

Estimation of COVID-19 Prevalence in a Tertiary Care Hospital in Bangladesh & Impact of COVID-19 Vaccine

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Abstract: The corona virus disease-2019 (COVID-19), also known as the corona pandemic, is an ongoing public health emergency caused by coronavirus 2019 (COVID-19), which is spread by the transmission of coronavirus-2, which causes severe acute respiratory syndrome. The first incidence of COVID-19 in Bangladesh was reported on March 7, 2020. There were 450,273,828 diagnoses worldwide as of March 9, 2022, with 1,948,471 in Bangladesh. To better understand the current state of COVID-19 in Brahmanbaria, a retrospective study was done at Brahmanbaria Medical College with COVID-19-suspected patients. Methods: A total of 600 oropharyngeal and nasopharyngeal swab samples were taken from COVID-19 suspected person, as well as the appropriate proceedings were identified using a reverse transcriptase–polymerase chain reaction assay. We found 193 (32%) of positive cases that represent similarity with national. Among 193 positive cases which 127 (66%) was male that is greater amount from female. Out of 193 positive cases 114 were symptomatic that is 59% and 79 were asymptomatic which is 41%. Asymptomatic infection is more frightening because it is difficult to identify patients. And Odds ratio is 0.9, it indicates a protective effect of vaccination against COVID-19. That reduced risk is 1-odds so will be 10 percent reduced risk of exposure.

Keywords: COVID-19, NP, OP, Odds Ratio, RT-PCR

1. Introduction

SARS-CoV-2, which was initially detected in Wuhan, China, causes Coronavirus Disease 2019 (COVID-19), a severe acute respiratory syndrome. This pandemic has rapidly expanded over the United States, Spain, Italy, and more than 70 other nations [1, 2]. SARS-CoV-2 can cause pneumonia and lung failure. COVID-19 has been linked to around 2,800,000 verified cases and 190,000 deaths worldwide as of April 25, 2020 [3]. Nearly two million people have been identified as confirmed cases of Corona Virus disease in 185 countries around the world in less than 5 months since the virus first emerged in December 2019. (SARS-CoV-2) [4]. On March 7, 2020, Bangladesh,

announced the first COVID-19 case, and by April 13, 2020, the nation had registered 803 incidents of COVID-19, with 39 deaths [5, 6] up to 9 march 2022 total number of cases 450,273,828 diagnoses in world 1,948,471 in Bangladesh. Bangladesh reported December 11 first case of Omicron variant [7] where the infection rate is too high The number of new cases increased the most in the Eastern Mediterranean Region (39%) followed by the South-East Asia Region (36%) and the European Region (13%) [8]. our study period of 15th December-2022 to 15th January-2022 when infecting rate was so high. The coronaviruses are really not new viruses; they were initially discovered in 1966 by Tyrell and Bynoe, who isolated them from persons who were suffering from common colds. Coronaviruses are enclosed, single-stranded,

positive RNA viruses that infect a variety of animals, especially humans, and cause respiratory and gastrointestinal illnesses [8]. Asymptomatic cases refer to people who can be tested positive for the coronavirus but develop limited or no symptoms such as fever, cough, or sore throat, noting that they are infectious and pose a risk of spreading to others. Mounting evidence suggests that there is an undetected pool of covert asymptomatic cases [9, 10]. The aim of our study identifying the positive rate among the suspected people for the awareness the community, symptomatic and asymptomatic infection to be established and also find out the effectiveness of COVID-19 vaccine.

2. Materials and Methods

A cross-sectional study was carried out in the Department of Microbiology, Molecular laboratory of Brahmanbaria Medical college, Bangladesh over the period of 15th

December-2021 to 15th January-2022. This lab is a well recognized and governmentally approved only PCR Laboratory in Brahmanbaria District under the Chittagong division which has the BSL-2 facility with the minimum requirement to do RT-PCR.

A total of 600 oropharyngeal and nasopharyngeal swab samples were collected from the suspected person of COVID-19 patients and transported aseptically to the experimental laboratory by following thermostable conditions for analyzing the RT-PCR status. Most of the person gives their sample after first week of the infection.

