



# New Emirates Medical Journal

Content list available at: <https://newemiratesmedicaljournal.com>



## RESEARCH ARTICLE

### Trends of Mortalities and Morbidities due to COVID-19, from Explosiveness to Aggressiveness, Gaps in System Response, and Transmission Chain

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#### Abstract:

#### Background:

Due to the high prevalence and wide distribution of coronaviruses, their large genetic diversity, frequent recombination of their genomes, and increasing human-animal interface activities, novel coronaviruses are likely to emerge periodically in humans owing to frequent cross-species infections and occasional spillover event.

#### Objective:

The aim of this research is to study the short-term morbidities, mortalities and trends of international spread of the COVID-19 outbreak. In addition, to study the explosiveness and aggressiveness of the outbreak and the gaps in response.

#### Methodology:

Outbreak events were observed and followed up over two months. This study used daily statistical reports issued by the World Health Organization, as well as data from different national authorities, regarding mortalities and morbidities from all over the world, with a specific focus on Chinese statistics as the main source of the outbreak.

#### Results:

The current study showed that the number of confirmed COVID-19 infected cases started with 41 cases in early January 2020. The number of cases with COVID-19 kept rising to reach 128000 on March 12, 2020. Moreover, the current study has revealed that the number of deaths was only (1) case in early January 2020 and increased to 25 deaths on January 23, and end up with 170 deaths by the end of January. Deaths have dramatically increased to reach 2462 on Feb 23 and 4717 on March 12. In regards to the geographical spread of the COVID-19 infection outbreak, the number of affected countries increased to 100 by mid- March 2020. The number of fatality cases was 0.0368, compared to 0.533 in recovered cases within two months.

#### Conclusion:

The natural history and course of the current outbreak revealed a highly explosive nature linked to considerable aggressiveness in terms of complications and mortalities, within only two months, and spread to 100 countries worldwide with 80000 cases within only two months. The study forecasted that the peak of the outbreak is not yet attained, and events that are more dramatic may occur worldwide.

**Keywords:** COVID-19, Mortality, Morbidity, Explosiveness, Aggressiveness, Transmission chain.

#### Article History

Received: March 22, 2020

Revised: May 15, 2020

Accepted: May 15, 2020

## 1. INTRODUCTION

Emerging and re-emerging pathogens are recognized as global public health challenges [1]. Coronaviruses are RNA

enveloped viruses that are broadly distributed among mammals, birds, and humans, and cause acute and severe respiratory infection, hepatic, neurologic, and enteric diseases [2, 3]. Six coronavirus species are known to cause human

disease [4]. Four viruses — 229E, OC43, NL63, and HKU1 — are prevalent and typically cause common cold symptoms in immunocompetent individuals [4]. The two other strains — severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) — are zoonotic in origin and have been linked to fatal illness in some cases [5].

In late December 2019, several local health facilities reported clusters of patients with pneumonia of unknown causes that were epidemiologically linked to seafood and wet animal wholesale market in Wuhan, Hubei Province, China [6 - 8]. On December 31, 2019, the Chinese Center for Disease Control and Prevention (China CDC) dispatched a rapid response team to accompany Hubei provincial and Wuhan city health authorities and to conduct an epidemiologic and etiologic investigation. The investigation identified the source of the pneumonia clusters and described a novel coronavirus detected in patients with pneumonia whose specimens were tested by the China CDC at an early stage of the outbreak. The investigation also described a series of pneumonia cases of unknown origin that emerged in Wuhan, with clinical presentations greatly resembling viral pneumonia [9]. Deep sequencing analysis from lower respiratory tract samples indicated a novel coronavirus, which was named 2019 novel coronavirus (2019-nCoV). Thus far, more than 800 confirmed cases, including in health-care workers, have been identified in Wuhan, and several exported cases have been confirmed in other provinces in China, as well as in Thailand, Japan, South Korea, Europe, and the USA [10 - 13].

COVID-19 was characterized as a pandemic by the World Health Organization (WHO) on March 12, 2020. This is due to the rapid increase in the number of cases outside China over the past 2 weeks prior to March 12, 2020, that has affected a growing number of countries. As of the morning of March 12, there are more than 20 000 confirmed cases and almost 1000 deaths in Europe. COVID-19 affects the elderly and those with pre-existing health conditions most severely [10 - 13].

## 2. OBJECTIVES

The aims of the present study were to describe the short-term morbidities, mortalities and trends of international spread time of the COVID-19 outbreak and study the explosiveness and aggressiveness of the outbreak and the gaps in response.

