

# Omicron new variant BA.2.86 (Pirola): Epidemiological, biological, and clinical characteristics – a global data-based analysis

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**Abstract. – OBJECTIVE:** Since December 2019, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has caused a threatening situation worldwide. The new variant of SARS-CoV-2, BA.2.86, also known as Pirola, is an Omicron sub-variant that causes great concern because it has been found to contain a large number of mutations. This study aims to investigate and identify the biological and clinical characteristics of this threatening new variant of SARS-CoV-2, which is BA.2.86.

**MATERIALS AND METHODS:** This observational study was performed in the Department of Physiology, College of Medicine, King Saud University, Riyadh, Saudi Arabia. The literature was searched using the key terms including “SARS-CoV-2, Omicron, BA.2.86, Pirola, epidemiology, clinical characteristics”. The data on Omicron BA.2.86 were obtained from the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), the Global Initiative on Sharing All Influenza Data (GSIAD), PubMed, Web of Science, regional ministries, research institutes, and international print media. Initially, 26 documents were identified and 10 documents were included for the data analysis. The information on the prevalence and the biological characteristics of the new variant of SARS-CoV-2, Omicron BA.2.86, was recorded and synthesized for analysis.

**RESULTS:** The Omicron BA.2.86 has been identified in 23 countries with 264 confirmed cases as of September 28, 2023. The number and distribution of these cases encompass the United Kingdom 66 (25.0%), USA 34 (12.87%), Denmark 31 (11.74%), Sweden 25 (9.46%), South Africa 20 (7.57%), Spain 20 (7.57%), France 15 (5.68%), Portugal 7 (2.65%), Japan 6 (2.27%), Canada 5 (1.89%), Thailand 5 (1.89%), Israel 5 (1.89%), Greece 5 (1.89%), Germany 3 (1.13%), Belgium 3 (1.13%), Luxembourg 3 (1.13%), Netherlands 3 (1.13%), South Korea 3 (1.13%). However, one case in each country has been reported in Australia, Italy, Iceland, Switzerland, and China. The disease has been reported more frequently in females (71.0%) than males (29.0%).

To date, no deaths have been reported. The novel variant has spread more swiftly than other variants of SARS-CoV-2 and has crossed many international borders.

**CONCLUSIONS:** The new Omicron variant BA.2.86 has affected 264 people in 23 countries. The disease is more common in females than males and mainly affects old age people (over 60 years of age). However, no deaths have been reported. The variant is spreading swiftly and transmitted more rapidly. The clinical manifestations in patients with Omicron BA.2.86 variant are not well documented and may be similar to earlier strains of COVID-19 by presenting with mild infectious symptoms, including headache, body ache, cough, fever, generalized myalgia, and severe fatigue. The global health authorities must take preventive measures to stop the outbreak of this emerging variant across the globe to minimize the disease burden.

*Key Words:*

Omicron, Coronavirus, SARS-CoV, BA.2.86 prevalence, Clinical characteristics.

## Introduction

The first case of a Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) infection was identified in December 2019 in the city of Wuhan, China. The virus subsequently spread rapidly across the globe, leading to a COVID-19 pandemic<sup>1,2</sup>. As of September 12, 2023, the ongoing pandemic has registered more than 770.43 million confirmed cases and 6.95 million deaths, as the World Health Organization reported. 70.5% of the population has received at least one dose of a COVID-19 vaccine worldwide, and 13.5 billion doses have been administered, with 32.6% of the population coming from low-income countries<sup>3</sup>.

Despite tremendous efforts by health officials, scientists, researchers, and the public battling the COVID-19 pandemic, recent news of an emerging new variant of the SARS-CoV-2 BA.2.86 has worried the world.

This new variant of the Coronavirus, the BA.2.86, sub-variant of Omicron, also known as “Pirola” was discovered on August 14, 2023, in Denmark. This variant contains more mutations than the previous strains of the virus<sup>4</sup>.

SARS-CoV-2 has continued to change its genetic code through mutations, resulting in the acquisition of unique characteristics and altered nature of the spread and severity of the disease, thereby leading to higher rates of the spread of infection<sup>5,6</sup>.

