Original Article

Demographic Profile of COVID-19 Cases: Laboratory Experience in a Tertiary Care Hospital of Dhaka City

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Abstract:

Background: COVID-19 pandemic becomes a great threat due to continuous rise of the global incidence and emergence of multiple waves of infections in many countries of the world. The diversity of this infection varies from country to country and knowledge regarding demographic characteristics of this infection is essential to combat the pandemic situation.

Objective: The aim of this study was to characterize the demographic profile of rRT-PCR (real time reverse transcriptase-polymerase chain reaction) confirmed COVID-19 cases and to provide a timeline regarding rates of infection.

Materials and methods: This cross- sectional study was conducted at the Department of Virology of Sir Salimullah Medical College, Dhaka, Bangladesh from May, 2020 to April, 2021. rRT-PCR test was performed to detect SARS-COV2 in 35001 clinical samples and their demographic characteristics were analyzed.

Results: Out of 35001 suspected cases,5008 (14.3%) were tested positive of which 58.0% belongs to the age group between 18–45 years.The majority of the cases were male (69.0%). Most of the positive cases became negative (85.0%) within three weeks of infection by rRT-PCR test. The highest percentage (29.2%) of confirmed COVID-19 cases was reported in the month of May 2020, then gradual decrease in the subsequent months followed by a sharp rise to 27.2% in the month of March, 2021.

Conclusion: This study shows an overall 14.3% positivity among suspected COVID-19 cases where adult males between 18-45 years are more commonly suffered. However, most of the infected persons become rRT-PCR negative within three weeks' time. A second surge of SARS-COV2 infection has been documented in this study that coincided with second wave of COVID-19 in Bangladesh.

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Introduction:
A cluster of atypical pneumonia of unknown etiology had been reported in the city of Wuhan, China in late December of 2019 that later on epidemiologically linked to a seafood and wet animal wholesale market[1,2]. Through genome sequencing, Chinese scientists identified a novel corona virus as the cause of this outbreak which was a single-stranded, enveloped, positive sense RNA virus having crown like spikes on the surface. The International Committee on Taxonomy of Viruses (ICTV) designated the name of this new coronavirus as "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" on February 11, 2020 as it was genetically related to other beta-corona viruses like severe acute respiratory syndrome (SARS) virus and middle east respiratory syndrome (MERS) virus which emerged in 2002 (China) and 2012 (Saudi Arabia) respectively[1,3]. On the same date the World Health Organization (WHO) named the disease as COVID-19 (corona virus disease 2019) and announced it as pandemic in March 11, 2020 due to increases number of COVID-19 cases and fatalities across the world[3]. The virus spread globally so rapidly that about 221 countries (by 20th September, 2021) have already been facing its grave consequences[4]. As of 20th September 2021, 221 countries, including Bangladesh have confirmed more than 228.21 million COVID-19 cases and 4.68 million deaths globally[5].In Bangladesh, the first three confirmed cases of COVID-19 were reported on 8th march, 2020 by the Institute of Epidemiology, Disease Control and Research (IEDCR)[6,7]. Almost every country of the world had adopted aggressive therapeutic and non-therapeutic measures to control the spread of COVID-19. The Government of Bangladesh also followed the similar trend of preventive strategies such as nationwide lockdown, wearing face mask, social distancing, contact tracing, monitoring, quarantine, isolation and vaccination[6,8,9]. Despite of these measures,COVID-19 cases have spread to all 64 districts of Bangladesh[6]. The situation became more challenging due to noncompliance of people toward the universal protective measures, emergence of mutant variants of SARS-CoV-2and a second wave strike of COVID-19 in Bangladesh[9,10,11]. In Bangladesh, by 20th September, 2021, about 1,542,683 confirmed COVID-19 cases with 27, 225 deaths were reported[5].

To combat this pandemic situation, a reliable, organized demographic data is essential to evaluate the situation and to take necessary strategies for control and prevention of COVID-19. The aim of this study was to evaluate one-year demographic data of confirmed COVID-19 cases by RT- PCR in a tertiary care hospital of Dhaka city and to provide a timeline about the rate of infection.

Materials and methods:
Study place: This cross-sectional study was conducted at the Department of Virology, Sir Salimullah Medical College, Dhaka, Bangladesh.

Sample size and period: A total of 35001 samples from the suspected COVID-19 cases were tested in the PCR laboratory between May 2020 to April 2021.

