

Omicron SARS-CoV-2 new variant: global prevalence and biological and clinical characteristics

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Abstract. – **OBJECTIVE:** The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has created a challenging and threatening situation worldwide. The SARS-CoV-2 embodies diverse epidemiological trends, alongside emerging and reemerging pathogenic characteristics, which have raised great public health concerns. This study aims to investigate the global prevalence, biological and clinical characteristics of Omicron, a new variant of SARS-CoV-2 that is causing concern and fear internationally.

MATERIALS AND METHODS: The data on the outbreak of the new variant “Omicron” was obtained from the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), European Centre for Disease Prevention and Control (ECDC), research institutes, and global international print media. We recorded information on the prevalence, the biological and clinical characteristics of the Omicron Variant of SARS-CoV-2 from November 24 to December 9, 2021.

RESULTS: Worldwide, the new variant of SARS-CoV-2, Omicron, has been identified in 57 countries with 2152 confirmed cases reported on December 9, 2021, ever since the emergence of the first case of this variant dated November 24, 2021. The number of confirmed Omicron variant cases has significantly increased globally. The novel variant is spreading swiftly and has crossed many borders all around the world. This new variant has been observed to be transmitted far more rapidly than other variants of SARS-CoV-2.

CONCLUSIONS: The new variant of SARS-CoV-2 has novel epidemiological and biological characteristics, making it more contagious than other variants of SARS-CoV-2. It has affected 2152 people in 57 countries in a short period of two weeks. However, the fatality rate of the SARS-CoV-2 Omicron variant has not yet been reported. The major clinical manifestations in this new variant are those of a “mild infection”, including headache, body ache, muscles ache, cough, fever, generalized myalgia, and severe fatigue. It is infecting

younger and middle-aged people more than previous variants. Worldwide health establishments should take immediate preventive measures to stop outbreaks of this emerging and reemerging pathogenic variant across the globe to minimize the disease burden on humanity.

Key Words:

Omicron, Coronavirus, SARS-CoV, Prevalence, Outbreak, Clinical characteristics.

Introduction

Since the first case of Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) was reported in Wuhan, China, on November 17, 2019, the world has witnessed multiple waves of a global pandemic followed by mass immunization programs. By now, 54.2% of the world’s population has received at least one dose of a COVID-19 vaccine to eradicate the disease¹.

Despite tremendous efforts by scientists, researchers, and health practitioners to combat this highly contagious pandemic, just recently, news of an emerging new variant of the coronavirus has jolted the world. This new variant has suddenly appeared after several countries, and their citizens began to have hope for a seemingly normal life.

The new variant of the Coronavirus, B.1.1.529, named “Omicron”, was discovered on November 24, 2021, in South Africa, from a patient’s specimen sample that was collected on November 9, 2021. This variant was noticed to have a higher number of mutations than any other previous strain of the virus². SARS-CoV-2 has continued to change its genetic code through mutations. These mutations, mainly on the spike protein of the virus, lead to slightly modified copies of the

virus called “variants”, resulting in this strain of the virus having unique properties such as altered transmissibility and severity of disease, thereby leading to new rates of infection spread, morbidity, and mortality. This novel “Omicron variant” is of great concern because it has dozens of mutations that can affect the way it behaves².

Mutations are assigned letters and numbers, such as D614G- which indicates that an amino acid changed from a D (aspartate) to a G (glycine) at position number 614 of the viral spike proteins³. The World Health Organization (WHO) has identified 5 VOCs (variants of concern) as Alpha, Beta, Gamma, Delta, and the latest one was added as an Omicron variant. Besides these, two currently designated VOIs (variants of interest) and seven VOM's (variants under monitoring) are being monitored for pathogenicity⁴.

The new Omicron variant of SARS-CoV-2 has created a highly challenging situation worldwide. The Omicron variant contains emerging pathogenic characteristics which have raised great public health concerns. This study aimed to investigate the global prevalence and the biological and clinical characteristics of the novel Omicron variant of SARS-CoV-2.

Materials and Methods

The present study was conducted in the Department of Physiology, College of Medicine, King Saud University, Riyadh, Saudi Arabia. This study recorded the global prevalence and the biological and clinical characteristics of a novel variant of SARS-CoV-2: Omicron. The required information was obtained from the World Health Organization (WHO)⁴, Centers for Disease Control and Prevention (CDC)⁵, European Centre for Disease Prevention and Control (ECDC)⁶, and reports from various countries and international print media. For the biological and clinical characteristics of the Omicron variant, we reviewed literature published in the World Health Organization, CDC, PubMed, research institutes, and international print media. The relevant literature was explored through keyword searches, including SARS-CoV, Omicron, and new variant. After the literature had been shortlisted, the appropriate biological characteristics and findings were recorded.