The World Health Organization (WHO)<sup>7</sup> and Centre for Disease Control Prevention (CDC)<sup>8</sup> have identified numerous variants, VOCs (variants of concern) known as alpha, beta, gamma, and Delta, and the latest one added to the list was an Omicron variant. Besides these, there are two currently designated VOIs (Variants of Interest) and seven VBMs (Variants being Monitored) according to the US Centers for Disease Control and Prevention<sup>7-9</sup> also known as VUMs (variants under monitoring) according to the European Centre for Disease Prevention and Control<sup>9</sup>, which are being monitored for pathogenicity<sup>7,8</sup> (Table I).

BA.2.86 possesses emerging pathogenic characteristics that have raised great public health concerns. The genetic sequence of Omicron BA.2.86 has more than 30 amino acid differences compared with Omicron BA.2, which was the dominant Omicron lineage in early 2022. Omicron BA.2.86 also has more than 35 amino acid differences on its spike protein<sup>7,8</sup>, compared with

the more recently circulating Omicron subvariant XBB.1.5 (also known as “Kraken”), which was dominant through most of 2023. This set of genetic mutations is of the same magnitude as seen between the initial Omicron variant and the Delta variant<sup>9,10</sup>. This study aims to explore the global prevalence, and biological and clinical characteristics of the novel omicron BA.2.86 variant.