Sample Collection: Nasopharyngeal swabs of suspected COVID-19 patients attending in the Flu corner of Sir Salimullah Medical College Hospital were collected in the designated sample collection area following WHO guideline. Samples were collected in a previously supplied properly identified screw capped tubes containing storage media. After collection, each screw capped tube containing sample was placed within a plastic zippered bag, placed them within an ice bag and transported to the PCR laboratory of Department of Virology. Demographic data of the patients were recorded in a predesigned data collection sheet at the time of sample collection and also submitted to the PCR laboratory along with the samples.

RNA extraction and rRT-PCR reaction: In the laboratory rRT-PCR (Real time Reverse transcriptase PCR) was done by Sansure Biotech Novel Coronavirus (2019-nCoV) Nucleic Acid Diagnostic Kit (SanSure Biotech, China). At first the Viral RNA was extracted from the patient's specimens using a SanSure Biotech sample release reagent (SanSure Biotech, China) as per instructions of manufacturer. To make a final reaction volume of 50 μL, at first 20 μL lysed sample was added in 0.2 mL PCR tube. Then 30 μL of master mix was added which consists of 26 μL PCR mix and 4 μL Enzyme mix (RT Enzyme and Taq polymerase enzyme).PCR amplification was done using QuantStudio TM 5 (Applied Biosystem, USA) thermocycler. The end-point PCR

result was analyzed using the software design for QuantStudioTM 5 real-time PCR system. The result was interpreted by detection of fluorescence curve for either or both of the N and ORF1ab genes of SARS-CoV-2. Samples were considered positive through detection of any significant target gene curve within a defined ct value (ct<40) along with internal control. The test included human RNA gene as an internal control. In every PCR run both positive control and negative controls were used as quality control.

Data analysis: All data, including age, gender, and residence and PCR test results were recorded in a Microsoft Excel spreadsheet. No imputation was made for missing data. All data were analyzed by using Excel Software 2016 and Microsoft word. Descriptive analyses of all relevant variables were done using appropriate statistical methods.

Results:

Out of 35001 samples, 5008 (14.3%) were tested positive and 29993 (85.7%) were tested negative for SARS Cov-2 (figure-1)**.** Among the positive cases 61.0% were male and 39.0% were female (table-I). Most of the positive cases belong to age group 18-45 years (58%) followed by 35% and 7% for the age group over 45 years and below 18 years respectively (table-II). Among 961 rRT-PCR confirmed follow-up cases, 816 (84.9%) were tested negative within 3 weeks from the first positive result followed by 11.1% cases after 3 weeks and 3.9 % cases after 4 weeks (figure-3).The highest percentage (29.2%) of confirmed COVID-19 cases was observed in the month of May 2020, then gradual decrease in the number with a sharp rise to 27.2% in the month of March, 2021 (figure-2).
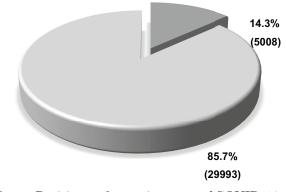

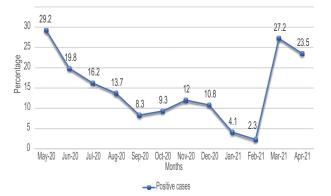**Fig.-1:** *Positive and negative cases of COVID-19.*

14.3% (5008)

85.7% (29993)

Fig.-2: *Distribution of the percentage of confirmed cases of COVID-19 per month from May, 2020 to April 2021.*

Time intervals of COVID19 positive follow up case (n=961) that tested as negative by rRT-PCR

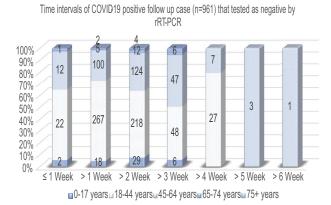0-17 years   18-44 years   45-64 years   65-74 years   75+ years

Fig.-3: *Distribution of the number and cumulative percentage of the COVID-19 cases in different age group according to the time interval of positive case that tested negative by rRT-PCR. Follow up rRT-PCR test report of 961 cases were found. Among them 37 cases were tested negative within d" 1 week, 392 cases after one week, 387 cases after 2 weeks, 107 cases after 3 weeks, 34 cases after 4 weeks, 3 cases after 5 weeks and one case was tested negative after 6 weeks.*

