Knowledge, Attitudes and Precautions Towards COVID-19 Pandemic among Bangladeshi Population: A Cross-Sectional Study

Md. Alamgir Kabir[1], Tania Akter Jhuma[2] and Muhammad Rashedul Islam[1]

[1]Department of Pharmaceutical Technology, Faculty of Pharmacy, University of Dhaka
[2]Department of Microbiology, Faculty of Biological Sciences, University of Dhaka

Abstract

In response to COVID-19 emergency outbreak, several countries took unprecedented measures and lockdown was implemented worldwide to minimize the drastic consequences. To reduce the damage, collaboration and acquiescence of people is needed to limit the spread of the virus. This study attempted to assess the knowledge, attitudes and precautions taken against COVID-19 among the Bangladeshi people. An online survey was carried out between 12th April and 4th May, 2020 using a snowball sampling technique in which 424 Bangladeshi residents participated. Descriptive statistics, chi-square test, fisher's exact test, one-way ANOVA, binary logistic regression, t-tests have been carried out. Most of the participants were concerned about the risk of COVID-19 as more than 80% people took 14 out of 18 precautions to avoid COVID-19. The attitudes toward COVID-19 showed people's willingness to follow government guidelines on isolation (96.7%) and quarantine (97.6%). The overall mean knowledge score was 3.11 out of 4. According to the independent sample t-test, age distribution was significantly ($p<0.05$) associated with knowledge level of the participants. Overall participants had a good understanding of the COVID-19 and a positive attitude towards preventive measures. The basic knowledge on COVID-19 among the people is acceptable which indicates that the timely dissemination of the information by the government of Bangladesh had a positive impact on people's behavior.

Key words: COVID-19, Precautions, Attitude, Knowledge, Bangladesh

Introduction

In December, 2019, a novel coronavirus (2019-nCoV) emerged in Wuhan, Hubei Province in China which caused massive case of unidentified pneumonia, later named the disease as 'COVID-19' by the World Health organization (WHO) on February 11, 2020 (Lai *et al.*, 2020; Rothan and Byrareddy, 2020; Wang *et al.*, 2020; Hossain *et al.*, 2021a). The International Committee on Taxonomy of Viruses (ICTV) named 2019-nCoV virus later as 'Severe Acute Respiratory Syndrome Coronavirus-2' (SARS-CoV-2) which is highly contagious (Gorbalenya *et al.*, 2020; Lai *et al.*, 2020). As the virus spread rapidly all over the world and the number of infected people increased globally, WHO declared COVID-19 a pandemic on March 11, 2020(Hossain and Rahman, 2021). The virus has now spread out more than 227 countries around the world which becomes a major public health concern (Kang *et el.*, 2020).

The pandemic COVID-19 has started revealing its subversive face in Bangladesh too. Within four month in July 9, 2020, 175,494 people were infected and 2,238 people were dead by SARS-CoV-2 in Bangladesh after the first case reported on 8 march, 2020 (Islam *et. el.*, 2020). Since the outbreak is unwanted for the people, it is crucial to explore the public response to combat the situation. To strengthen the communication efforts of the clinicians and public health officials, it is imperative

to understand the public knowledge, response, perceptions, attitudes and behavior in response to the outbreak (Blendon *et al.*, 2004). Given the fact that there is a tremendous amount of misinterpretation in many social media sites that can have adverse consequences in the country's community and economy, people's perception of COVID-19 would allow government and the media to develop an effective awareness campaign (Geldsetzer, 2020; Bari *et al.,* 2021).

This study aims to understand how the people in Bangladesh responded to the recent outbreak of COVID-19 on the basis of their living area, sex, occupation and age. This was a questionnaire based online survey was sought to understand three issues: (1) The precautions taken against COVID-19, (2) The attitudes towards quarantine and isolation for COVID-19, and (3) The knowledge about COVID-19.

Materials and Methods

Participants and study design: To accomplish the objective of this study, a quantitative approach was exploited. A survey is most effective as it enables large populations to be assessed with minimal effort (Jones *et al.*, 2013). This is a cross-sectional, observational survey which was conducted from April 12 to May 4, 2020 using a snowball sampling technique (Hossain *et al*., 2022). Since it was not feasible to perform a comprehensive nationwide sampling during this time span due to lock down, we opted to use an online survey using Google forms. The survey was disseminated across two platforms on social media; Facebook and Messenger. Facebook and Messenger were chosen as these are two of Bangladesh's most popular social and communication platforms and used by people of both young and old generations (Islam *et al*., 2021). Before the link was provided to both the English and Bengali language versions of the questionnaire, a simple and standard outline of the survey was given in the message or Facebook posting. A total of 424

participants from all eight divisions (51 out of 64 districts) participated in the survey.