## Materials and Methods

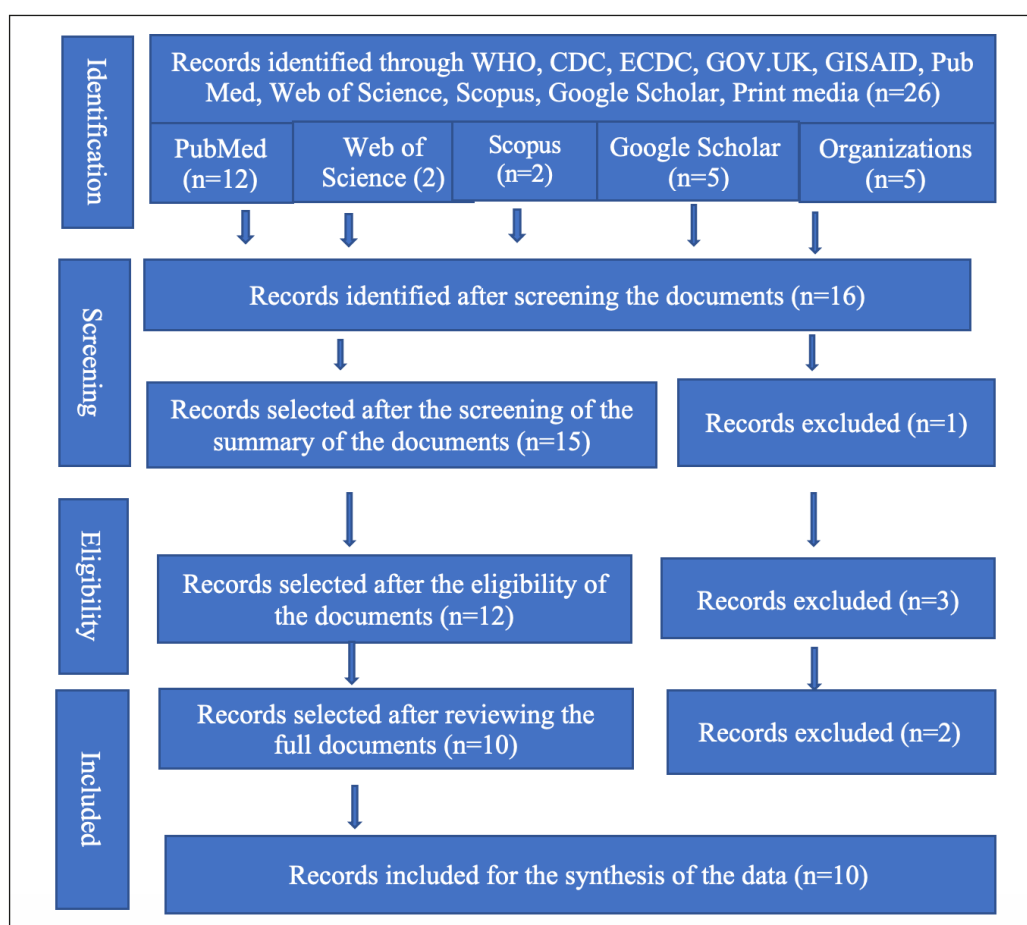
### Research Methodology

This study was performed at the Department of Physiology, College of Medicine, King Saud University, Riyadh, Saudi Arabia. This study recorded the most updated information on global prevalence, and biological and clinical characteristics of a novel variant of SARS-CoV-2, BA.2.86. For data collection, the literature was searched using the key terms including “SARS-CoV-2, Omicron, new variant, BA.2.86, Pirola, epidemiology, clinical characteristics”. The pertinent prevalence information was obtained from the World Health Organization<sup>7</sup>, Centers for Disease Control and Prevention (CDC)<sup>8</sup>, European Centre for Disease Prevention and Control<sup>9</sup>, GOV.UK<sup>11</sup>, the Global Initiative on Sharing All Influenza Data (GISAID)<sup>12</sup>, PubMed<sup>13</sup>, Web of Science<sup>14</sup>, regional ministries, research institutes, and international print media reports from various countries. Initially, 26 documents, health organizations, articles, and print media reports were identified. After reviewing these websites and documents, 10 documents were selected for the data collection and analysis. The literature was reviewed and selected as per PRISMA guidelines (Figure 1).

**Table I.** The SARS-CoV-2 variants and current classification status.

WHO Label	Pango Lineage	Current Status	Date of Designation
Omicron	F456L	VOI	VOI: September 1, 2023
Omicron	BA.2.86	VBM	VBM: September 1, 2023
		VOC	VOC: September 12, 2023
Omicron	XBB.1.9.1	VBM	VBM: September 1, 2023
Omicron	XBB.1.9.2	VBM	VBM: September 1, 2023
Omicron	XBB.2.3	VBM	VBM: September 1, 2023
Omicron	XBB.1.16	VBM	VBM: September 1, 2023
Omicron	XBB.1.5	VBM	VBM: September 1, 2023
Omicron	CH.1.1	VBM	VBM: September 1, 2023
Omicron	BA.2.74	VBM	VBM: September 1, 2023
Omicron (parent lineages)	B.1.1.529 and descendant lineages	VOC	VOC: November 26, 2021

Phylogenetic Assignment of Named Global Outbreak (Pango); VBM: variant being monitored; VUM: Variant under monitoring; VOI: Variant of Interest; VOC: Variant of concern<sup>7-9</sup>.



**Figure 1.** PRISMA flow diagram for the selection of documents.

### Statistical Analysis

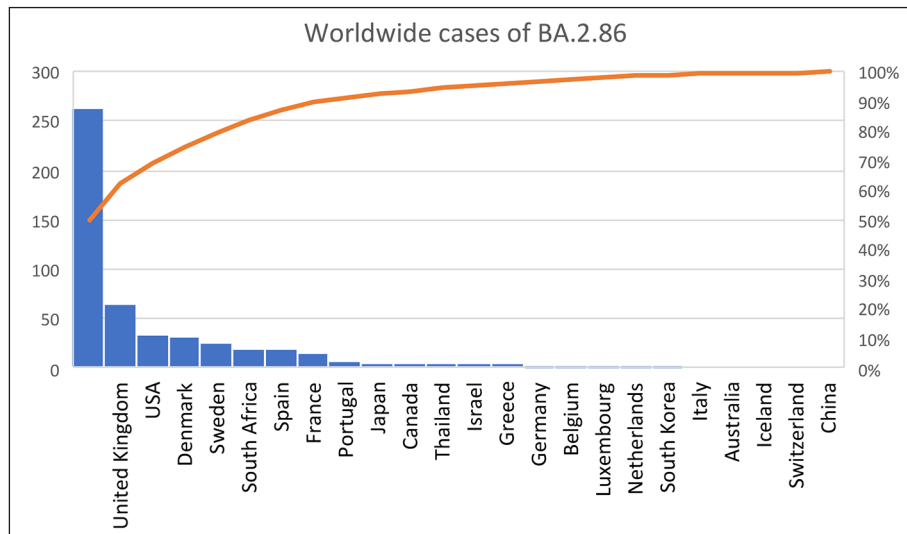
The data were collected, arranged in an Excel worksheet, and rechecked by another team member. The data were entered and analyzed by using the SPSS 26.0 statistical software (IBM Corp., Armonk, NY, USA). The frequencies and percentages were calculated.

