



Complication Severity and Its Association with the Treatment Management of COVID-19 Patients in Bangladesh: A Cross-Sectional Study

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ABSTRACT

In an unprecedented way, COVID-19 patients in Bangladesh have suffered greatly due to the severity of the complications. Additionally, treatment management was also a grave concerning issue. This study explored the extent of COVID-19 complications associated with the pattern of COVID-19 Prevention and Treatment Management in the context of Bangladesh. This cross-sectional study included 659 COVID-19-positive patients aged 18 and up who were treated at home or in hospitals and lived in Dhaka city From April to September 2021. The results showed that 20.5% had a mild COVID-19 infection. Family income, the number of co-morbidities, and the location of therapy were found to have a substantial impact on recovery time. In addition, there were high correlations between age, the number of co-morbidities, level of education, and the place of treatment with the severity of Covid-19 infection. The government should place a greater emphasis on training and resources to ensure efficient hospital management and widespread public knowledge as a precaution for further phenomena like COVID-19.

Keywords: COVID-19, Complications, COVID-19 Patients, Management, Bangladesh

1. Introduction

SARS-CoV-2, a new coronavirus, was initially discovered in Wuhan, Hubei Province, China, in December 2019 (1). The new virus is related to the

coronaviruses that cause Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS), although it is distinct in its own right (2). According to WHO, older adults, as well as individuals with underlying medical disorders, are more likely to

acquire severe COVID-19 disease (3). Patients with weak immune systems are often considered to be more at risk (4). The most prevalent means of human-to-human transmission are assumed to include direct touch, inhaled droplets, and fomites from an infected individual (1). The virus invades the upper respiratory system through the mucosa and finally damages the lungs (5). The SARS-CoV-2 infection has been linked to a range of mild to severe clinical manifestations (6). Fever, dry cough, diarrhea, shortness of breath, vomiting, stomach discomfort, generalized myalgia, headache, malaise, and bilateral interstitial pneumonia are the most common symptoms of COVID-19 (7).

The current COVID-19 outbreak has exacerbated social stigma and discrimination against people who have come into contact with the virus. Although COVID-19 is primarily a respiratory virus, it affects many tissues, some of which are distal to the respiratory system. COVID-19 may be asymptomatic with the ability to transmit the virus, and some are indistinguishable from regular flu. The current method for limiting the spread of instances is to take preventive measures & to stop COVID-19 from spreading further, early screening, diagnosis, isolation, and treatment are required (8). Face masks are suggested by the European Centers for Disease Control (ECDC) to prevent COVID-19 transmission from possibly asymptomatic or pre-symptomatic patients (9). The purpose of social distancing is to decrease contact between people in a greater community where individuals may be contagious but haven't been detected and hence haven't been separated (10). Patients should wash their hands for 20 seconds with soap and water or use an alcohol rub, work from home, stand 2 meters away from people, avoid contact with their nose, eyes, and mouth, and avoid unnecessary travel (11). According to studies and leading health organizations, individuals must practice strict hand-washing and respiratory hygiene to prevent the spread of respiratory viruses, particularly COVID-19 (12). Maintaining communication with friends, relatives, and neighbors through telephone chats or using online contact platforms can be helpful in decreasing the effects of community isolation (13).

COVID-19 patients are affected initially with symptoms like fever, dry cough, sneezing, etc. Among all the early symptoms fever is the most prevalent, which was reported in 88 among 100 of COVID-19 patients in Chinese research (14). Some develop mild symptoms, while others develop severe complications such as respiratory distress

and pneumonia, which lead to death. Around 20% COVID-19 patients need hospital admission who receives therapies ranging from oxygen to ventilator support. People with diabetes, according to existing research, are not more susceptible to SARS-CoV-2 infection (15). In the current COVID-19 epidemic, Zhang et al. consider cancer patients to be particularly vulnerable (16). One of the most major disorders in chronic COVID-19 patients is hypertension (high blood pressure) (14). Cheng et al. investigated the prevalence of renal disease (RD) in COVID-19 patients and the relationship between indications of impaired kidney function and death (Cheng Y., 2020). The main connections with severe disease in patients significantly impacted by COVID-19 were hypertension, diabetes, coronary artery disease, and cerebrovascular disease (15). One-fifth to half of COVID-19 flu patients had diabetes, depending on the global territory, highlighting the association between COVID-19 and diabetes (17). Yang et al. discovered that one-fourth of the 32 non-survivors from a cohort of 52 COVID-19 patients had diabetes (18). The presence of more than one co-morbidity and obesity among adult individuals also predicts a lower prognosis among COVID-19 patients (19).