The AccuPower® COVID-19 Multiplex Real-Time RT-PCR Kit, which is specifically designed for use with the ExiStation™16 system for sample extraction and the AccuPower® SARS-CoV-2 Multiplex Real-Time RT-PCR Kit, which covers both the Pan-arbovirus gene and the SARS-CoV-2 gene, are described in this study [11].

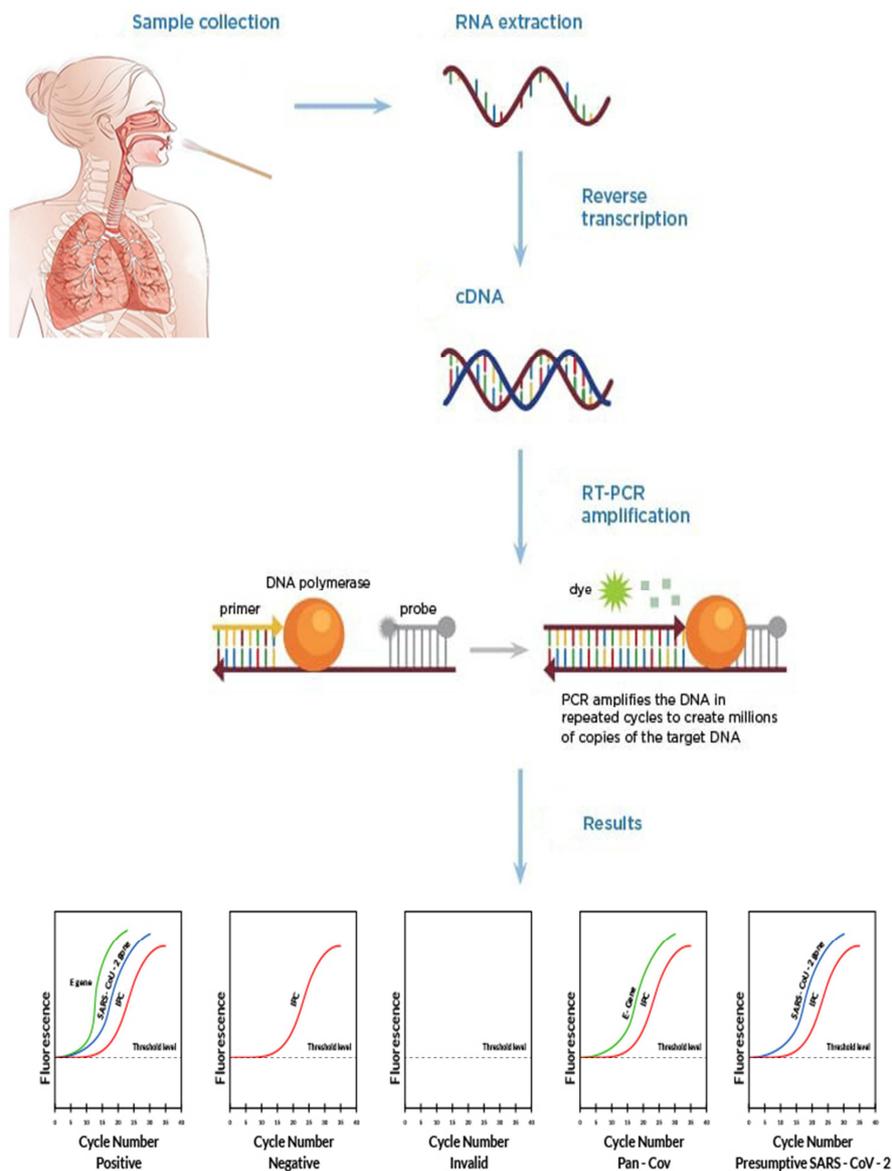


Figure 1. Sample collection, polymerase chain reaction performing and result analysis.

Real-time RT-PCR Method:

(1). RNA Extraction Method

The separation and purification of RNA from biological materials is known as RNA extraction. The procedure is considered as complicated due to the ubiquitous presence of ribonuclease enzymes in cells and tissues which can rapidly degrade RNA. Generally successful nucleic acid purification required four important steps which are 1. Effective disruption of cell or tissue, 2. denaturation of nucleoprotein complex, 3. inactivation of nucleases, for example, RNase for RNA extraction and DNase for DNA extraction; 4. avoiding contamination [12].