## 3. METHODOLOGY

The outbreak events were observed and followed up over two months. This study used daily statistical reports issued by WHO as well as data from different national authorities regarding mortalities and morbidities all over the world, with a specific focus on Chinese statistics as the main sources of the outbreak. The operational definitions of variables regarding case confirmation, case recovery, case admission, and casecontacts were adopted as per WHO definitions. Unofficial statistical reports were excluded as a source of data.

## 4. RESULTS

The current study showed that the number of confirmed cases infected with COVID-19 has started with 41 cases in early January 2020. As shown in (Fig. 1), the number of infected cases increased to 855 on 23 January and reached 7700 cases after only five days. The number of cases with COVID-19 kept increasing to attain 78823 on 23 February. According to the WHO report, the total number of infected cases had reached 128000 on March 12, 2020.

The current study revealed that the number of deaths was only (1) case in early January 2020 and increased to 25 deaths on January 23, and ended up with 170 deaths at the end of January. Death cases have dramatically increased to reach 2462 on February 23 and 4717 on March 12 (Fig. 2).

In regards to the geographical spread of the COVID-19 outbreak, the study showed that on January 4, 2020, only China was affected. While on 8 January 2020, two countries were affected as Thailand discovered some cases. On 13 January, Singapore also detected infected cases. On February 5, 27 countries reported confirmed cases of COVID-19. The number of affected countries significantly increased to reach 100 by mid-March (Fig. 3). In terms of case fatality and case recovery ratio of COVID-19 in two months, the number of fatality cases was 0.0368 compared to 0.533 of recovered cases within two months (Fig. 4).

## 5. DISCUSSION

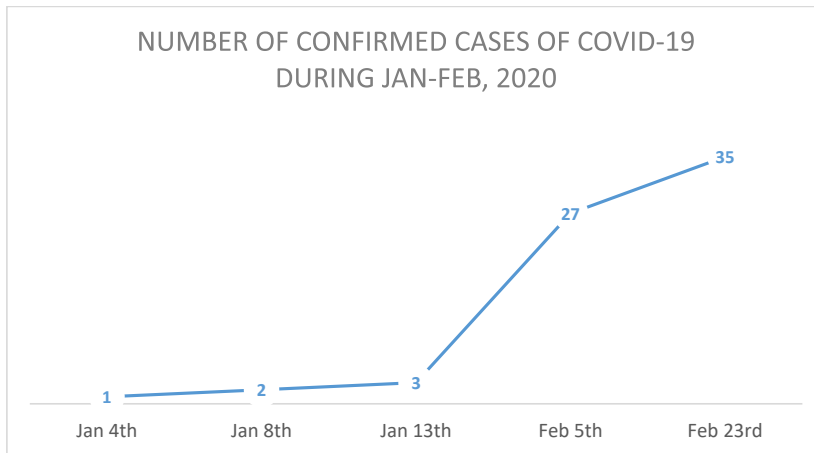
The current study revealed a dramatic, explosive outbreak of COVID-19 infection in terms of the number of confirmed cases, the number of deaths, and the number of countries affected with the outbreak within 50 days. The explosion of the epidemic with a high incidence of morbidity and mortality reflected another nature of the disease, which is the aggressiveness of the virus. Both the explosive and aggressive nature of the epidemic alarmed global as well as national health care systems in regards to responsiveness capacity, containment strategies, and application of strategies of an effective transmission chain breakdown. The nature of the current epidemic reflected the fragile status of the response of the global capacity of the health system, along with a lack of preparedness and inability to predict and forecast. Furthermore, the current epidemic is making a new trend, moving from a localized area to worldwide zones, which makes containment much harder and requires more efforts at the level of global mobility, leading to more economic loss. The other significant observation in the current pandemic is the attainment of the peak of the explosion.