Moreover, maintaining social distancing, wearing mask, maintaining etiquette during sneezing, self-quarantine at home or institutional isolation are the recommended ways to manage mild or moderate cases, though there is a lack of practice of the guidelines. This study aimed to determine the pattern of COVID-19 management and prevention in hospital and home settings in urban Bangladesh. The purpose of this study is to explore the fact what extent COVID-19 complications are related to the pattern of COVID-19 Prevention and Treatment Management.

2. Methods and Materials

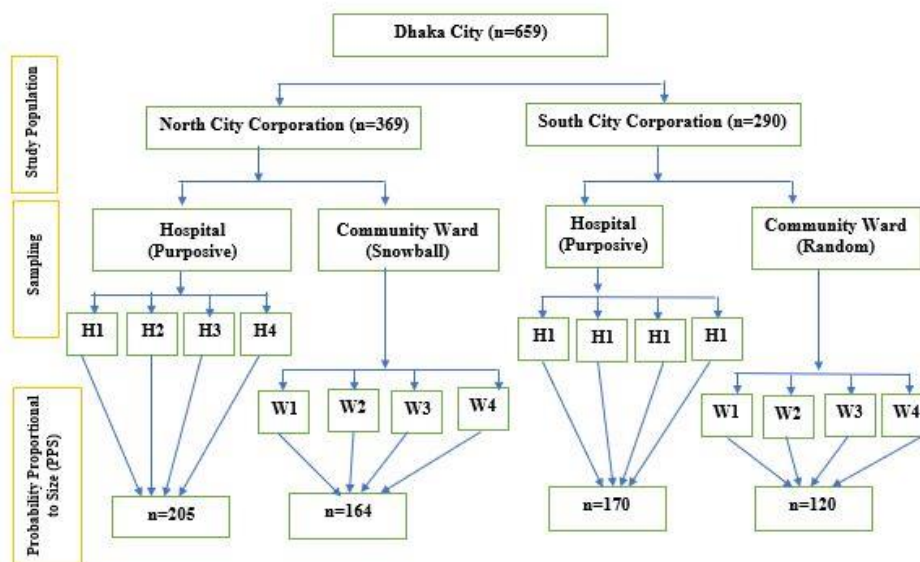
This cross-sectional study was conducted utilizing a pre-tested semi-structured questionnaire addressing the WHO component in terms of prevention and management of COVID-19 at home and in hospitals. Amid COVID-19 it was indeed highly difficult to maintain randomization in the sampling design. So, in this study, the COVID-19 dedicated hospitals were purposively selected in Dhaka city which is the capital city of Bangladesh. The study included 659 COVID-19 positive patients aged 18 and up who were treated at home or in hospitals and lived in Dhaka city From April to September 2021. Before the interview, respondents were asked to give their informed consent.

Information on hospital-treated patients, 205 and 170 patients were drawn from hospitals in Dhaka North City

Corporation and Dhaka South City Corporation, respectively.

Figure 1

Multi-stage sampling technique



In the meantime, household survey was conducted based on snowball sampling in order to reach 164 patients from Dhaka North City Corporation's four wards and 120 patients from Dhaka South City Corporation's four wards were interviewed in order to obtain information on people treated at home. The list of COVID-19 positive cases was obtained from the ward counsellor's office (Figure 1). In order to measure severity, it was categorized into two; mild and severe (20). Data were gathered using an electronic survey on smartphones and, in some cases, face-to-face interviews, and was analyzed using a statistical package for social science v-23. The study protocol was approved by the research ethics committee of the faculty of allied health

sciences of Daffodil International University, Dhaka, Bangladesh.

3. Findings and Results

Respondents were 38.43±13.90 years old on average, 60.2% of whom were female, and among them, 46% held a bachelor's degree or higher (Table 1). The typical monthly household income was BDT 50,000, and slightly more than 42% of participants were service holders. 4.42 ±1.39 was the average family size. Around 10.3% of the participants were overweight, whereas only 5.6% were underweight.