Statistical Analysis and Ethical Statement

In this study, information on the new Omicron variant of the SARS-CoV-2 outbreak was

obtained from the “World Health Organization, Centers for Disease Control and Prevention, European Centre for Disease Prevention and Control” and from various international print media reports and reports from various countries, and reliable print media, hence ethical approval was not required. The data was recorded and analyzed, and the results were expressed in numbers and percentages and a *p*-value less than 0.05 was considered significant.

Results

Global epidemiological updates on the prevalence of novel variant of SARS-CoV-2 are presented in (Table I). The new variant Omicron swiftly crossed the international borders of 57 countries and has to date, infected 2152 people (Table I, Figure 1) from November 24, 2021, to December 9, 2021. It has caused no casualties, all according to medical literature-based findings.

The number of confirmed Omicron cases on December 3 was 219; however, on December 9, 2021, the occurrence of the disease was further increased in 57 countries and affected 2152 people.

On December 9, 2021, a large number of Omicron cases was reported from Denmark (569), the UK (568), South Africa (397), Canada (65), South Korea (60), the United States (47), Australia (42), Portugal (37), France (37), Netherlands (36), Norway (33), Botswana (32), Belgium (30), India (23), Israel (21), and Germany (15) (Table I). However, many cases were also reported from various other corners of the globe (Table I). The Omicron variant coronavirus cases were initially reported from South Africa and swiftly spread to different geographic areas. The outbreak of this variant was mainly seen during the Fall period (Table II).

The clinical characteristics of "Omicron variant" infection mostly consisted of mild symptoms. Patients affected by the new variant complained of a mild cough, fever, generalized myalgia, malaise, a scratchy but not sore throat, headache, body ache, and moderate to severe fatigue (Table II).

Discussion

Coronavirus infection is an emerging global health concern and has infected a significant portion of the world's population. This study investigated the global prevalence, and the biological and clinical characteristics of the new Omicron

Table I. Prevalence of Omicron variant of COVID-19 in various countries worldwide.

Country	Cases on Dec 3, 2021	Cases on Dec 9, 2021
United Kingdom	22	568
Denmark	4	569
South Africa	77	397
Portugal	13	37
France	1	37
India	2	23
Israel	4	21
Botswana	19	23
Norway	2	33
Netherlands	16	36
United States	2	47
Australia	7	42
Germany	9	15
Canada	6	65
Iceland		20
South Korea	5	60
Austria	1	17
Belgium	1	30
Italy	9	13
Finland	1	9
Spain	2	14
Sweden	3	13
Brazil	2	6
Hong Kong	4	4
Japan	2	4
Nigeria	3	6
Latvia	0	5
Nepal	0	2
Romania	0	2
Russia	0	2
Argentina	0	1
Croatia	0	3
Czech Republic	1	2
Fiji	0	2
Greece	0	3
Ireland	0	1
Saudi Arabia	1	1
Switzerland	0	13
Thailand	0	1
Tunisia	0	1
UAE	1	1
Zambia	0	3
Total confirmed cases	220	2152 (53.34%)

Ref: 14-23

cron variant of SARS-CoV-2. The new variant of SARS-CoV-2 has unique epidemiological and biological factors, including greater contagious-

ness than other variants of SARS-CoV-2. To date, it has affected many people in many countries in a short period of about ten days. However, the fatality rate of the SARS-CoV-2, the Omicron variant, has not yet been reported. According to the latest reports, the virus has mutated with 50 mutations overall and 32 on the spike protein alone⁸. The major clinical manifestations in the SARS-CoV-2 Omicron variant are a mild degree of fever, cough, shortness of breath, generalized myalgia, malaise, and severe body fatigue⁹.

Since Omicron's emergence, scientists have been on high alert, trying to learn about the properties of the new Omicron variant. Many of the mutations have not been reported in a single viral variant before. Another critical point of concern was that many of the mutations found to be the same in the Alpha and Delta variants were also those that have resulted in increased rates of transmission of infection along with a capability to evade infection-blocking antibodies. This is the main reason behind the growing fear among the science community that this new variant might lead to an immediate and massive surge in global COVID-19 cases and deaths, thus undoing the benefits that vaccination campaigns had brought to the world. It has also been reported that one of the Omicron variant's mutations leads to "S gene target failure" (or "S gene dropout"), indicating that one of the numerous areas of the gene that are targeted by PCR testing will give a false negative¹⁰. However, WHO reports that this new variant is still more or less being picked up by PCR testing sufficiently¹¹.

