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Abstract

Background – The **SARS-CoV-2/ Covid -19** pandemic is still going on and globally healthcare system is overstressed with this new burden added with previous NCD & CD in existence. The First human case of this global pandemic was reported from Wuhan city of China in December 2019.11<https://apps.who.int/iris/bitstream/handle/10665/332197/WHO-2019-nCoV-FAQ-Virus.origin-2020.1-eng.pdf>*Objective* – The main objective of this study is to illustrate the key features of Covid -19 virus responsible for continuation and recurrence of this pandemic as well as current latest status in brief. *Setting and design* – Different aspects of Covid -19 structural variations and its effect will be analysed. Brief details about epidemiological triad will be outlined. *Methodology* – The explanation will be given to title through analysis of several accredited findings. The cause of perpetuation of Covid -19 can be understood by the way of infections and other related factors. *Result*- Several factors are responsible for the continuation of the pandemic.

Conclusion – In the epidemiological triad we have agent/host/environment. . . .

Background - The **SARS-CoV-2/ Covid -19** pandemic is still going on and globally healthcare system is overstressed with this new burden added with previous NCD & CD in existence. The First human case of this global pandemic was reported from Wuhan city of China in December 2019. The SARS-CoV-2/ Covid -19 coronavirus belongs to a large family of coronavirus. Usually they cause respiratory infection in humans like other respiratory viruses such as rhinoviruses/ human respiratory syncytial virus/ parainfluenza viruses/ adenoviruses/influenza A & B viruses / enteroviruses / herpes simplex viruses/ human metapneumoviruses etc.

Globally new covid-19 cases are rising again or we can say alternatively that incidence rate is increasing. In the last week of March 2021 the new cases reported globally are more than 3.8 million. At the same time the number of deaths also increased consecutively for the second consecutive week. The deaths increased by 5 % compared to previous week. The total number of death for above mentioned period was over 64000 new deaths. The more alarming fact is that all regions have reported an increase in incidence rate in last week of March 2021. If we talk about deaths then except African region all regions reported an increase in the number of deaths due to covid-19. Added to above facts still the European region with region of Americas are on the top accounting for 80 % of all cumulative cases and deaths.22<https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19—31-march-2021> There is sharp rise in south East Asia region or actually it's the largest increase on global basis that is 21 % increase in deaths with continued increasing trends in the 3rd consecutive week. The south East Asian region is also having a huge population as well as many nations are in developing stage with stressed and overburdened health system.

Objective - The main objective of this study is to illustrate the key features of Covid -19 virus responsible for continuation and recurrence of this pandemic as well as current latest status in brief. The latest scenario

of covid-19 pandemic is as follow: see table 1

Table 1 - Newly reported and cumulative COVID-19 confirmed cases and deaths, by WHO Region, as of 28 March 2021- source - WHO

WHO Region	New cases in last 7 days (%)	Change in new cases in last 7 days *	Cumulative cases (%)	New deaths in last 7 days (%)	Change in new deaths in last 7 days *	Cumulative deaths (%)
Americas	1 306 017 (34%)	11%	55 243 776 (44%)	32 176 (50%)	4%	1 331 419 (48%)
Europe	1 641 672 (43%)	11%	44 191 579 (35%)	23 778 (37%)	7%	954 829 (34%)
South-East Asia	437 060 (11%)	46%	14 619 886 (12%)	2 947 (5%)	21%	217 737 (8%)
Eastern Mediterranean	270 884 (7%)	3%	7 395 085 (6%)	3 428 (5%)	5%	156 891 (6%)
Africa	62 286 (2%)	22%	3 061 438 (2%)	1 340 (2%)	-6%	77 446 (3%)
Western Pacific	84 395 (2%)	32%	1 859 933 (1%)	518 (1%)	7%	31 361 (1%)
Global	3 802 314 (100%)	14%	126 372 442 (100%)	64 187 (100%)	5%	2 769 696 (100%)

The whole group of coronavirus is very peculiar. They are pleomorphic, single stranded RNA viruses measuring 100-160 nm in diameter. There are several factors responsible for the continuation of covid-19 pandemic. Broadly we can look at the epidemiological triad i.e. agent, host and environmental factors.

Setting and design – Different aspects of Covid -19 structural variations (see table 2) and its effect will be analysed. Brief details about epidemiological triad will be outlined.

Table 2: Overview of variants of interest (VOIs), as of 30 March 2021 – source - WHO

Next strain clade	20C	20C/S.452R	20B/S.484K	Not yet assigned	20C	20C
PANGO lineage	B.1.525	B.1.427/B.1.429	B.1.1.28.2, alias P.2	B.1.1.28.3 alias P.3	B.1.526 (with E484K or S477N)	B.1 descendant with 9 mutations
GISAID clade	G/484K.V3	GH/452R.V1	GR	Not yet assigned	GH	GH
Alternate names		CAL.20C/L452R		PHL-B.1.1.28		
First detected by	United Kingdom and Nigeria	United States of America	Brazil	Philippines and Japan	United States of America	France
First appearance	December 2020	June 2020	April 2020	February 2021	November 2020	January 2021

Next strain clade	20C	20C/S.452R	20B/S.484K	Not yet assigned	20C	20C
Key spike mutations	H69-V70 deletion; Y144 deletion; Q52R; E484K; Q677H; D614G; and F888L	L452R; W152C; S13I; and D614G	L18F; T20N; P26S; F157L; E484K; D614G; S929I; and V1176F	141-143 deletion; E484K; N501Y; and P681H	L5F; T95I; D253G; D614G; A701V; and E484K or S477N	G142 deletion; D66H; Y144V; D215G; V483A; D614G; H655Y; G669S; Q949R; and N1187D

Hence from the above facts it's clear that agent is having continuous variations one of the factors responsible for the ongoing covid-19 pandemic. These viruses have crown like appearance produced by club shaped projections that studs the viral envelope. The coronavirus group actually infects a wide variety of animals of different species. These are divided into three antigenic and genetic groups.

