



# Present Public Health Concern: Could the Transmission of the JN.1 Variant of COVID-19 Place Bangladesh at Risk of Transmitting the Disease?

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Dear Editor,

Wuhan, in the Chinese province of Hubei, declared the first coronavirus case in December 2019.<sup>1,2</sup> It was first thought to be a pneumonia outbreak as the virus causes severe acute respiratory illness. It is a positive single stranded RNA virus from the family *Coronaviridae* which was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), previously named 2019-nCov.<sup>2</sup> The International Committee on Taxonomy of Viruses (ICTV) announced this designation due to genetic similarities between the coronavirus that caused the 2003 SARS outbreak and the virus was given the name COVID-19 by the World Health Organization (WHO) in 2020.<sup>2</sup>

As of 7 January 2024, over 774 million confirmed cases and over 7 million deaths have been reported globally.<sup>3</sup> Bangladesh reported the first 3 confirmed cases of coronavirus disease (COVID-19) in the country on March 8, 2024. According to the Directorate General of Health Services (DGHS), Bangladesh reported 34 additional COVID-19 instances in a 24-hour period ending on January 26, 2024 and with these new figures, the total COVID-19 cases increased to 2046935 cases.<sup>4</sup> Alpha-, Beta, Gamma-, and Delta coronavirus are the 4 genre of corona virus in which 7 human coronaviruses (HCoVs) have been detected that belong to the Alpha- and Beta coronavirus genera.<sup>5</sup> The latest SARS-COV-2 variant called JN.1 (current “Variant of interest” by WHO) which is an offshoot of the omicron subvariant BA.2.86 (also named as “Pirola”) was detected first in 12 countries in 2023.<sup>6</sup> The United States Centers for Disease Control and Prevention (CDC) showed that JN.1 is one of the fastest growing SARS-CoV-2 strains in the United States with 15 to 29% of new COVID-19 infections which make it responsible for a third of all cases in the north east of US.<sup>7</sup> January 2024, Institute of Epidemiology, Disease Control and Research (IEDCR) announced the first case of COVID-19 sub-variant JN.1 in Bangladesh and is identified in 5 samples from Dhaka city as well as outside of the city.<sup>8</sup> According to the WHO, this variant spreads quickly and may be more contagious among Bangladeshis since JN.1 can evade the immune system, especially in the winter. We can

predict the difficulties that will arise if JN.1 spreads severely based on past experience with the COVID-19 outbreak, such as a lack of medical facilities, weakened immunity from prior vaccinations, failure of antiviral treatment, lack of awareness about personal hygiene, inadequate wastewater surveillance system, and so on. Therefore, we are concerned about the potential obstacles that Bangladesh would encounter in the event of a severe and rapid spread of JN.1.

The SARS-CoV-2 virus is the cause of the acute respiratory condition known as COVID-19. The SARS-CoV-2 virus is classified by the WHO into 2 groups: variants of interest (VOI) and variants of concern (VOC).<sup>9</sup> A novel mutation with predictable phenotypic effects is classified as being in the variants of interest (VOI) category if it is accompanied by at least 1 mutation that results in local transmission, several clusters, or detections in multiple countries, such as JN.1 as VOI, was discovered in the US in September 2023 and the only difference between this variant and the BA.2.86 variant is the inclusion of the L455S protein in the JN.1 variant, which results in a mutation of 1 spike protein.<sup>10</sup> In addition, the JN.1 variation has 24LPP, 69HV, 145Y, 211N (208N in BA.2), and 483V (480V in BA.2) deletions in the spike, 31ERS deletion in the N-protein, 26nt deletion in the 3'-UTR, and 2375SGF loss in ORF1ab (NC\_045512.2). Numerous other JN.1 spike mutations could also be significant (242N=H249N, 261D=A268D, 352T=K360T, 400K=R407K, 442H=P449H, 449W=L456W, 474K=N485K, 480K=A488K, and 566V=A574V).<sup>11</sup> This variation may be able to avoid detection by the immune system due to mutation on 1 spike protein. The transformation of the spike protein into an entirely new threat complicates the ability of neutralizing antibodies to recognize and counteract the spike protein.<sup>12</sup>

The SARS-CoV-2 BA.2.86 lineage (JN.1) is phylogenetically distinct from the other SARS-CoV-2 variants. JN.1's signature mutation is S:L455S and based on the in vitro ACE2 binding experiment, it is known from a case study that the dissociation constant (KD) value of the JN.1 receptor-binding domain (RBD) is significantly higher also the pseudo virus experiment revealed that JN.1 has a noticeably increased



infectivity and these findings simplify that JN.1 is the most immune-evading variation discovered to date.<sup>13</sup>

During dry season, because of the inadequate water surveillance system, the JN.1 subvariant might spread rapidly across Bangladesh in January to March 2024. After testing 885 samples for JN.1, the infection rate of COVID-19 in Bangladesh increased to 3.80% from below 1% for the first time.<sup>8</sup> The transmission pathway of JN.1 is quite similar as the previous variants of coronavirus as it is highly contagious and can transmit from human, surface, or any equipment that has the presence of the virus. Also, there is evidence of the presence of coronavirus and its variants in wastewater as it can be excreted through urine and the levels are rising in the US.<sup>14</sup> In Dhaka, there is just 1 wastewater treatment plant (WWTP) that provides services to around 5 million people, or 20% of the city's population. In Dhaka, 97% of fecal waste enters the environment untreated. This raises the possibility of JN.1 spreading as well.