The findings from South Africa reveal anecdotal reports of reinfections and cases in vaccinated individuals; however, further investigations are required. It has also been reported that the sharpest rise of infections in South Africa's Gauteng province was among the youth, i.e., grade school, college, and university students, which is the age group that was relatively less affected by the previous variants of the virus^{7,11,12}.

The most recent reports, dated December 6, 2021, revealed that the new variant has spread to 43 countries across the globe. The total number of global cases of this variant was 928, with the most significant number being reported by its country of origin, South Africa, United Kingdom, Denmark, Botswana, Portugal, France, India, Israel, Botswana, Norway, Netherlands, United States, Australia, and Germany (Table I). Moreover, other countries have also reported the Omicron cases (Table I).

Table II. Biological and clinical characteristics of Omicron variant of SARS-CoV-2.

Biological Characteristics	
Country of origination	Gauteng, South Africa
Characteristics	A new variant of “SARS-CoV-2 Coronavirus, B.1.1.529, named “Omicron”
Spike protein mutations	It contains 35 mutations on the spike protein and 50 mutations overall
Spread	Omicron variant is more transmissible than previous strains.
Seasonal occurrence	Fall onset - November 24, 2021
Age of affected individuals	Known to be infecting younger individuals more than previous strains
Clinical Characteristics	
Fatigue	+++
Body ache	+
Headache	+
Fever	+
Generalized myalgia	+
Malaise	+
Muscle ache	+
Pulmonary characteristics	
Cough	+
scratchy throat	+
Shortness of breath	+
Pneumonia	may be
Extra-pulmonary characteristics	
Abdominal pain	+/- (Further investigation is required)
Nausea and vomiting	+/- (Further investigation is required)
Diarrhea	+/- (Further investigation is required)

Ref:⁵⁻¹², [+Mild; ++Moderate; +++Severe; +/- on and off].

symptoms in COVID-19 patients around November 18 that were “extremely mild”, with the first patient, a 33-year-old male, complaining of general fatigue, body aches, a mild headache, and a scratchy throat rather than the usual complaints of a “sore throat”. When other patients testing positive for COVID-19 began reporting similar symptoms (which were unusual compared to the Delta variant’s features), it raised the suspicion of perhaps a new variant. These concerns were immediately conveyed to South Africa’s vaccine advisory committee⁹. Indeed, a new wave seems to be coming our way. However, two important questions remain unanswered, namely 1) will this variant cause more severe and lethal infections and 2) will previous vaccines provide immunity against this new variant. Further research is rapidly underway to address multiple queries to calm the uprising fears.

The response of the global leadership to this new outbreak has been immediate closing of borders and suspension of flights to certain countries, especially those in Africa. Other countries have introduced tighter travel restrictions and stricter policies by mandating PCR testing or quarantining for a certain number of days. After the recent loosening of restrictions on masks and public gatherings, because COVID-19 cases had

decreased globally, governments are again emphasizing the importance of social distancing, maintaining good hygiene, isolating, and immediately reporting symptoms. Most importantly, governments are advocating the urgency and importance of getting vaccinated. If COVID-19 vaccinations do not provide complete protection against the new variant, then it is expected that they will at least result in less severe infections and lower death rates. Caution must be continued to be exercised.

Study Strengths and Limitations

This study has investigated the global prevalence, and the biological and clinical characteristics of the new Omicron variant of SARS-CoV-2 all at the same time. However, a limitation of this study is that PubMed and Web of Science-based literature is not currently able to support better conclusions, so early after the emergence of this pathogen.

Conclusions

Worldwide, the new variant of SARS-CoV-2, Omicron, has involved 57 countries and has re-

sulted in 2152 confirmed cases from the first reported case of Omicron, November 24, 2021, to December 9, 2021. The novel variant has swiftly spread across the global borders of 57 countries and infected 2152 people, although no fatalities due to this variant virus have been reported during the study period. The Omicron virus appears to be transmitted rapidly. The new variant of SARS-CoV-2 has diverse epidemiological and biological characteristics, making it more contagious than other variants of SARS-CoV-2. It has affected many people in various countries in a short period of two weeks. The major clinical manifestations of this new variant are those of a “mild infection,” including headache, body ache, muscles ache, cough, fever, generalized myalgia, and severe fatigue. To minimize the disease burden internationally, all global health authorities should take immediate preventive measures to stop outbreaks of this emerging and reemerging pathogenic variant across the globe.

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Conflict of Interests

The authors declare no conflict of interest

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