The symptoms of this novel pneumonia were also non-specific. Patients with comorbidities had more severe systemic symptoms of generalized weakness and dry cough. As expected, they might have decreased total white blood cells, lymphocytes, or platelet counts, and also extended activated thromboplastin time and increased C-reactive protein level. The multifocal ground-glass changes on lung CT scans were typical of viral pneumonia. The lung involvement in patients with comorbidities was also more diffuse and extensive than that of younger patients, whose blood test results were largely normal. Patients who had a history of chronic sinusitis might

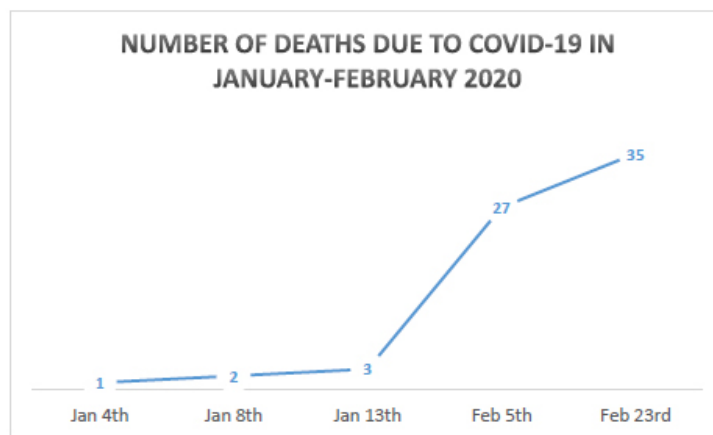
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have a bacterial superinfection due to a productive cough instead of a dry cough. These patients also had a high white

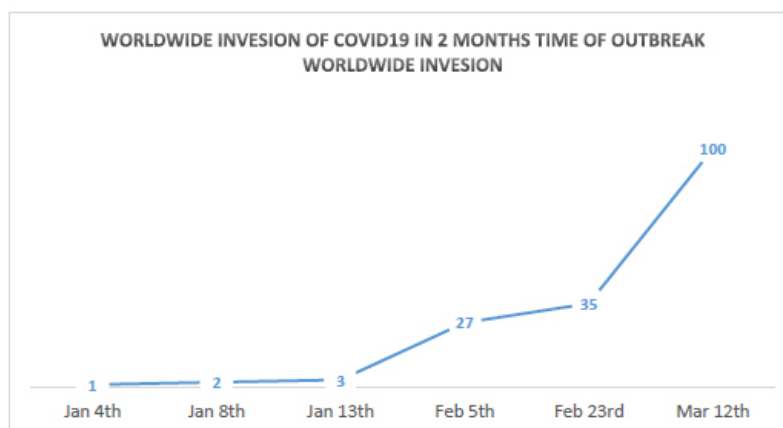
blood cell count, although the bacterial test was negative [14 - 20].



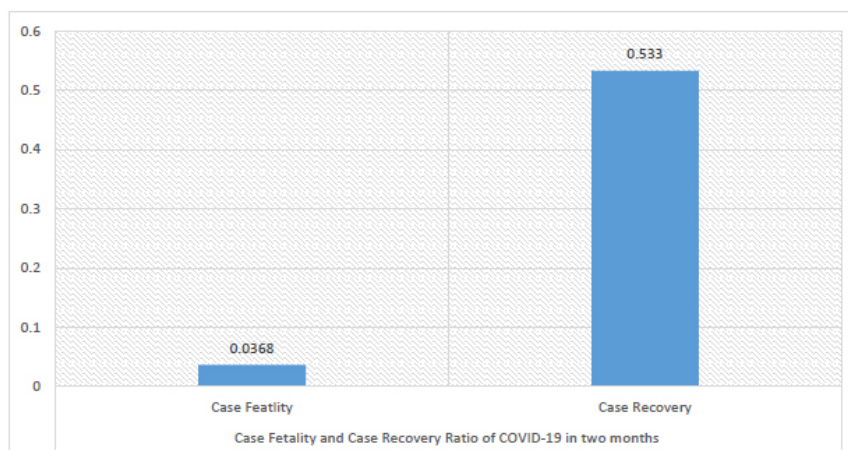
**Fig. (1).** Time trends and morbidity of cases with COVID-19 over two months.