### Results

The global epidemiological updates on the occurrence of novel variants of SARS-CoV-2, BA.2.86, are presented in Figures 2 and 3. The new variant Omicron swiftly crossed the international borders of 23 countries and has infected 264 people from August 14, 2023, to September 28, 2023 (Figure 2, 3). The new variant has caused no casualties, according to medical literature-based findings. The number of cases and relative percentages of Omicron BA.2.86 have been reported. The new Omi-

cron BA.2.86 rapidly spread and involved 23 countries worldwide, including the United Kingdom 66 (25.0%), USA 34 (12.87%), Denmark 31 (11.74%), Sweden 25 (9.46%), South Africa 20 (7.57%), Spain 20 (7.57%), France 15 (5.68%), Portugal 7 (2.65%), Japan 6 (2.27%), Canada 5 (1.89%), Thailand 5 (1.89%), Israel 5 (1.89%), Greece 5 (1.89%), Germany 3 (1.13%), Belgium 3 (1.13%), Luxembourg 3 (1.13%), Netherlands 3 (1.13%), South Korea 3 (1.13%). However, one case in each country has been reported in Australia, Italy, Iceland, Switzerland, and China. The disease has been reported more frequently in females (71.0%) than males (29.0%). To date, no deaths have been reported. The novel variant has spread more swiftly than other variants of SARS-CoV-2 and has crossed many international borders (Figure 2, 3).

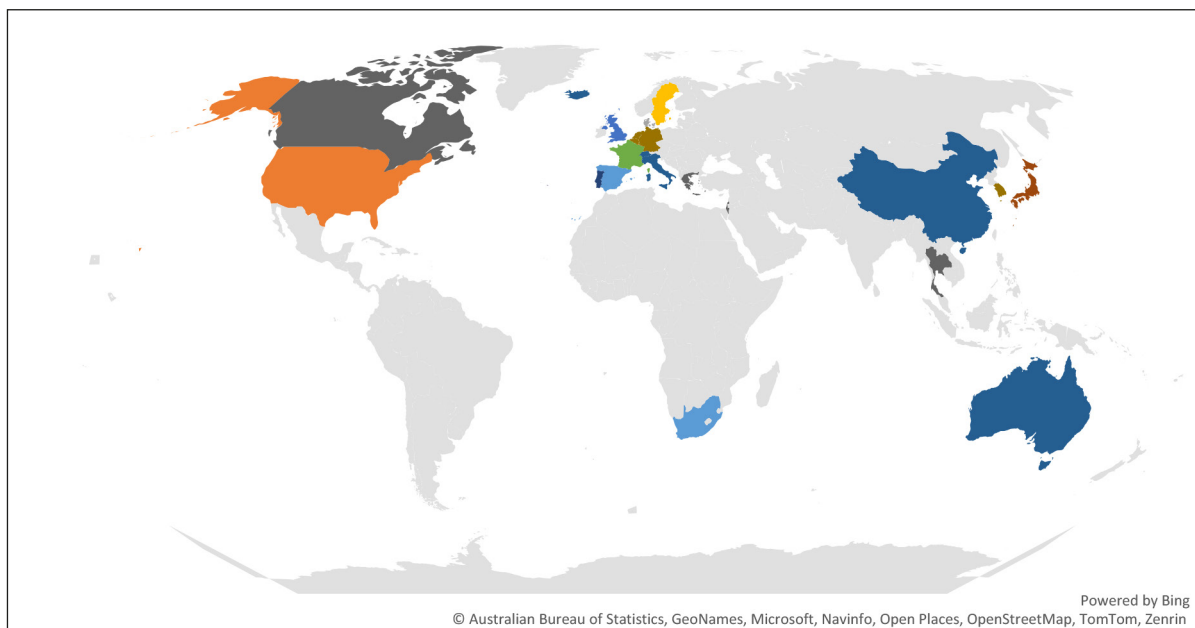
The majority of SARS-CoV-2 BA.2.86 cases have been in the United Kingdom 66 (25.0%). BA.2.86 was first reported on August 14, 2023, as part of healthcare horizon scanning in the UK.