Methodology – The explanation will be given to title through analysis of several accredited findings. The cause of perpetuation of Covid -19 can be understood by the way of infections and other related factors. SARS (SARS – CoV) CORONAVIRUSES causing human infections falls in group 1 and 2. The human isolates were HCoV-229E and HCoV-OC43. SARS-CoV was earlier considered to be a novel group of viruses (novel coronavirus, n covid-19) but now they are placed in group 2 (SARS-CoV-2). The fully sequenced have shown minimal variations.

The main problem in understanding morphology and other important determinants to know more about this virus is that it's difficult to cultivate it in vitro added with continuous variations. We can grow some strains in human tracheal organ cultures but quite difficult to grow in tissue culture. SARS-CoV is exceptional as it can be grown in African green monkey kidney (Vero –E6) cells facilitating to know more about this virus.

Generally human coronavirus infections present globally. Seroprevalence studies have demonstrated this fact. The seasonal trends shows that infection is more common in late fall, winter, and early spring times. If we look at the history **SARS-2002/2003 – south china outbreak** begin with 8096 recognised cases in 28 countries & added to this 90 % of cases occurred in china and hongkong. Now the world is moving very fast or we can say the host factors related spread have exaggerated the pandemic added with various climatic changes. That time the natural reservoir of SARS-CoV appeared to be horseshoe bat. The 2002-2003 outbreaks thought to be originated due to human contacts with infected domestic animals. The striking fact is that in 2002-2003 as well as 2019-2020-2021 most cases spread from human to human and there are multiple ways of spread particularly respiratory droplets. The 2002 outbreak ceased in 2003 but 2019 outbreak is going on and global fast movement is one of the most important factors. The super spreaders may remain symptomless while spreading the virus.

Result- Several factors are responsible for the continuation of the pandemic. The pathogenesis of the strains causing common cold e.g. HCoV-229E and HCoV-OC43 says that they infect ciliated epithelial cells in the nasopharynx via the aminopeptidase 1 receptor (group 1) or a sialic acid receptor. Viral replication leads to a cascade of events manifested externally as common cold symptoms similar to other virus group called rhinoviruses.

SARS-CoV infects the respiratory tract via ACE 2 receptors. The systemic illness is manifested more or less depending upon immune status as well as associated morbidity conditions. The systemic manifestations include variety of signs and symptoms and sometime it's symptomless. The study of pulmonary pathology will reveal more findings in coming days. One key finding is that earlier 2002-2003 outbreaks have many

similarities with ncovid-19. The disease is milder in children and ARDS is also found in ncovid-19 severe cases. Besides this symptoms of common cold etc are very much similar. The incubation period is 1-14 days range. In earlier cases 2002-2003 laboratory findings have shown in SARS lymphopenia present in approx 50 % cases resulting in decreased immunity. Mostly T cells CD4+ (helper t cells) were affected and also CD8+T cell as well as natural killer to some extent.

The detailed information about ncovid-19 is yet to be finalised as several strains have been found and the trends shows that these variations will keep going. The global market has several accredited vaccines duly recognised by WHO. The final analysis and results can be declared only after a large population of world get vaccinated and with the development of herd immunity the predictions can be clearer.

Conclusion – In the epidemiological triad we have agent/host/environment. For controlling this pandemic of covid-19 as per public health approach our mind should be clear that we have to have a keen and deep view of epidemiological triad. The epidemiological triad (concept of causation) consist of agent (causative factor), host (those who get infected from agent) and the surroundings (ecology, environment etc.).

The modification at one of the above factors will modify other factors positively or negatively. Now we have to keep in mind that

- The new strains will keep on evolving as it's a natural event and practically impossible to change this factor of mutation etc.
- We can do a lot at the host factors and lots of guidelines are issued by national/international organisations particularly WHO. The importance of vaccination should be considered globally as well as equity in vaccination etc. At the same time the efficacy of vaccines on all different strains is yet unknown.
- At the environmental level also we can keep our environment safe by adapting WASH and other guidelines to make world a safer place for everyone.
- At last but not least global coordination is required to stop this pandemic and any future mutations increasing virulence of covid-19 will have a detrimental effect globally if not stopped now through international collaborations.

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REFERENCES

1. https://apps.who.int/iris/bitstream/handle/10665/332197/WHO-2019-nCoV-FAQ-Virus_origin-2020.1-eng.pdf
2. <https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19—31-march-2021>

3. Harrison's Principles of Internal Medicine-18th edition volume 1
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