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A REVIEW ON CORONA VIRUS A MENACE

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ABSTRACT : In the eve of December 2019 an epidemic outbreak started in Wuhan city of China, that was caused by novel corona virus (COVID- 19), which brought trouble and turns into a dangerous and deadly public health catastrophe of world trepidation, with confirmed cases in majority of countries. A highly infectious and pathogenic COVID-19 viral contagion with the incubation period extending from two to fourteen days, which was transmitted by breathing of infected droplets. This unique coronavirus was provisionally named 2019-nCoV, now named as SARS-CoV-2 by International Committee on Taxonomy of Viruses. SARS-CoV-2 belongs to the family Coronaviridae, genus Betacoronavirus, subgenus Sarbecovirus. Virus has spread globally and resulted in thousands of deaths and having a large impact on our health systems and parsimonies. The transitional source of origin and transfer to humans is unknown, however, the speedily developing pandemic has confirmed human to human transfer. Around 43,905,621 stated cases and 526,074 deceases of COVID-2019 have been reported on July 25, 2022. The symptoms of COVID-19 are dry cough, sore throat, tiredness, breathlessness, fatigue, body aches, myalgia, vomiting, nausea, diarrhoea, in severe cases pneumonia, acute respiratory distress syndrome (ARDS) and multiple organ dysfunction resulting to death. For their diagnosis Real-time PCR (RT-PCR), is used in this samples such as sputum, oro-pharyngeal swabs, nasopharyngeal aspirate, deep tracheal aspirate, or broncho-alveolar lavage were taken. Prevention includes vaccination, home quarantine, social distancing, sanitising and bearing of face mask. This review is to make aware of the pandemic situation that is not completely over.

Key words : COVID-19, Corona virus, SARS-CoV2, vaccines, real-time PCR.

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INTRODUCTION

The universal pandemic of coronavirus disease 2019 has presented a major hazard to civic health worldwide. In 2002 severe acute respiratory syndrome coronavirus (SARS-CoV) and in the year 2012 Middle East respiratory syndrome coronavirus (MERS-CoV) emerged in humans and caused incurable respiratory illness, and now corona viruses a new public health concern in the whole world in December 2019 (Cui *et al*, 2019). A novel coronavirus designated as SARS-CoV-2 arose in the city of Wuhan, China, and caused an outbreak of rare viral pneumonia. A highly transmissible, novel coronavirus disease, also known as corona virus disease 2019 (COVID-19) (Wu *et al*, 2020 and Hui *et al*, 2020). Similar to other RNA viruses, SARS-CoV-2, while adapting to their different human hosts, is susceptible to heritable evolution with the development of mutations over time, resulting in mutant variants. Alpha, Beta, Gamma, Delta and Omicron are the variants of covid-19 (Cascella *et al*, 2022). The Corona virus pandemic disease represents a substantial task for individuals, society and as well as government. The aim of the study is to deliver the up to date understanding of the virus and the disease, along with the ongoing direction for its control, prevention, and management. This dreadful disease recently has taken a significant place in our daily practice, as a new group of breathing disorder and their higher rates of transmissibility; we should pay more attention for prevention and treatment of the corona disease.

Structure of dreadful Novel Corona virus 19

Coronaviruses are an enormous group of viruses that causes respiratory and enteric infections in animals and humans. The size of virion is 100-160 nm, which is spherical in shape and have an envelope. Their capsid is of 27-32 kb, which is having a single-stranded RNA genome with positive polarity sheltered by the envelope (Lai and Cavanagh, 1997). This virus contain four types of spikes about 20nm long, glycoprotein S-spikes in all