To extract RNA, MagListo™ 5M Viral DNA/RNA Extraction Kit (BIONEER) was used according to its protocol. According to the manual alkaline lysis method was applied with Magnetic Nano-beads to efficiently minimize the isolation time. This product can separate comprehensive types of SARS-CoV-2 viral RNA from sputum, Nasopharyngeal (NP), and Oropharyngeal (OP) swab. Lysis & Precipitation, Binding, Washing & Elution all steps were performed as per instructions to isolate purified RNA.

(2). Use of PCR –Kit

AccuPower SARS-CoV-2 Multiplex Real-Time RT-PCR kit (BIONEER) is an in vitro diagnostic kit. This kit is used to diagnose COVID-19 infections which is designed to detect E-gene & SARS-C0V-2 from a COVID-19 suspected patient’s sample such as nasopharyngeal swab and oropharyngeal swab through Real-Time Polymerase Reaction (PCR) [13].

(3). Reporting

After completion of PCR cycle if the Ct value of E-gene ≤ 35 and the SARS-C0V-2 gene ≤ 34 then it’s considered as positive and if the Ct value of E-gene <35 and the SARS-C0V-2 gene is <34, it is determined as Negative. If IPC shows its Ct value within the specified range < 33 It is valid [14].

3. Result

Total 600 samples of Nasopharyngeal (NP) and Oropharyngeal (OP) specimens were taken from the suspected person and we found 193 positive that was 32% and 68% was negative (figure 2). Within 193 positive cases 127 was male that is 66% and 66 were female which is 34% (figure 3). Out of 193 positive cases 114 were symptomatic that is 59% and 79 were asymptomatic which is 41% (figure 4).

Table 1. Comparison of COVID-19 infection with vaccination.

	Disease	Not-disease	Total
Vaccinated	147	318	465
Not-vaccinated	46	89	135
	193	407	600

Use the information in the marginal table to find the OR (using the OR formula from above):

$$OR = (a/c) / (b/d) = (147/46) / (318/89) = 3.2 / 3.6 = 0.9.$$

(Source: [15])

If the Odds ratio is 0.9 then it indicates a protective effect. That reduced risk is 1-odds so will be 10 percent reduced risk of exposure.

Sex	Frequency	Positive	Negative
Male	434	127	307
Female	166	66	100
Total	600	193	407

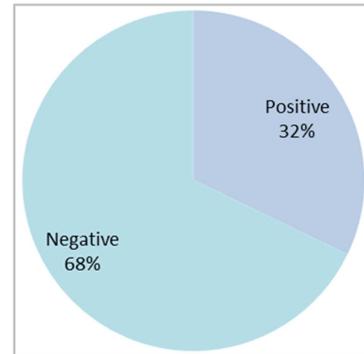


Figure 2. Figure showing on table 600 (434 male & 166 female) suspected person sample test done by RT-PCR and result positive 193, negative 407. Pie chart the percentage of positive and negative.

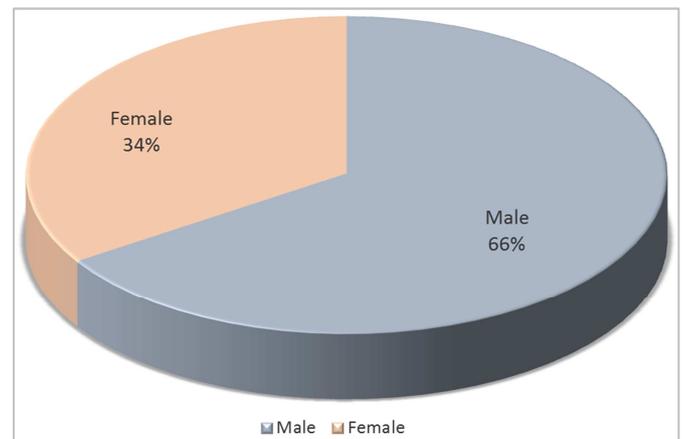


Figure 3. Figure showing on pie chart the percentage of total number of SARS-CoV-2 patients among the male & female.