Similar to other variants of the coronavirus, JN.1 infection is characterized by symptoms that resemble those of the common cold, such as headache, sore throat, loss of appetite, loss of smell, fatigue, chest discomfort, gastrointestinal irritation, severe diarrhea, and confusion.<sup>1,6</sup> WHO ended the federal declaration of COVID-19 as the public health emergency on May 11, 2023.<sup>9</sup> This has significantly reduced public awareness about personal hygiene like wearing masks, using hand sanitizers and so on which increase the risk of COVID-19 spreading rapidly. Creating public awareness is 1 the major challenges to combat spreading of JN.1 variant.

150922912 persons nationwide have gotten their first dose of the COVID-19 immunization to date, according to DGHS data. Additionally, the second dose was given to 142193342 individuals. As a result, almost 1 crore individuals still remain without the second dose of immunization. 68558826 individuals took the third dose and 5052350 took the fourth. Five to six lacs people are yet to receive a single dose of the vaccine, in the meantime.<sup>15</sup> Though the SARS-CoV-2 variants used in the earlier vaccinations were substantially different from the version currently in circulating JN.1, people will not gain much protection from COVID-19 if he is relying on the vaccination, he had over a year ago because of the fact that one's immunity from vaccination or illness tends to decline over time.<sup>14</sup>

Antiviral medication-based treatment approaches present yet another difficult obstacle. While some antiviral medications have been shown to be useful in reducing the severity of illness and the need for hospitalization, they are not a guaranteed method of curing the infection and are often associated with several adverse effects that must be managed concurrently.<sup>16</sup>

Another major challenge is the lacking of medical facilities. People in the nation who had previously experienced the COVID-19 pandemic suffered primarily from a shortage of medical services. To address any unfavorable circumstance, hospitals from Dhaka to the district level and those at the

Upazila level must have an adequate supply of oxygen, high flow nebulizers, ICU beds, and ventilation equipment. Our prior hospital experiences during the COVID-19 surge were unsatisfactory. At global level 1966 new intensive care unit admission was reported till 7 January 2024. In global perspective, sufficient intensive care unit would be a great challenge in Bangladesh if JN.1 keeps dominating.<sup>17</sup>

Bangladesh, being classified as a developing nation, faces significant obstacles in effectively managing any potential outbreaks owing to its inadequate healthcare infrastructure. As a result of the overburdened public health system, inadequate medical facilities, and lack of medical supplies in Bangladesh, COVID-19 patients may not receive the necessary care. A report published in 2020 indicates that amidst the COVID-19 pandemic, Bangladesh allocated a relatively small quantity of less than 2000 ventilators for its 165 million inhabitants. It was estimated that there was 1 ventilator for every 93273 individuals in Bangladesh during the height of COVID-19 infection.<sup>18</sup> Evidently, Bangladesh is severely lacking in intensive care units equipped with ventilators and other medical supplies. Lack of oxygen shortfall and supplying equipment to public and private healthcare facilities nationwide would create a challenge if JN.1 spreads severely. In Bangladesh, the fatal coronavirus is being fought against a shortfall of some 50000 doctors, nurses, medical technicians, ward boys, and health professionals.<sup>19</sup> Besides, when it comes to the ratio of doctors to patients, Bangladesh is the nation in South Asia that is second from the bottom. According to the WHO, Bangladesh has just 5.25 doctors for per 10000 people. A shortage of doctors can arise at times of patient care and counseling if JN.1 continues to spread quickly.<sup>20</sup>

The spike protein of JN.1 carries about thirty mutations that were inherited also it picked up a new mutation (L455S), which makes it even harder for antibodies—a component of the immune system's defense mechanism—to attach to the virus and stop infection. Additionally, the COVID-19 infection causes the induction of certain pro-inflammatory cytokines such as TNF, IL-1 $\beta$ , and IL-6 as well as a number of chemokines (CCL20, CXCL1, CXCL2, CXCL3, CXCL5, CXCL6, and CXCL16).<sup>2</sup> Hence, innate immunity could play a role to prevent the infection. Some people have not received any doses of vaccination yet so herd immunity could play a crucial role if JN.1 spreads severely also public awareness should be raised again about social distancing and other personal hygiene. Our anticipation is that, hospital facilities should be improved and investigation should be conducted whether the facilities, which were provided during the first wave of corona virus, are still validated. Adjuvant therapy of antivirals and vaccination could be another important method to fight against JN.1 if it spreads severely. Moreover, awareness about the diseases should be raised among the people so that they feel encouraged to find out whether they are infected and this will also help to anticipate the actual severity of JN.1 infection.

Bangladesh has a high population density and an inadequate water surveillance system, which raises the possibility of the JN.1 form spreading quickly. Bangladesh may encounter difficulties as a result of its inadequate medical infrastructure and shortage of professionals. In order to lower the risk of harm caused by the JN.1 variation, an updated vaccination therapy may also be helpful in addition to adjuvant antiviral therapy. Programs to raise social awareness can be extremely important in halting the spread of the novel coronavirus strain JN.1. If not, Bangladesh might have to deal with a ridiculous situation once more.

### Author contributions

ATN and CIN conceptualized and wrote the manuscript draft. ID revised the manuscript. SMRD conceptualized, revised the manuscript, and supervised the project. All the authors agreed to submit the manuscript in its current form.

### Data availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

### Ethic statement

Not applicable.

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