the coronaviruses, small hemagglutinin-esterase (HE) spikes in few viruses, some trans-membrane glycoproteins and envelope protein spikes (Fig. 1). On the basis of the genome structure the coronaviruses can be classified into three serogroups. Serogroups-1 and Serogroups-2 viruses can infect mammalian and seven of them (229E-CoV, NL63-CoV, OC43-CoV, HKU1-CoV, SARS-CoV, MERS-CoV and, COVID-19) which can infect man while serogroups-3 contains avian viruses only (Kachroo, 2020). After binding with a specific receptor, corona virus will enter into host cells by fusion of viral envelope with the plasma membrane. Once the virus is entered, it releases the viral genome RNA in the cytoplasm that translates into, pp1a and pp1ab polyproteins (De Wilde *et al*, 2017). Their translation produced the non-structural proteins and form replication transcription complex (RTC) in double-membrane vesicles (Sawicki and Sawicki, 2005). The RTC duplicates continuously and produces a nested set of sub-genomic RNAs that encode accessory and structural proteins (Hussain *et al*, 2005 and Perrier *et al*, 2019). The newly designed genomic RNA, nucleo-capsid proteins and envelope glycol-proteins assemble and form viral particle buds. At last, the virion comprising vesicles fuse with the plasma membrane of the host to release the virus. Coronavirus infections are responsible for a variety of cytopathic effects that depend upon the viral strains and host cells. The mechanism of cytopathic effects attributed

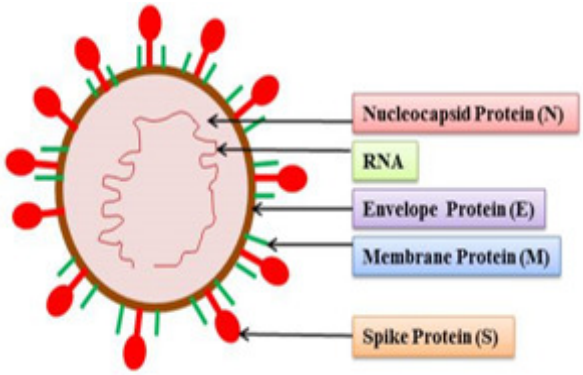

Fig. 1 : Structure of Corona Virus.

Fig. 2 : Symptoms of Covid-19.

Table 1 : Prominence, working and challenges of vaccines.

	Vaccines include	How it works	Importance	Challenges
Whole Virus	Sinopharm, Sinovac	It uses weakened or deactivated form of the pathogen.	It is suitable for people with compromised immune systems.	Booster shots required.
Protein subunit	Novavax	The protein subunit vaccine contains purified "pieces" of a pathogen rather than the whole pathogen.	It suits Compromised immune systems.	Booster shots may be required.
Viral vector	Oxford-AstraZeneca, Sputnik V, Johnson & Johnson	Once the body's cells are "infected", the cells are instructed to produce a large amount of antigens, which in turn trigger an immune response.	It can trigger a strong immune response as it also involves both B cells and T cells.	Previous exposure to the vector could reduce effectiveness.
Nucleic acid (mRNA)	Pfizer, Inc., BioNTech, ModernaTX, Inc.	Whoever is exposed to the COVID-19 coronavirus in the future would have an immune system that recognises it, and in turn fight off the infection.	Since there are no live components, there's no risk of the vaccine triggering disease.	Free RNA in the body is quickly broken down)

to a variety of reasons, interfere with signal pathway, instability of cellular function, enhanced cytokine/ chemokine expression, inhibition of transcription and translation of cellular proteins.

Signs and symptoms of Corona virus infection

After exposure to corona virus, signs and symptoms in an individual may appear 2 to 14 days later. The time interval between exposure and onset of the symptoms is termed as incubation period. One can still spread corona virus before the appearance of the symptom (pre-symptomatic transmission) (MFMER, 2022) (Fig. 2).

Novel Corona virus 19 Vaccines

Categories of vaccines available

Whole virus : Whole virus vaccines uses an

Table 2 : Preview of Covid 19 vaccines.