**Figure 2.** The global prevalence of SARS-CoV-2 New Variant BA.2.86 (Pirola).

This is a method for detecting early cases of disease by way of examining a range of materials to identify potential threats or future developments. The UK cases have been in the East of England, London, and Northwest England. Of the 66 total cases in the United Kingdom, 5 people were hospitalized (and 2 have unknown hospitalization status). Among the cases in the UK, the majority (71%) were females and (29.00%) were males<sup>11</sup>. In England, 58% of patients were symptomatic and 42% did not have clinical symptoms. Among

the affected individuals, 88% of them received a booster dose of vaccine<sup>11</sup>. The Omicron variant BA.2.86. is currently classified under variants of concern (VOC) (Table I). This term represents the highest level of interest by the World Health Organization<sup>7</sup>, US Centers for Disease Control and Prevention<sup>8</sup>, the European Centre for Disease Prevention and Control<sup>9</sup>, and about a new or emerging SARS-CoV-2 variant. The three levels from lowest to highest interest include 1) a variant being monitored or variant under monitoring; 2) a



**Figure 3.** The map shows the SARS-CoV-2 New Variant BA.2.86 cases reported from various countries worldwide.

variant of interest; and 3) a variant of concern<sup>7-9</sup>. The clinical characteristics of Omicron variant BA.2.86 infections have not been widely reported but appear to mostly consist of mild symptoms that are similar to those of Omicron. Patients affected by the new variant may have a mild cough, fever, generalized myalgia, malaise, headache, body aches, and fatigue (Table II).

## Discussion

The COVID-19 pandemic has affected a sizable portion of the world's population. As of September 28, 2023, while submitting the revised version of the manuscript, the ongoing pandemic has registered more than 770.56 million confirmed cases and 6.95 million deaths<sup>2</sup>. More recently, a new variant Omicron BA.2.86 has been identified and literature is acutely lacking on this topic. This study investigated the global prevalence and the biological and clinical characteristics of the new Omicron variant BA.2.86.

It has affected 264 people in 23 countries in a brief period of about six weeks. However, the fatality rate of the SARS-CoV-2, the Omicron variant BA.2.86, has not yet been reported<sup>12</sup>. Recent reports<sup>8</sup> highlight that the variant has mutated with over 30 mutations. The most recent report, dated September 28, 2023, revealed that the new variant has spread to 23 countries and has affected 264 people across the globe<sup>12</sup>. The most significant relative incidence has been reported from the United Kingdom (25.0%), USA (12.87%), Denmark (11.74%), Sweden (9.46%), South Africa (7.57%), Spain (7.57%), France (5.68%). However, in other countries including Portugal (2.65%), Japan (2.27%), Canada (1.89%), Thailand (1.89%), Israel (1.89%), Greece (1.89%), Germany (1.13%), Belgium (1.13%), Luxembourg (1.13%), Netherlands 3 (1.13%), South Korea 3 (1.13%) and in Australia, Italy, Iceland, Switzerland, and China, one case in each country has been reported (Figure 2, 3).

