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## A Brief Review on Novel Coronavirus

<sup>1</sup>Akanksha K. Nirmal, <sup>2</sup>Pratik D. Joshi, <sup>3</sup>Gajanan S. Sanap

<sup>1</sup>Lecturer, <sup>2</sup>Student, <sup>3</sup>Principal

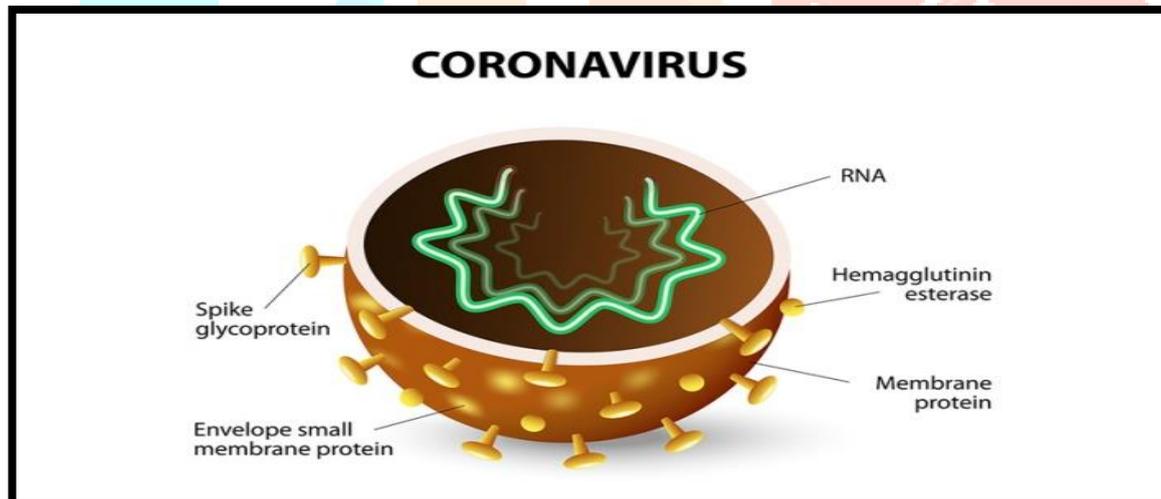
<sup>1</sup>Late Bhagirathi Yashwantrao College of Pharmacy Pathri, Aurangabad, India

**Abstract:** This study has been undertaken to investigate the determinants of stock returns in Karachi Stock Exchange (KSE) using two assets pricing models the classical Capital Asset Pricing Model and Arbitrage Pricing Theory model. To test the CAPM market return is used and macroeconomic variables are used to test the APT. The macroeconomic variables include inflation, oil prices, interest rate and exchange rate. For the very purpose monthly time series data has been arranged from Jan 2010 to Dec 2014. The analytical framework contains.

**KEYWORDS:** *Coronavirus; Novel coronavirus; 2019-nCoV; Middle East Respiratory Syndrome coronavirus; SARS Coronavirus; Outbreak; China; Wuhan; Emerging virus; WHO (World Health Organization)*

### I. INTRODUCTION

Coronaviruses are a large family of viruses that cause illness ranging from common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and severe Acute respiratory Syndrome (SARS-CoV).



Severe respiratory and enteric infections affecting both humans and animals typically is being caused by coronaviruses. [4] Coronaviruses as genus of coronaviridae are enveloped single positive stranded RNA viruses which have the largest viral genome (26-33 kb) among the RNA viruses. [4, 5] The coronaviridae belongs to two subfamilies: 1) coronavirinae 2) Toronavirinae. The coronaviridae family involves four sub families namely Alpha, Beta, Gamma and Delta.

Coronaviruses infect mammals through bat, mouse, alpacas, swine, dog, cattle, chicken, horse and also humans. [4,6] The infection can cause variety of diseases like gastroenteritis, respiratory tract infection. [6] In humans coronaviruses (HCoV) are proved to cause respiratory tract infections like common cold and also causes severe respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS). [6,7]

By today six human coronaviruses species have been identified. It includes OC43, 229E, NL63, HKU1, SARS-CoV, MERS Cov. [6, 9] HCoV-OC43 and HCoV-229E were identified 50 years ago, which mainly causes common cold in humans.