Table 1

Background characteristics of study subjects (n=659)

Background characteristics	Number	Percent
Gender		
Male	262	39.8
Female	397	60.2
Age (in years)		
Up to 29	195	29.6
30-49	312	47.3
50 and above	152	23.1
Mean ± SD	38.43 ± 13.90	
Level of education		

Up to Secondary	168	25.5
Higher Secondary	188	28.5
Bachelor & above	303	46.0
Marital status		
Single	136	20.6
Married	523	79.4
Occupation		
Health service provider	154	23.4
Service	278	42.2
Business	79	12.0
Housewife	124	18.8
Student	24	3.6
Monthly family income (Bangladeshi Taka)		
Up to 50000	379	57.5
> 50000	280	42.5
Mean, Median	54633, 50000	
Family size		
Mean ± SD	4.42 ± 1.39	
BMI category		
Underweight	37	5.6
Normal weight	423	64.2
Overweight	131	19.9
Obese	68	10.3

About 79.5% of the 659 participants had mild COVID - 19 infection, with the remaining 20.5% having a mild infection (Figure 2). The level of infections was categorized based on the diagnostic investigations done. Participants were asked if they believe they are taking all recommended precautions to avoid becoming infected with the Coronavirus (Figure 3).

In the mild infection group, it was discovered that 76.2% never used all preventative measures, 80% used them seldom, 76.7% used them occasionally, and 80.9% used them always to avoid COVID-19 infection. While, the corresponding figures were 23.1%, 20.0%, 23.3%, and 19.1%, respectively among the severely infected participants.

Figure 2

Severity of COVID – 19 among respondents (n=659)

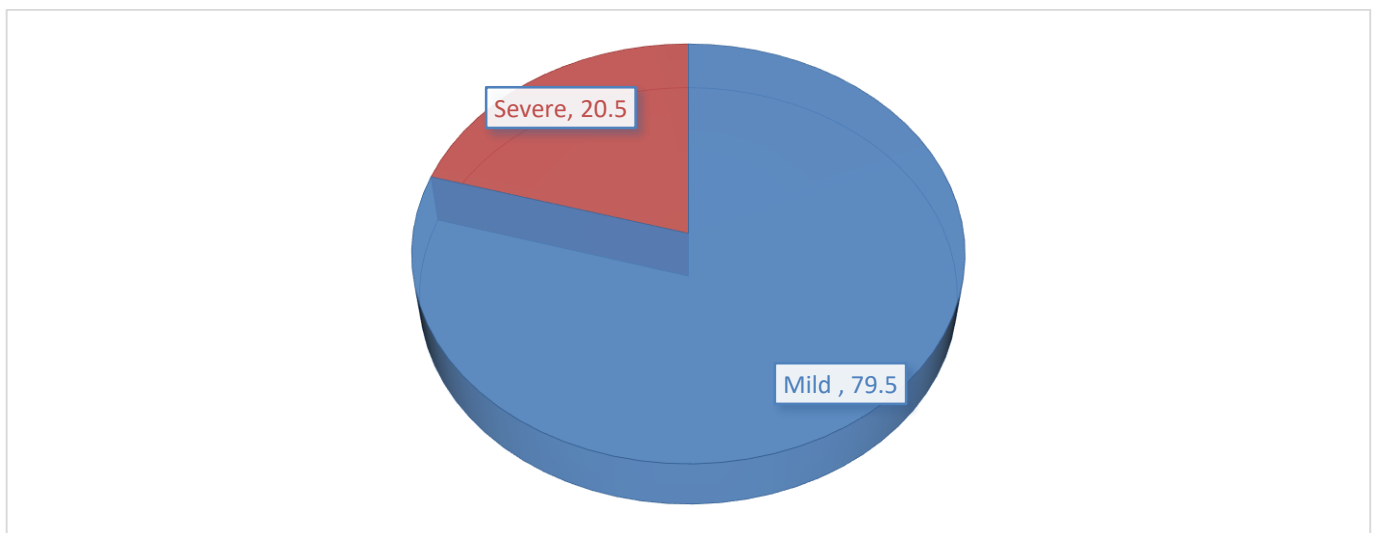
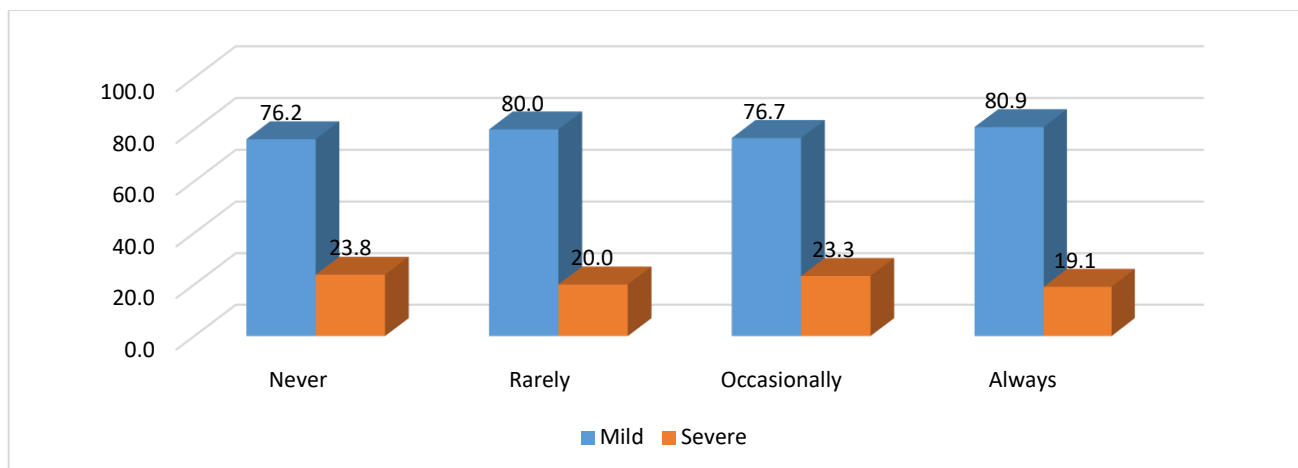