**Fig. (2).** Time trends and mortality related to COVID-19 over two months.



**Fig. (3).** Time trends of international spread of COVID-19 over 2 months.



**Fig. (4).** Case fatality and the case recovery ratio of COVID-19 in two months.

An outbreak of novel coronavirus occurred in Wuhan in the winter of 2019–2020. Similar to the 2003 SARS outbreak in Guangzhou, China, Wuhan is also a rapidly flourishing provincial capital city of Hubei and the traffic hub of central China. Moreover, both outbreaks were initially connected to wet markets where game animals and meat were sold. In the case of SARS, the person-to-person transmission was efficient, and super-spreading events had led to major outbreaks in hotels and hospitals. Learning from the SARS outbreak, which started as animal-to-human transmission during the first phase of the epidemic, all game meat trades should be optimally regulated to terminate this portal of transmission. However, as shown in this study, it is still crucial to isolate patients and trace and quarantine contacts as early as possible because asymptomatic infection appears possible (as shown in one of our patients). It is also important to educate the public on both food and personal hygiene and alert health-care workers on compliance with infection control measures to prevent super-spreading events. Unlike the 2003 SARS outbreak, the improved surveillance network and laboratory capability of China were able to recognize this outbreak within a few weeks and determine the viral genome sequences that would allow the development of rapid diagnostic tests and efficient epidemiological control. Our study showed that person-to-person transmission in family homes or hospital and intercity spread of this novel coronavirus is possible, and therefore, vigilant control measures are warranted at this early stage of the epidemic [20 - 25].

## CONCLUSION

The natural history and course of the current outbreak revealed highly explosive nature linked to considerable virulence in terms of complications and mortalities, within only a two-month period spread to 35 countries worldwide and reached 80000 cases. The study forecasted that the peak of the outbreak is not yet attained and events that are more dramatic can be expected worldwide.

## RECOMMENDATIONS

Rigorous international, as well as national public health

and clinical measures need to be strictly applied and secured at individual and population levels for the most effective strategy for breaking down the transmission chain.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

## HUMAN AND ANIMAL RIGHTS

No Animals/Humans were used for studies that are base of this research.

## CONSENT FOR PUBLICATION

Not applicable.

## AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available in World Health organization at [[https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1)]. These data were derived from the following resources available in the public domain: [[https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1)].

## FUNDING

None.

## CONFLICT OF INTEREST

All authors declare that they have no conflicts of interests.

## ACKNOWLEDGEMENTS

Declared none.

## REFERENCES

- [1] Richman DD, Whitley RJ, Hayden FG. Clinical virology. 4<sup>th</sup>. Washington : ASM Press 2016. Google Scholar
- [2] Ksiazek TG, Erdman D, Goldsmith CS, *et al*. A novel coronavirus associated with severe acute respiratory syndrome. N Engl J Med 2003; 348(20): 1953-66. [<http://dx.doi.org/10.1056/NEJMoa030781>] [PMID: 12690092]
- [3] Kuiken T, Fouchier RAM, Schutten M, *et al*. Newly discovered

