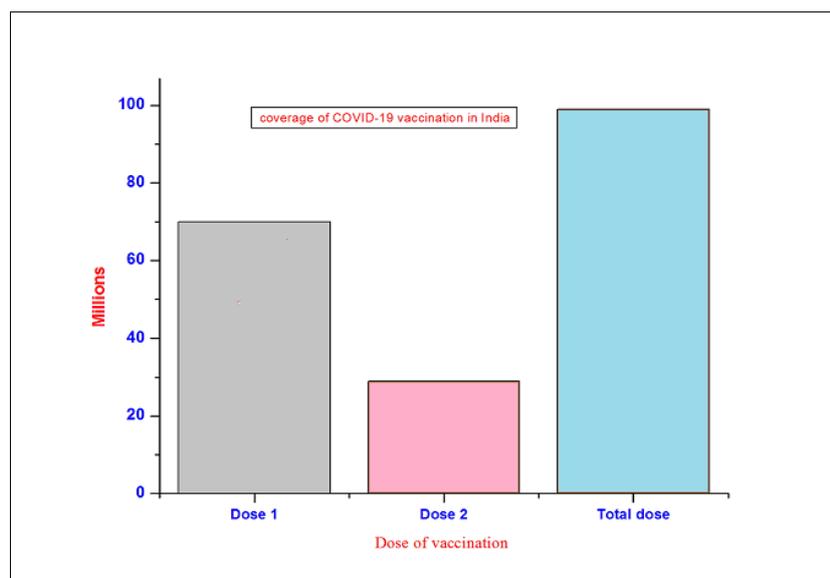
Figure 3 Schematic presentations of the treatment plan of COVID -19

#### 4.3.1. Current scenario of COVID-19 vaccination of India

Covaxin, India's first inactivated vaccine, was developed by Bharat Biotech, and Coveshield vaccines, developed by Oxford University and commercialized by Serum Institute in collaboration with Astra Zeneca. According to India's Department of Biotechnology, the country can generate 70-100 million doses each month, but the reality presently seems to be different. In India, two vaccinations are routinely used: Coveshield and Covaxin. The first dosage got covishield, while the second dose received covaxin. The results revealed that combining these two covid -19 vaccines resulted in superior immunogenicity than two doses of the same vaccine shown in **Fig. 4(A)**. The research, which has yet to be peer-reviewed, also discovered that immunizing with a combination of these vaccines was safe, with side effects comparable to those shown with a single dosage regimen. India, as one of the vaccine producers, delivered around 35.79 million doses to overseas countries, with the most susceptible age groups being those aged 30-45



**Figure 4 (A)** Combining vaccine strategies



**Figure 4 (B)** COVID-19 vaccination coverage in India, till 8 January 2022. Source: Ministry of Health and Family Welfare, Government of India, Cumulative coverage report COVID-19 vaccination

Years and above. The vaccines fell short due to the failure of the vaccination coverage drive, which made immunizations available to persons of different age groups with a strong reference and almost covered a major section of the population. With the ability to mass-produce a low-cost vaccine, India can not only help its population be vaccinated on time, but it can also help fulfill global vaccination demand without incurring economic hardship [52,]. In India, as shown in Fig 4 (B) where the total cases have reached 34,143,236 with one of the highest death tolls of nearly 4,83,463

according to the Ministry of Health and Family Welfare, Government of India as of January 8<sup>th</sup>, 2022, and vaccine coverage data show that a total of 1,48,59,58,323 the people have received vaccination in India till 8 Jan 2022 [53].