Figure 3

Observed all preventive measures to avoid Coronavirus infection by severity (n=659)



About 407 (61.8%) respondents did not suffer from any co-morbidity (Table 2). While others with co-morbidities were mostly suffered from diabetes (22.9%), cardiovascular disease (19.7%), asthma/COPD (7.9%), rheumatoid

arthritis (3.8%) and CKD (1.7%). Of those who never used preventive measures, 23.8% had severe illness; of those who rarely used preventive measures, 20% had severe illness etc.

Table 2

Co-morbid conditions by severity (n=659, Multiple response)

Co-morbid conditions	Number	Percent
None	407	61.8
Diabetes	151	22.9
Cardiovascular disease	130	19.7
Asthma/COPD	52	7.9
Rheumatoid Arthritis	25	3.8
CKD	11	1.7
Others	19	2.9

More than half (353, 53.6%) of the 659 participants said they used PPE at work, and nearly three-quarters (77.6%) had a moderate infection. 550 (83.5%) of the respondents always wore a mask when stepping outside, and 82.4% had a minor infection, according to the survey. Wearing mask was found to have a statistically significant relationship with infection levels ($p < 0.001$). The severity level is unaffected by wearing the mask in front of family/friends

or washing/changing the mask. Another crucial component for COVID-19 prevention was found to be substantially linked ($p < 0.001$) with infection severity. About 73.3% of respondents with mild infections used soap to wash their hands, 69.2% used an alcohol-based hand rub, and 87.2% used both. Corresponding proportion for the participants had severe infection were 26.7%, 30.8%, and 12.8%, respectively.

Table 3

Use of PPE at workplace and Mask in going outside by Severity (n=659)

Use of PPE	Mild Number (%)	Severe Number (%)	Total	Chi-square value	p-value
Use Personal Protective Equipment (PPE) at work place					
No	250 (81.7)	56 (18.3)	306	1.674	0.196
Yes	274 (77.6)	79 (22.4)	353		
Always wear a mask when going outside					
Sometimes	71 (65.1)	38 (34.9)	109	16.572	0.000
Always	453 (82.4)	97 (17.6)	550		
Wear a mask in front of family, friends, colleagues when outside home					