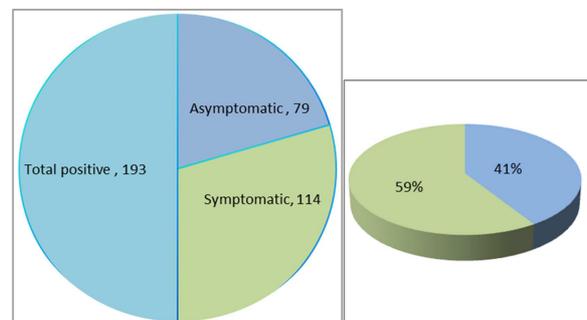


Figure 4. Pie chart showing the total number of positive cases and symptomatic and asymptomatic number of cases also show the percentage symptomatic and asymptomatic.

4. Discussion

Within 600 Nasopharyngeal (NP) and Oropharyngeal (OP) specimens were taken from the suspected person and our founding 193 positive that was 32% and 68% was negative. Out of 193 positive cases 127 were male that is 66% and 66 were female which 34% is. Out of 193 positive cases 114 were symptomatic that is 59% and 79 were asymptomatic which is 41%. Our previous study was conducted in the same place within 752 NP and OP specimens were taken in this study period from suspected patients, among which 218 (28.5%) was positive and 528 (71.5%) was negative. Among the 218 positive 158 (78.8%) male and 56 (26.2%) female [16]. Another study was conducted in Brahmanbaria medical college 2021 our samples were 2025, about 1145 (56.54%) cases were found positive. Among the positive cases, 59% were symptomatic, and 41% were asymptomatic. Out of the total confirmed cases, 487 (42.53%) were male & 658 were (56.54)% female [17]. Asymptomatic persons seem to account for approximately 40% to 45% of SARS-CoV-2 infections [18]. This estimate is puzzling, given that the actual proportions of asymptomatic people among those tested on these dates were 56.7 percent, 54.3 percent, 70.7 percent, 73.9 percent, 86.1 percent, and 46.2 percent. According to a second news report [18], one of the study's coauthors projected that "40 percent of the general population may be infected with SARS-CoV-2 without presenting any symptoms [19]. Sah et al estimated that 35.1 percent of infections never produced clinical symptoms, and hence were genuinely asymptomatic, based on an analysis of over 350 research (95 percent CI: 30.7 to 39.9 percent). 42.8 percent of patients had no symptoms at the time of testing (95 percent prediction interval: 5.2 to 91.1 percent), which included both asymptomatic and pre-symptomatic infections. Asymptomaticity was much lower in the elderly, at 19.7% (95 percent CI: 12.7 to 29.4%), compared to 46.7 percent in children (95 percent CI: 32.0 to 62.0 percent). In comparison to instances with no underlying medical issues, we discovered that those with comorbidities had considerably reduced asymptomaticity [20]. A. Kronbichler et al. found 506 individuals with an asymptomatic course in 34 investigations (68 single cases and 438 from case series). Normal radiology patients were younger (19.59 17.17 years) than abnormal radiology patients (39.14 26.70 years) (p-value = 0.013). Despite the fact that the patients were asymptomatic, CT examinations indicated abnormalities in 62.2 percent of the cases; ground-glass opacities were the most common finding (43.09 percent by meta-analysis). The majority of studies found normal laboratory results (61.74 percent by meta-analysis) [21]. A 10% improvement in vaccination coverage was associated with 8% reduction in incidence [22].

5. Conclusions

COVID-19 infected people can have a variety of symptoms. According to the Centers for Disease Control

(CDC), symptoms can emerge two to fourteen days after exposure. According to the CDC, the most frequent symptoms include fever, coughing, and difficulty breathing.

A person who is asymptomatic shows no evidence that the disease is present in their body. According to the CDC, 35% of COVID-19 cases are asymptomatic. People who are asymptomatic are unaware that they are infected. Others have no way of knowing either.

COVID-19 is contagious and can easily spread to others, regardless of how it manifests. The risk of an asymptomatic person infecting others is identical to that of a sick person. Being well-informed on the infection and how the virus spreads is the best way to prevent and slow down transmission. Stay at least 1 meter apart from people, wear a properly fitted mask, and wash your hands or use an alcohol-based rub frequently to protect yourself and others from infection. When it's turn, get vaccinated and follow the instructions in our local guidance. Getting vaccinated could save our life. COVID-19 vaccines provide strong protection against serious illness, hospitalization and death.

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