Table-I
Gender distribution of COVID-19 cases by rRT-PCR

Covid 19 cases	Gender	
	Male	Female
	n (%)	n (%)
Positive cases, N=5008	3057 (61.0)	1951 (39.0)
Negative cases, N=29993	17311 (57.7)	12682 (42.3)
Total cases, N= 35001	20368 (58.2)	14633 (41.8)

Table II
Distribution of COVID-19 cases according to different age groups

Age groups in year	Covid 19 cases by rRT-PCR N= 35001		Total cases
	Positive cases N=5008	Negative cases N=29993	
<18, n (%)	350 (7.0)	2554 (8.5)	2904 (8.3)
18-45, n(%)	2909 (58.0)	17543 (58.5)	20452(58.4)
>45, n(%)	1749 (35.0)	9896 (33.0)	11645(33.3)

Discussion:

SARS-CoV-2, the causative agents of COVID-19 pandemic is one of the most virulent pathogens causing severe acute respiratory illness in humans[12]. Initial case studies of China demonstrated 81% of mild cases, 14% of severe respiratory distress and 5% of critical cases of COVID-19 with a case fatality rate of 2.4 %[12] .This study revealed 14.3% infection rate of COVID-19 which was almost near to the overall infection rate (16.3%) of COVID-19 in Bangladesh[13]. The highest infection rate (58.0%) was observed among the young adults of 18–45 years old followed by adults of more than 45 years group (35%).The lowest infection rate (7.0%) was recorded among child and adolescence below18 years old. Almost similar findings of highest percentage (51.8%) of SARS-CoV-2 infected patients in the age group of 20–40 years old and lower infection rate in the younger people were also reported in another study of Bangladesh[10]. The higher risk of being infected with COVID-19 in young adults and middle-aged people may be due to the fact that most of them are in the working-class group and probably have high chance of exposure to circulating virus during outside activities and reluctant to compliance health safety[10,14]. This study also showed the male (61%) predominance in infection over their female counter-part (39%). Other studies[1,6,10,14,15]also revealed the similar findings of male dominance in COVID-19 which may be due to social and cultural dogmatism such as gender disparities in testing, women's shyness and active male population who are relatively more prone to exposure than women[10,14]. We observed almost equal male- female (0.97:1) ratio of confirmed COVID-19 cases below the age group of 18 years but higher male-female ratio (1.6: 1) above 18 years old cases which may be due to more active male population particularly in terms of jobs outside the home than the female[14].In a population based matched cohort study of 152,637 women also revealed that female sex hormone might have effect with low rate of infection and less severity of SARS-COV2 among women[16]. This could explain the role of female hormone estrogen among adult women and the less predominance of female infection in this study. Among 961 rRT-PCR confirmed follow-up COVID-19 cases, 816 (84.9%) were tested negative within 3 weeks from the first positive result followed by 11.1% cases after 3 weeks and 3.9 % cases after 4 weeks. Moreover rate of viral clearance within 3 weeks was highest among the age 0-17 years (89%) than other age groups. A study from India reported 18 days as median time required for RT-PCR negativity of COVID-19 from the first positive report[17]. Among the COVID-19 cases who required longer duration (>3 weeks) to become RT-PCR negative, 60.7% were male and 51.7% belongs to the age group of 18-44 years. Highest percentage (29.2%) of positive cases was observed during the initial month of May 2020 then there was a gradual decrease of COVID-19 cases to 8.3% by September 2020 and slightly increased from October 2020 to December 2020. We observed lowest percentage of cases from January 2021 (4.1%) to February 2021 (2.3%) and then there was a sharp rise in the cases of COVID-19 during March 2021 which corresponds to the second wave of COVID-19 in Bangladesh. A study from Bangladesh also reported lowest infection rate (below 5%) during mid-January to first week of March, 2021 and then increased number of infections and deaths that suggested the start of the second wave of COVID-19 in Bangladesh[18]. The limitation of this study was that only demographic data of COVID-19 confirmed cases by RT-PCR were analyzed irrespective of their sign, symptoms, co-morbidity and outcomes of the cases.

Conclusion:

SARS COV2 infection imposed a major threat to human health across the world. Evaluation of demographic data with pattern and course of infection is important in designing screening and prevention protocol to control infection. This study revealed 14.3% infection rate with male predominance. However most of the cases became

negative by the 3rd week of initial positive test. Although the seasonal variations in the course of infection was not delineated in this study however a second surge of infectivity has been documented almost a year after the first detected case which may indicate second wave of SARS COV2 infection.

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