No	46 (76.7)	14 (23.3)	60	0.329	0.566
Yes	478 (79.8)	121 (20.2)	599		
How often mask is changed/washed					
Rarely	20 (76.9)	6 (23.1)	26	0.257	0.880
Sometimes	89 (80.9)	21 (19.1)	110		
Always	405 (79.3)	106 (20.7)	511		
What do you used for Hand Washing					
Soap	244 (73.3)	89 (26.7)	333	20.153	0.000
Alcohol based hand Rub	18 (69.2)	8 (30.8)	26		
Both Soap and Alcohol based Hand Rub	253 (87.2)	37 (12.8)	290		

The most common primary sign of COVID–19 infection was fever, according to reports for 533 (80.9%) respondents, followed by dry cough in case of 398 (60.4%), myalgia for 373 (56.6%), headache for 333 (50.5%),

sneezing for 252 (38.2%), chest pain for 171 (25.9%), diarrhoea for 153 (23.2%) and loss of smell/taste for 142 (21.5%) respondents.

Table 4

Primary symptoms of COVID-19 infections experienced by severity (n=659, Multiple response)

Primary symptoms	Mild Number	Severe Number	Total Number
None	58	4	62
Fever	416	117	533
Dry cough	302	96	398
Myalgia	286	87	373
Headache	263	70	333
Sneezing	186	66	252
Chest pain	110	61	171
Diarrhea	106	47	153
No smell/taste of food	117	25	142
Others	16	2	18

The present study additionally looks into the participants’ selected characteristics of interest by treatment location in order to analyse how the general public reacts to such diseases (Table 5). It took into account age, BMI, education level, tobacco usage, co-morbidity

information, physical activity, preventive measures, religion, COVID–19 severity, recovery time, post-COVID sequelae, and daily sunlight exposure. All of the examined variables were discovered to have a significant relationship with the place of treatment.

Table 5

Distribution of the participants by place of treatment by characteristics of interest (n=659)

Distribution of the participants	Place of treatment				Chi-square Test	
	Home Number	First Home then Hospital Number	Hospital Number	Total Number	Value	p-value
Age						
Up to 29	101	63	31	195	31.956	<0.001
30 - 49	132	113	67	312		
50 & above	34	77	41	152		
Total	267	253	139	659		
BMI Category						
Underweight	14	12	11	37	15.720	0.015
Normal weight	167	152	104	423		
Overweight	54	60	17	131		
Obese	32	29	7	68		
Total	267	253	139	659		

Level of education						
Up to Secondary	61	80	27	168	29.785	<0.001
Higher Secondary	62	64	62	188		
Bachelor & above	144	109	50	303		
Total	267	253	139	659		
Number of co-morbidities						
None	197	156	54	407	85.848	<0.001
One	56	58	30	144		
At least two	10	28	44	82		
Three or more	4	11	11	26		
Total	267	253	139	659		
Do any form of physical exercise						
No	114	111	105	330	45.760	<0.001
Yes	153	142	34	329		
Total	267	253	139	659		
Preventive Measures taken						
Never	12	5	4	21	22.442	<0.001
Sometimes	64	93	63	220		
Always	191	155	72	418		
Total	267	253	139	659		
Religiosity						
Low	12	9	0	21	28.761	<0.001
Moderate	105	52	45	202		
High	150	192	94	436		
Total	267	253	139	659		
Severity of COVID – 19 infection						
Mild	230	187	107	524	12.623	0.002
Severe	37	66	32	135		
Total	267	253	139	659		
Recovery time						
Up to 14 days	184	136	54	374	35.168	0.000
More than 14 days	83	117	85	285		
Total	267	253	139	659		
Post COVID-19 Complication						
None	76	41	77	194	71.365	<0.001
At least 1	22	25	9	56		
At least 2	24	42	9	75		
Three or more	145	145	44	334		
Total	267	253	139	659		
Had 15 - 20 minutes of sun light every day						
No	131	144	53	328	12.752	0.002
Yes	136	109	86	331		
Total	267	253	139	659		

Age, family income, BMI, number of co-morbidities, level of education, usage of any kind of tobacco, treatment location, and post-COVID complications were all used as factors in a logistic regression (Table 6). COVID-19 Suffering is classified as having a recovery time of up to 14

days or more than 14 days. The recovery time was found to be associated with the factors of family income, number of co-morbidities, tobacco use, treatment location, and post-COVID-19 complications.