**Table 1** A state-by-state analysis of the percent of overall vaccination and India's population adopted by the Ministry of Health and Family Welfare, Government of India

S. No	State	Population	Dose 1	Dose 2	Total vaccination
1.	Andhra Pradesh	53,903,393	4,00,82,487	3,07,28,752	7,08,11,239
2.	Arunachal Pradesh	15,70,458	8,11,910	6,55,590	14,67,500
3.	Assam	35,607,039	2,19,27,601	1,62,50,752	3,81,78,353
4.	Bihar	124,799,926	5,84,94,171	4,33,15,480	10,18,09,651
5.	Chhattisgarh	25,545,198	1,79,77,433	1,25,78,825	3,05,56,258
6.	Goa	1,586,250	13,19,508	11,20,515	24,400,23
7.	Gujarat	63,872,399	4,75,82,358	4,33,84,764	9,09,67,122
8.	Haryana	27,388,008	2,07,73,925	1,52,03,393	3,59,77,318
9.	Himachal Pradesh	7,451,955	59,29,163	55,11,230	1,14,40,393
10.	Jharkhand	38,593,948	1,90,00,422	1,16,98,643	3,06,99,065
11.	Karnataka	67,562,686	4,83,05,734	3,95,27,725	8,78,33,45
12.	Kerala	35,699,443	2,63,70,455	2,15,58,246	4,79,28,701
13.	Madhya Pradesh	85,358,965	5,27,43,860	5,05,20,223	10,32,64,083
14.	Maharashtra	123,144,223	8,11,97,428	5,56,26,731	13,68,24,159
15.	Manipur	3,091,545	13,33,806	10,05,182	23,38,988
16.	Meghalaya	3,366,710	12,43,080	8,95,169	21,38,249
17.	Mizoram	1,239,244	7,50,199	5,91,411	13,41,610
18.	Nagaland	2,249,695	7,60,450	5,79,961	13,40,411
19.	Odisha	44,356,334	2,96,97,758	2,18,70,982	5,15,68,740
20.	West Bengal	91,347,736	6,52,17,243	4,26,98,608	10,79,15,851
21.	Punjab	30,141,373	1,74,12,664	97,91,030	2,72,03,694
22.	Rajasthan	81,032,689	4,74,88,007	3,60,61,353	8,35,49,360
23.	Sikkim	658,019	5,29,700	4,84,483	10,14,183
24.	Tamil Nadu	77,841,267	5,06,72,703	3,48,27,655	8,55,00,358
25.	Telangana	38,510,982	2,82,68,742	1,98,90,649	4,81,59,391
26.	Tripura	4,169,794	25,99,926	21,39,818	47,39,744
27.	Uttar Pradesh	228,959,599	13,11,71,604	7,77,02,415	20,88,74,019
28.	Uttarakhand	11,250,858	79,08,600	65,51,063	1,44,59,663

## 5. Conclusion

Based on the evidence from the scientific literature, this review raises the possibility of nervous system involvement in COVID-19. Therefore, it would be major thought to evaluate all patients with COVID-19 for neurological symptoms, to improve the forecast the COVID-19 by delivering appropriate management in a timely fashion. The SARS-CoV-2 Coronavirus illness to begin with showed up in Wuhan, China in December 2019 and has since spread to over 200 nations, coming about in a worldwide wellbeing widespread, according to the World Health Organization. Around 3.5

million cases have been affirmed, with 165,000 to 243,000 passings. The foremost common indications are respiratory and cardiac, but neurological side effects have moreover been detailed in case reports and case thinks about within the writing. Migraine and discombobulation are the foremost common indications, taken after by encephalopathy and daze. Cerebrovascular mischance, Guillian barre syndrome, acute transverse myelitis, and intense encephalitis are among the complications specified. The foremost s prevalent fringe indication was hyposmia. It's also worth noticing that neurological indications may show up some time recently conventional side effects like fever and hack which conventional side effects may show up afterward in these people. Bharat Biotech designed the primary inactivated vaccine in India's current COVID-19 immunization environment, while Coveshield vaccines were created by Oxford College and commercialized by Serum Organized in collaboration with Astra Zeneca. Coveshield and Covaxin are two inoculations frequently utilized in India. In comparison to two doses of the same inoculation, combining these two covid-19 vaccines come about in improved immunogenicity. The study moreover found that immunizing with a combination of these vaccines is safe for pateint, with less side effects comparable to those seen with a single dose regimen. This review will hopefully contribute to increased alertness for both neurologists and non-neurologists involved in the care of COVID-19 patients.

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

No conflict of interest.

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