Recently identified NL63 and HKU1 are reported to cause mild respiratory tract infection and these four coronaviruses can cause severe lower respiratory tract infections in young's and old persons. [8,9] HCoV-NL63 is associated with acute laryngotracheitis. [8,9] SARS-CoV, a group 2b-Beta Coronavirus initially emerged in 2002-2003 in Guangdong Province, South China, which causes lower respiratory tract infection with high morbidity [10,11] and mortality called as SARS. In 2012 a novel group 2c beta-Coronavirus, Coronavirus MERS-Cov first identified in Saudi Arabia [12, 13] which was causative agent in pathogenic lower respiratory tract infection with

High mortality (20%-40%). This was mainly epidemic in Middle East, but also brought at outbreak in South Korea in 2014. [7, 8] [12, 13]

**TIMELINE OF THE KEY EVENTS IN THE EARLY STAGES OF OUTBREAK**

- 22 January 2020 20:00 GMT -Who delays decision on emergency declaration
- 23 January 2020 04:00 GMT – Chinese government closes of Wuhan
- 23 January 2020 15:00 GMT- Chinese authorities close down Huonggong
- 23 January 2020 20:00 GMT- Who decides against emergency declaration
- 24 January 2020 16:30 GMT -Second U.S. infection
- 27 January 2020 03:00 GMT -Death toll rises
- 27 January 2020 12:45 GMT – Scientists speaks out from locked down Wuhan.
- 27 January 2020 13:30 GMT – Scientists estimate how quickly virus spreads.
- 28 January 2020 05:00 GMT –Case increases by more than60%
- 28 January 2020 16:00 GMT- First human to human transmission outside China
- 29 January 2020 04:00 GMT – Australian researches grow virus in cell culture
- 30 January 2020 19:45 GMT- Human to human transmission confirmed in the United States
- 30 January 2020 – WHO declares global emergency
- 3 February 2020 16:30 GMT – Scientists began to study samples of live virus
- 4 February 2020 11:00 GMT - Cases in China passes 20,000

**ORIGINATION**

The novel coronavirus (2019-nCoV) recently reported from Wuhan (China), Thailand, Japan, South Korea and US have been confirmed as new coronavirus. [2]

Based on genomic data which is being published on 2019-nCoV, it is confirmed that the 2019-nCoV is most closely related to two severe acute respiratory syndrome (SARS) like n-CoV sequences Isolated in bats in 2015 to 2017. [3] Therefore the 2019-nCoV shares most common ancestors as origin.

The two bats viruses were collected in the duration of 2015 to 2017 at Zoushan, Zhejiang Province, China.

Now it is speculated that the 2019-nCoV may originated near Zhoushan or other places. The 2019-nCoV was first isolated from Stallholders who worked at south Chinese a food Market in Wuhan. This market sells most of the wild animals or mammals, which were likely intermediate hosts of 2019-nCoV that were originally from bat hosts.

**VIROLOGY**

Corona viruses are enveloped positive stranded RNA viruses that belongs to family coronaviridae and order nidovirals. [14] People in the world belongings infected with four human coronaviruses. 1) 229E 2) NL63 3) OC43 4) HKU1. Starting two are called antigenic group 1 whereas later two are called group 2. The coronaviruses which are zoonotic in nature can evolve into a strain that can infect human beings, which can lead to fatal illness.[15]E.g. SARS-CoV, MERS-CoV, 2019-nCoV.

The spiky glycoprotein (S-Glycoprotein) which is being attached to virion to host cell membrane is postulated to play a dominant role in host range restriction.[16] SARS-CoV infects type 2 pneumocytes and ciliated bronchial epithelial cells with utilizing angiotensin converting enzyme 2 as a receptor. MERS-CoV exploits dipeptidyl peptidase 4(DPP4) a transmembrane glycoprotein to infect type 2 pneumocytes and unciliated bronchial epithelial cells.[17,18]

In general coronaviruses first replicate in epithelial cells of respiratory cells and leads to cytopathic changes.[19] Thorough studies have not yet have conducted to elucidate the molecular basis of pathogenesis of 2019-nCoV.