Table 6

Recovery time of COVID-19 infected patients: A logistic regression analysis.

Covariates	B	p-value	Odds Ratio (OR)	95% C.I. for OR	
				Lower	Upper
Family income					
Up to 50000 (rc)					
More than 50000	.373	.047	1.453	1.005	2.099

No. of comorbidity		.000				
None (rc)						
At least one	.766	.001	2.151	1.378	3.358	
At least two	1.139	.000	3.122	1.701	5.730	
Three or more	.732	.112	2.080	.843	5.131	
Place of treatment		.000				
Home (rc)						
Home to hospital	.493	.013	1.637	1.110	2.415	
Hospital	1.274	.000	3.575	2.130	6.002	
Post COVID complications		.000				
None (rc)						
At least one	.843	.016	2.322	1.170	4.611	
At least two	1.555	.000	4.737	2.498	8.983	
Three or more	.822	.000	2.275	1.441	3.592	

*CI= Confidence Interval

In comparison to respondents with family income higher than 50,000 BDT, those with total family income from all sources up to 50,000 BDT were 1.45 (CI: 1.05-2.1) times more likely to have a lengthier recovery period. Respondents with one co-morbidity were found to have 2.15 (CI: 1.38-3.36) times more recovery time, while those with up to two co-morbidities were found to have 3.12 (CI: 1.70-5.73) times more recovery time. In compared to those treated at home before moving to hospital, those treated at home-to-hospital were 1.64 (CI: 1.10-2.42) times more likely to have a longer recovery time, while those treated directly at hospital were 3.58 (CI: 2.13-6.00) times more likely to have a longer recovery time. That seems to be, patients who are treated at home from the outset of their COVID-19 infection may not need to go to the hospital or, if they do, they are less likely to stay in the hospital longer than patients who go to the hospital without receiving any home treatment. In comparison to patients who recovered in less than 14 days, those with a longer recovery time are 2.28 (CI: 1.44-3.59) times more likely to experience three or more post-COVID complications, 4.74 (CI: 2.50-8.98) times more likely to experience two post-COVID complications, and 2.32 (CI: 1.17-4.61) times more likely to experience one post COVID-19 complication.

4. Discussion and Conclusion

In an unprecedented way, the COVID-19 epidemic as an extremely infectious has been a significant shock to our societies and economies, revealing systemic disparities in every sector from health to the economy and underlining society's reliance on humans on the front lines and at home (13). The analysis of the present study accumulated the objective, to assess how often COVID-19 problems occur and how they are influenced by treatment and prevention management.

Of the 659 samples analyzed, 40.2% were male and 60.8% were female, which is at odds with the gender breakdown seen in the DGHS's official report on the COVID-19 infection. Around a third of the men in the intended samples could not be contacted because they were uninterested or unavailable for work at the time of data collection. More over half of the study participants (59.5%) had been hospitalized at some point during the course of COVID-19 (21). Previous research indicated that 69.3% of patients were living alone, while 27.9% were admitted to COVID-19 specialty hospitals, and 2.8% were admitted to general hospitals (2, 22). More individuals were being treated in hospitals rather than at home during the time this data was collected because of the second wave of COVID-19 infection.

It was shown that among individuals who had several medical conditions, diabetes accounted for 22.9%, cardiovascular disease for 19.7%, and asthma/COPD for 7.9%. Similar results were found in a prior study done in Bangladesh, when it was shown that 34.6% of COVID-19 patients also suffered from diabetes. In contrast, in a hospital-based survey in China, COVID-19 patients were found to have hypertension (30%), diabetes (36%), and coronary heart disease (15%) as their related medical condition (4). In addition, this infectious disease can strike anyone, regardless of their health status.

Personal protective equipment (PPE) is used daily by those working in the healthcare industry to safeguard themselves and their patients against the spread of infectious diseases. PPE is crucial now more than ever because of the rapidly expanding coronavirus epidemic. Over half of those surveyed (53.6%) reported using PPE on the job, and the same percentage (83.5%) reported always wearing a mask when venturing outside. Those who reported using PPE and masks were found to have lower

rates of infection (77.6% vs. 82.4%). The use of face masks was related with an 82% lower risk of SARS, Middle East respiratory disease, and COVID-19 transmission in a meta-analysis that looked at the effects of masks in healthcare and non-healthcare (e.g. community) settings (23).