Covid-19 Vaccine	Country of origin	Developers	Type	Technology	Dose Interval	Reference
Pfizer-BioNTech	United States, Germany	BioNTech, Pfizer	RNA vaccines	RNA (modRNA in lipid nanoparticles)	2 doses 3-4 weeks	RDS (2020)
Moderna	United States	Moderna, NIA ID, BARDA, CEPI	RNA vaccines	RNA (modRNA in lipid nanoparticles)	2 doses 4 weeks	SIS (2021)
BBIBP-CorV	China	Beijing Institute of Biological Products	Inactivated vaccines	Inactivated SARS CoV 2	2 doses 3-4 weeks	Xia S *et al* (2021)
CoronaVac	China	Sinovac	Inactivated vaccines	Inactivated SARS CoV 2	2 doses 2-3 weeks	CTE (2020)
Covaxin	India	Bharat Biotech, Indian Council of Medical Research	Inactivated vaccines	Inactivated SARS CoV 2	2 doses 4 weeks	CC (2021)
WIBP-CorV	China	Wuhan Institute of Biological Products	Inactivated vaccines	Inactivated SARS CoV 2	2 doses	CNBG 2020
CoviVac	Russia	Institute of Vaccines and Medical Biologicals	Inactivated vaccines	Inactivated SARS CoV 2	2 doses 2 weeks	Ivanova (2021)
Sputnik V	Russia	Gamaleya Research Institute of Epidemiology and Microbiology	Viral vector vaccines	Adenovirus vector (recombinant Ad5 and Ad26)	2 doses 3 weeks	Jones and Roy (2021)
Oxford-AstraZeneca (Vaxzevria, Covishield)	United Kingdom, Sweden	University of Oxford, AstraZeneca, CEPI	Viral vector vaccines	Adenovirus vector (ChAdOx1)	2 doses 4-12 weeks	Gallagher and Triggle (2020)
Convidecia (Ad5-nCoV)	China	CanSino Biologics, Beijing Institute of Biotechnology of the Academy of Military Medical Sciences	Viral vector vaccines	Adenovirus vector (recombinant Ad5)	1 dose	Zhu *et al* (2020)
Johnson & Johnson	United States, Netherlands	Janssen Vaccines (Johnson & Johnson), BIDMC	Viral vector vaccines	Adenovirus vector (recombinant Ad26)	1 dose	Ledford (2021)
EpiVacCorona	Russia	Vector Institute	Protein subunit vaccines	Subunit (peptide)	2 doses 3 weeks	Ryzhikov *et al* (2021)
RBD-Dimer (ZF2001)	China	Anhui Zhifei Longcom Biopharmaceutical Co. Ltd.	Protein subunit vaccines	Subunit (recombinant)	3 doses 30 days	Yang *et al* (2021)

attenuated form of the pathogen that causes a disease to trigger protective immunity to it. There are two types of whole virus vaccines these are live attenuated vaccines that uses a weakened form of the virus, which can still grow and replicate, but does not cause illness. Inactivated vaccines contain viruses whose genetic material has been destroyed by heat, radiation or chemicals so they cannot infect cells and replicate, but can still activate an immune response (Gavi, 2020; Healthcare IT news, 2021, Tektook *et al,* 2021).

Protein subunit : There are numerous types of protein subunit vaccines which contain specific isolated proteins from viral or bacterial pathogens, polysaccharide vaccines contain chains of sugar molecules (polysaccharides) found in the cell walls of some bacteria, conjugate subunit vaccines bind a polysaccharide chain to a carrier protein to try and boost the immune response. Only protein subunit vaccines are being developed against the virus that causes COVID-19.

Non-replicating viral vector : Viral vector-based vaccines differ from most conventional vaccines in that they don't actually contain antigens, but rather use the body's own cells to produce them. They do this by using a vector to deliver genetic code for antigen, in the case of COVID-19 spike proteins found on the surface of the virus, into human cells (Fig. 1). By contaminating cells and instructing them to make large amounts of antigen, which then trigger an immune response, the vaccine mimics what happens during natural infection with certain pathogens especially viruses. This has the advantage of triggering a strong cellular immune response by T cells as well the production of antibodies by B cells.

Nucleic acid (mRNA) : In it genetic material is used from a disease-causing virus or bacterium (a pathogen) to stimulate an immune response against it. Depending on the vaccine, the genetic material could be DNA or RNA; in both cases it provides the instructions for making a specific protein from the pathogen, which the immune system will recognise as foreign (an antigen). Once inserted into host cells, this genetic material is read by the cell's own protein-making machinery and used to manufacture antigens, which then trigger an immune response.

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