**ETIOLOGY**

Infection caused by the 2019-nCoV shares many clinical similarities with infection caused by SARS-CoV. A typical human coronavirus having incubation period of 2-4 days; It is being 3-6 days for 2019-nCoV and 4-6 days for SARS-CoV. [27, 28, 30, 31] The 2019-nCoV represents symptoms such as malaise, fever and dry cough at prodromal phase. [28, 30, 31]

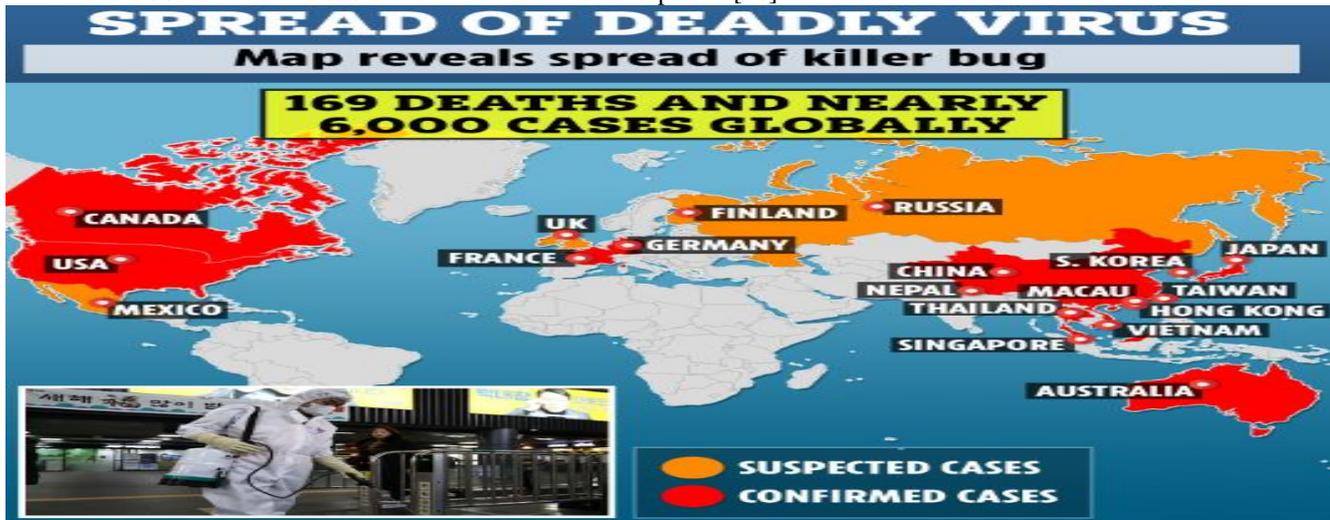
The study of 425 patients have confirmed 2019-nCoV infection; the mean duration from illness onset to first medical visit was 5.8 (95% CI 4.3 to 7.5) days for patients with illness onset between January 11, 2020. [29] Are port published by Huang, et Al, on 41 confirmed cases of 2019-nCoV infection who were admitted in Wuhan hospitals indicates that fever (98%), Cough (76%) dyspnea (55%) and myalgia or fatigue (44%) were most common symptoms. [30] In related to typical human coronavirus infection, few who were affected with novel coronaviruses had upper respiratory tract signs and symptoms (e.g. Sore throat. Rhinorrhea).