The current study found a significant correlation between mask use and COVID-19 infection rate, similar to prior investigations (23). Further evidence suggests that immunized individuals experience fewer symptoms than those who were not vaccinated against COVID-19 (9). It is evident that PPE, face masks, and immunization are crucial in reducing the spread of COVID-19 among healthcare personnel and the general public. COVID-19 can have varying degrees of impact on its victims. The majority of persons who have an infection experience some degree of discomfort. The World Health Organization lists fever, cough, exhaustion, and an inability to smell or taste as the most typical manifestations of this viral disease (13). A sore throat, headache, aches and pains, diarrhea, skin rashes or discoloration of fingers or toes, red or irritated eyes, difficulty breathing, shortness of breath, speech or mobility loss, dementia, and, in rare cases, chest pain are all listed as symptoms of infection. The majority of the WHO COVID-19 symptoms were present among the participants in this study. The vast majority of respondents had fever (80.9%), dry cough (60.4%), myalgia (56.6%), headache (50.5%), sneezing (38.2%), chest pain (25.1%), and diarrhoea (23.2%). Around 70% of responders had in-home visits from a certified physician during the early stages of their COVID-19 infection. Participants were treated according to the standards set forth by the Director General of Health Services of Bangladesh, as 86.7% of those who responded were given antipyretics, 71.6% were given antiallergics, 69.4% were given antihistamines, 66% were given antibiotics, 53% were given vitamins, and 14.8% were given oxygen therapy (21).

The results showed that 60% of the people who participated were either admitted to the hospital or transported there from home. Hospitalized patients in Bangladesh were given antipyretics to reduce fever, pain relievers to alleviate discomfort, oxygen to alleviate respiratory distress, and saline to ensure they stayed well hydrated (Bhuiyan et al., 2020). In addition, all patients were treated with hydroxychloroquine and azithromycin to alleviate the resulting medical issues. Hospitalized patients with COVID-19 were additionally treated with antipyretics (91.6%), antihistamines (84.4%), antiallergenics (83.4%),

antibiotics (73%), vitamins (62%), antivirals (31%) and oxygen therapy (41.8%), as shown in the current study.

Recuperation time was the dependent variable in a logistic regression that also included age, family income, body mass index, number of co-morbidities, level of education, usage of any tobacco product, location of treatment, and post-COVID problems as independent variables. Time to recovery was found to be influenced by socioeconomic status, the number of co-morbidities, cigarette use, location of care, and the severity of problems experienced after COVID-19. So, it is expected that the study's results will serve as a benchmark for future research into COVID-19 problems and their association with the pattern of COVID-19 prevention and treatment management in Bangladesh.

As far as we are aware, this was the first study in Bangladesh when it started to report on the prevalence and methods of control for COVID-19. The World Health Organization's steps in the prevention and treatment of COVID-19 in home and medical facilities was the focus of this study.

The results showed that 20.5% having a mild COVID-19 infection. Family income, the number of co-morbidities, and the location of therapy were found to have a substantial impact on recovery time. In addition, there were high correlations of age, the number of co-morbidities, level of education, and the place of treatment with the severity of Covid-19 infection. The government should place a greater emphasis on training and resources to ensure efficient hospital management and widespread public knowledge as a precaution for further phenomena like Covid-19.

Authors' Contributions

Syed Billal Hossain: Contributed to the conceptualization of the study and the design of the research protocol. Participated in data collection and analysis. Involved in interpreting the findings and drafting the manuscript.

Abul Hasan Baki Billah (Corresponding Author): Provided leadership in the design and implementation of the study, particularly in conceptualizing the association between complication severity and treatment management in COVID-19 patients in Bangladesh. Supervised data collection and analysis. Played a major role in interpreting the findings and drafting the manuscript.

Basit Al Haidari: Contributed to the analysis of data and interpretation of results. Provided critical insights into the

implications of the findings within the context of COVID-19 treatment management in Bangladesh. Contributed to manuscript writing and revision.

ABM Alauddin Chowdhury: Participated in the recruitment of participants and data collection. Assisted in data analysis and interpretation. Contributed to manuscript writing and revision.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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