The science community and policymakers must understand the linkage of SARS-CoV-2 variants, including Omicron BA.2.86, with weather conditions

**Table II.** Biological and clinical characteristics of SARS-CoV-2 new variant BA.2.86<sup>4,7-12</sup>.

<b>Biological Characteristics</b>	
Variant	SARS-CoV-2 (BA.2.86)
Country of Origination	Denmark and Israel
Total number of cases	264
Number of countries affected	23
Characteristics	Positive-sense single-stranded RNA SARS-CoV-2, Omicron (BA.2.86)
Nickname	Pirola
Mutations	It contains 35 mutations on the spike protein with more than 34 mutations than BA.2 and 36 more than XBB.1.5
Age of affected individuals	Common in old age (more than 60 years old)
Gender	More common in females than male
Sources of Spread	Spread broadly, detected in humans and wastewater samples. International seeding from one or more sources through mass travel.
Seasonal occurrence	August 2023 and later in 2023 (not well established)
<b>Clinical Characteristics: data is still lacking; however, the following clinical features may occur</b>	
Fatigue	+
Body ache	+
Headache	+
Fever	+
Generalized myalgia	+
Malaise	+
Pulmonary characteristics	
Cough	+
Scratchy throat	+
Shortness of breath	May be

[+Mild; ++Moderate; +++Severe].

and seasonal variations. A previous study<sup>15</sup> reported a significantly high incidence of daily cases and deaths in countries with low temperatures. Similarly, the outbreak of this novel variant was observed early at the beginning of the winter season. Considering the relationship between seasonal variation and SARS-CoV-2 cases and deaths, it is important to note that most cases of the new variant SARS-CoV-2 Omicron BA.2.86 are reported from the UK and other countries in which weather is shifting to cold.

The genetic leap of this novel variant is of the same magnitude as the initial Omicron variant and the Delta variant. The literature currently lacks detailed information about the clinical manifestations of SARS-CoV-2 Omicron BA.2.86. However, very few reports published in print media highlight that the clinical manifestations in the SARS-CoV-2 Omicron BA.2.86 variant include a mild degree of fever, cough, shortness of breath, generalized myalgia, malaise, and body fatigue<sup>10</sup>.

Reeve et al 2023<sup>16</sup> investigated an outbreak of the BA.2.86 variant in the East of England. The authors identified that 45 (33 residents, 12 staff), cases of variant BA.2.86. The attack rate among residents was 87%, and 19 (42.22%) were symptomatic, and one was hospitalized. Among the 33 resident cases, 29 (87.87% had been vaccinated four months earlier.

Keeping in view the current epidemiological trends and pathophysiological situation of this novel variant Omicron BA.2.86, it is an emerging challenge to global healthcare and policymakers as well as the public to understand the epidemiological trends, nature of spread, to timely take preventive measures to stop the outbreak of this emerging variant.

### **Study Strengths and Limitations**

This is the first global data-based study added to the literature, which has recorded information from various worldwide sources, international organizations, ministries, PubMed-referenced publications, Web of Science, and international news sources about the global prevalence and the biological and clinical characteristics of the new Omicron variant of SARS-CoV-2. However, a limitation of this study is that only a few brief reports are available on PubMed and Web of Science, and this limited literature cannot support more definite conclusions. Moreover, there are insufficient cases to confidently assess outcome or severity.

### **Conclusions**

In a fleeting period of six weeks, the new variant Omicron BA.2.86 has affected 264 people

in 23 countries around the world. The disease is more common in females than males and preferentially affects older people (more than 60 years of age). The majority of cases are from the United Kingdom. The attack rate among the residents in the United Kingdom was 87%, and 42.22% were symptomatic. However, no deaths have been reported due to the new Omicron. The clinical manifestations in the BA.2.86 Omicron variant are not well reported but, as of today, only mild infections, including headache, body ache, cough, fever, generalized myalgia, and severe fatigue, have been reported. The global health authorities must take preventive measures to stop the outbreak of this emerging variant across the globe to minimize the disease burden.

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### **Conflict of Interest**

The Authors declare that they have no conflict of interests.

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### **Ethical Approval**

In this study, information on the new variant of SARS-CoV-2, BA.2.86 was obtained from various publicly available sources; hence ethical approval was not required.

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### **Informed Consent**

Not required.

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### **Authors' Contribution**

SAM, study concept, manuscript writing and editing. ASM, literature review, data collection and data entry; data analysis, DCK, manuscript checking and editing.

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