Intestinal presentations (eg. Diarrhoea) seem to be in frequent in patients with 2019-nCoV. [30, 32] A cases of 140 patients 61 (44%) had lymphopenia 158 (41%) had elevation of either aspartate aminotransferase (AST) above upper limit of reference range. [31, 31] Procalcitonin level had been normal among most of reported individuals. Elevated levels were observed in the patients who were affected with secondary infection. [31,31] Elevated serum ferritin and co-reactive protein levels were respectively reported in 63% and 86% of the patients reported by Chunet Al. [30] Also on increase in level of plasmapro-inflammatory cytokines level is being also reported. [31, 33]

## EPIDEMIOLOGY

A number of patients suffering from pneumonia with unknown cause of it were initially reported by health commission of Hubei Province, China on December 31, 2019.[21] This number increases to 41 with seven critically ill patients; One death was noted in subsequent report on January 11, 2020.[22] The Chinese authorities reported to WHO stated that some of patients were operating dealers or vendors in Wuhan seafood market which was already reported to be selling live and freshly slaughtered hunted animals.[20,23]

Several reports of clusters of cases among the families and infection of 16 health care workers pointed to human-to-human transmission of viruses.[20,24,25] On the report published by Chinese authorities on 5 February 2020, at least 17,496 cases with death toll of 362 in more than 25 countries that have been reported.[26]



## PATHOGENESIS

- Fecal to oral transmission
- Viruses enter through G.I.
- Invade and replicates in villi of small intestine
- Infect cells covering the upper 2/3 of small intestine
- Infected villi damaged and blunted to such small intestine can't absorb nutrients.

## DIAGNOSIS

Samples to be collected:

- (1) Respiratory material (nasopharyngeal and oropharyngeal swab in ambulatory patients and sputum (if produced) and endotracheal aspirates in patients with more severe respiratory diseases.
- (2) Serum for serological testing, outer sample and evanescent sample. This is additional to Respiratory materials and can support the identification of true agent, once serological assay is available.
- (3) Other species to consider is unresolved cases, blood for culture unite for legionella and pneumococcal antigen detection. E.g. Detection of putative coronavirus. A single negative test result, particularly if this is from an upper respiratory tract specimen does not exclude infection. Repeat sampling and testing, lower respiratory specimens are strongly recommended in severe or progressive disease. A positive alternate pathogen does not necessarily ruled out either one as little known about the role of infection.[34, 35, 36] Limited information exists regarding chest imaging findings of 2019-nCoV lung infection.

Reported chest C.T. finding in 2019 coronaviruses infection.

C.T. readings	Frequency (%)
Ground Glass opacity	86
Consolidation	29
Crazy paving	19
Linear	14
Cavitation	00
Discretunodules	00
Pleural effusion	00
Lymphodenopathy	00
Bilateral distribution	76
Peripheral distribution	33

[Chung M, Bernheim A, Mei X, et al. CT imaging features of 2019 novel coronavirus (2019-nCoV). Radiology (in press).]

#### TREATMENT

There is no specific treatment for 2019-nCoV. There is still working to develop a vaccine. Ramdesivir (Antiviral drug) was developed for the treatment of Ebola virus disease. This drug is used for treatment of first U.S. infection of 2019nCoV. An ongoing randomized controlled trial evaluating the efficacy and safety of lopinavir, ritonavir and interferon alpha-2b in patients infected with novel coronaviruses as launched on January 10,2020. Supportive care and isolation, fluid management, oxygen therapy administration of antimicrobials for treatment of secondary bacterial infection to alleviate the symptoms and prevent organ dysfunction is currently recommended by WHO for suspected and confused cases regulating hospital admission.

#### PREVENTIVE MEASURES

- 1) Avoid contact with people that are sick.
- 2) Avoid touching your eyes, nose, and mouth.
- 3) Stay home after you are sick.
- 4) Cover your cough or sneeze with a tissue paper or hand checker, then throw the tissue in the trash or dustbin.
- 5) Clean and disinfect regularly touched objects and surfaces employing a regular household cleaning spray or wipe.
- 6) Follow CDC's recommendations for employing a facemask.
- 7) Clean all "high-touch" surfaces on a daily basis.
- 8) Avoid consumption of undercooked animal products or the products obtained from raw sources.
- 9) Avoid touching your eyes, nose, and mouth with unwashed hands.
- 10) You and your patient should wear a facemask if you are within the same room.
- 11) Wear a disposable facemask and gloves after you touch or have contact with the patient's blood, stool, or body fluids, like saliva, sputum, nasal mucus, vomit, urine.
- 12) throw out disposable facemasks and gloves after using them. Do not reuse them.

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