- coronavirus as the primary cause of severe acute respiratory syndrome. *Lancet* 2003; 362(9380): 263-70. [http://dx.doi.org/10.1016/S0140-6736(03)13967-0] [PMID: 12892955]
- [4] Drosten C, Günther S, Preiser W, *et al.* Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *N Engl J Med* 2003; 348(20): 1967-76. [http://dx.doi.org/10.1056/NEJMoa030747] [PMID: 12690091]
- [5] de Groot RJ, Baker SC, Baric RS, *et al.* Middle East respiratory syndrome coronavirus (MERS-CoV): announcement of the Coronavirus Study Group. *J Virol* 2013; 87(14): 7790-2. [http://dx.doi.org/10.1128/JVI.01244-13] [PMID: 23678167]
- [6] Zaki AM, van Boheemen S, Bestebroer TM, Osterhaus ADME, Fouchier RAM. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. *N Engl J Med* 2012; 367(19): 1814-20. [http://dx.doi.org/10.1056/NEJMoa1211721] [PMID: 23075143]
- [7] WHO Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003. [https://www.who.int/csr/sars/country/table2004\\_04\\_21/en/](https://www.who.int/csr/sars/country/table2004_04_21/en/) Accessed 19<sup>th</sup> Jan 2020, Google Scholar
- [8] WHO Middle East respiratory syndrome coronavirus (MERS-CoV). <http://www.who.int/emergencies/mers-cov/en/> (November, 2019), Accessed 19<sup>th</sup> Jan 2020, Google Scholar
- [9] WHO Novel coronavirus – China. <http://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/> (Jan 12, 2020), Accessed 19<sup>th</sup> Jan 2020, Google Scholar
- [10] WHO Novel coronavirus – Thailand (ex-China). <http://www.who.int/csr/don/14-january-2020-novel-coronavirus-thailand/en/> (Jan 14, 2020), Accessed 19<sup>th</sup> Jan 2020, Google Scholar
- [11] WHO Novel coronavirus – Japan (ex-China),. <http://www.who.int/csr/don/17-january-2020-novel-coronavirus-japan-ex-china/en/> (Jan 17, 2020), Accessed 19<sup>th</sup> Jan 2020, Google Scholar
- [12] WHO Novel coronavirus – Republic of Korea (ex-China),. <http://www.who.int/csr/don/21-january-2020-novel-coronavirus-republic-of-korea-ex-china/en/> (Jan 21, 2020), Accessed 23<sup>rd</sup> Jan 2020, Google Scholar
- [13] CDC First travel-related case of 2019 novel coronavirus detected in United States. <https://www.cdc.gov/media/releases/2020/p0121-novel-coronavirus-travel-case.html> (Jan 21, 2020), Accessed 23<sup>rd</sup> Jan 2020, Google Scholar
- [14] Tan W, Zhao X, Ma X, *et al.* A novel coronavirus genome identified in a cluster of pneumonia cases — Wuhan, China 2019–2020. <http://weekly.chinacdc.cn/en/article/id/a3907201-f64f-4154-a19e-4253b453d10e> Accessed 23<sup>rd</sup> Jan 2020, Google Scholar
- [15] Centre for Health Protection of the Hong Kong Special Administrative Region Government CHP closely monitors cluster of pneumonia cases on Mainland. <https://www.info.gov.hk/gia/general/201912/31/P2019123100667.htm> 2019. (Dec 31, 2019), Accessed 21st Jan 2020, Google Scholar
- [16] Centre for Health Protection of the Hong Kong Special Administrative Region Government CHP provides further information on cluster of pneumonia cases in Wuhan. <https://www.info.gov.hk/gia/general/202001/12/P2020011200710.htm> (Jan 12, 2020), Accessed 21st Jan 2020, Google Scholar
- [17] Juan D. Wuhan wet market closes amid pneumonia outbreak, *ChinaDaily* (Jan 1, 2020) <https://www.chinadaily.com.cn/a/202001/01/WS5e0c6a49a310cf3e35581e30.html> Accessed 21st Jan 2020, Google Scholar
- [18] Cohen J. Chinese researchers reveal draft genome of virus implicated in Wuhan pneumonia outbreak American Association for the Advancement of Science, Washington, DC (Jan 11, 2020) . <https://www.sciencemag.org/news/2020/01/chinese-researchers-reveal-draft-genome-virus-implicated-wuhan-pneumonia-outbreak> Accessed 21st Jan 2020, Google Scholar
- [19] To KK, Chan KH, Li IW, *et al.* Viral load in patients infected with pandemic H1N1 2009 influenza A virus *Med Virol*. 2010; 82: pp. 1-7. CrossRefView Record in ScopusGoogle Scholar
- [20] To KKW, Yip CCY, Lai CYW, *et al.* Saliva as a diagnostic specimen for testing respiratory virus by a point-of-care molecular assay: a diagnostic validity study. *Clin Microbiol Infect* 2019; 25(3): 372-8. [http://dx.doi.org/10.1016/j.cmi.2018.06.009] [PMID: 29906597]
- [21] Chan KH, To KKW, Li PTW, *et al.* Evaluation of NxTAG Respiratory pathogen panel and comparison with xTAG respiratory viral panel fast v2 and film array respiratory panel for detecting respiratory pathogens in nasopharyngeal aspirates and swine/avian-origin influenza A subtypes in culture isolates. *Adv Virol* 2017; 2017: 1324276. [http://dx.doi.org/10.1155/2017/1324276] [PMID: 28947901]
- [22] Peiris JS, Lai ST, Poon LL, *et al.* Coronavirus as a possible cause of severe acute respiratory syndrome. *Lancet* 2003; 361(9366): 1319-25. [http://dx.doi.org/10.1016/S0140-6736(03)13077-2] [PMID: 12711465]
- [23] Chan JF, Zhang AJ, Chan CC, *et al.* Zika virus infection in dexamethasone-immunosuppressed mice demonstrating disseminated infection with multi-organ involvement including orchitis effectively treated by recombinant type I interferons. *EBioMedicine* 2016; 14: 112-22. [http://dx.doi.org/10.1016/j.ebiom.2016.11.017] [PMID: 27884655]
- [24] To KKW, Chan WM, Li KSM, *et al.* 2017.
- [25] Woo PC, Lau SK, Teng JL, *et al.* Metagenomic analysis of viromes of dromedary camel fecal samples reveals large number and high diversity of circoviruses and picobirnaviruses. *Virology* 2014; 471-473: 117-25. [http://dx.doi.org/10.1016/j.virol.2014.09.020] [PMID: 25461537]
- [26] WHO Novel coronavirus health-topics/coronavirus. [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1) Accessed 19<sup>th</sup> Jan 2020, Google Scholar