Study measures: The questionnaire consisted of four main themes: 1) demographics, which surveyed participant's socio demographic information including, gender, age, residence area and occupation; 2) precautions taken against COVID-19; 3) attitudes towards quarantine and isolation for COVID-19; and 4) knowledge about COVID-19. The questionnaire comprised of total 24 questions (Table 1): 18 regarding precautions to protect COVID-19 transmission (P1-P18), 2 regarding attitude towards quarantine and isolation for COVID-19 (A1-A2), and 4 regarding knowledge about COVID-19 (K1-K4). Participants were given "Yes", "No" options for precautions and attitudes and for knowledge an extra option "Don't know" was provided. The questionnaire was developed in compliance with WHO, CDC, and IEDCR website recommendations as well as numerous journal articles (Azlan *et al.*, 2020; Blendon *et al.*, 2004; Singhal., 2020; Zhong *et al.*, 2020).

Statistical analysis: The data collected for this study were analyzed using the Statistical Package for the Social Sciences (SPSS), version 25. Descriptive statistics were conducted. Frequencies and percentages were used to demonstrate participant's response. Mean and standard deviation were used to present the overall knowledge score. Fisher's exact test was performed to evaluate the correlation between demographic variables, whereas the odd values were predicted by binary logistic regression. Independent sample t-test was used to compare mean. As surveys are subjected to sampling error and the margin of error for a survey of 424 respondents, with a 95% confidence interval (CI), is ±5 points. 95% CIs were used to quantify the association between variables. The statistical significance level was set at $p < 0.05$ (two-sided).

Table 1. Questionnaire of precautions, attitudes and knowledge towards COVID-19.

Questions	Options
Precautions taken against COVID-19	
P1: Have you used a disinfectant at home or work?	Yes, No
P2: Do you carry a disinfectant to clean any object that may come in contact with a person infected by corona virus?	Yes, No
P3: Have you accessed any website for advice on COVID-19?	Yes, No
P4: Have you ever talked to a doctor about health issues related to COVID-19?	Yes, No
P5: Do you know where to contact if you feel you may have COVID-19 symptoms?	Yes, No
P6: Are you avoiding people who have recently come from abroad?	Yes, No
P7: Are you avoiding public meetings?	Yes, No
P8: Are you paying social visit to anyone's house or receiving guest at home now?	Yes, No
P9: Have you reduced the use of public transport?	Yes, No
P10: Have you bought masks for use?	Yes, No
P11: Are you using a mask when you go out?	Yes, No
P12: Are you touching your face frequently?	Yes, No
P13: Are you using handkerchiefs or tissues while coughing or sneezing or sneezing at the elbow?	Yes, No
P14: Are you washing your hands with soap after coming home from outside?	Yes, No
P15: Are you maintaining a social distance (3 feet or 1 meter) outside the home?	Yes, No
P16: Do you wash your hands more often than before?	Yes, No
P17: Do you wash your hands for at least 20 seconds?	Yes, No
P18: Have you canceled a doctor's appointment for COVID-19?	Yes, No
Attitudes and experiences of isolation for COVID-19	
A1: If you come in contact with someone affected by COVID-19, do you agree to stay socially isolated for 2 weeks?	Yes, No
A2: If you had COVID-19, would you agree to go to quarantine?	Yes, No
Knowledge about COVID-19	
K1: Is COVID-19 contagious in nature?	Yes, No, Don't know
K2: Is there any vaccine against COVID-19?	Yes, No, Don't know
K3: Is there any effective treatment for COVID-19 affected people?	Yes, No, Don't know
K4: Does COVID-19 spread through close contact (within 6 feet) with infected people, contaminated objects or surfaces?	Yes, No, Don't know

Results and Discussion

Demographic characteristics: The study included a total of 424 participants from all of the eight divisions (51 districts out of 64). Highest number of participants were from Dhaka division, followed by Rangpur and Chattogram (Figure 1). Out of the total, 252 (59.4%) were male, 391 (92.2%) were under age 30 and 331(78.1%) resided inside city corporation. Table 2 details further demographic characteristics.

Assessment of precautions against COVID-19: A total of eighteen questions were used to assess the precautions taken by participants against COVID-19. Many of the participants took almost all of the precautions against COVID-19 except to consult doctor on health issue associated with COVID-19 (Figure 2). Of the eighteen precautions, seven are significantly related to at least one demographic variables (Table 3).
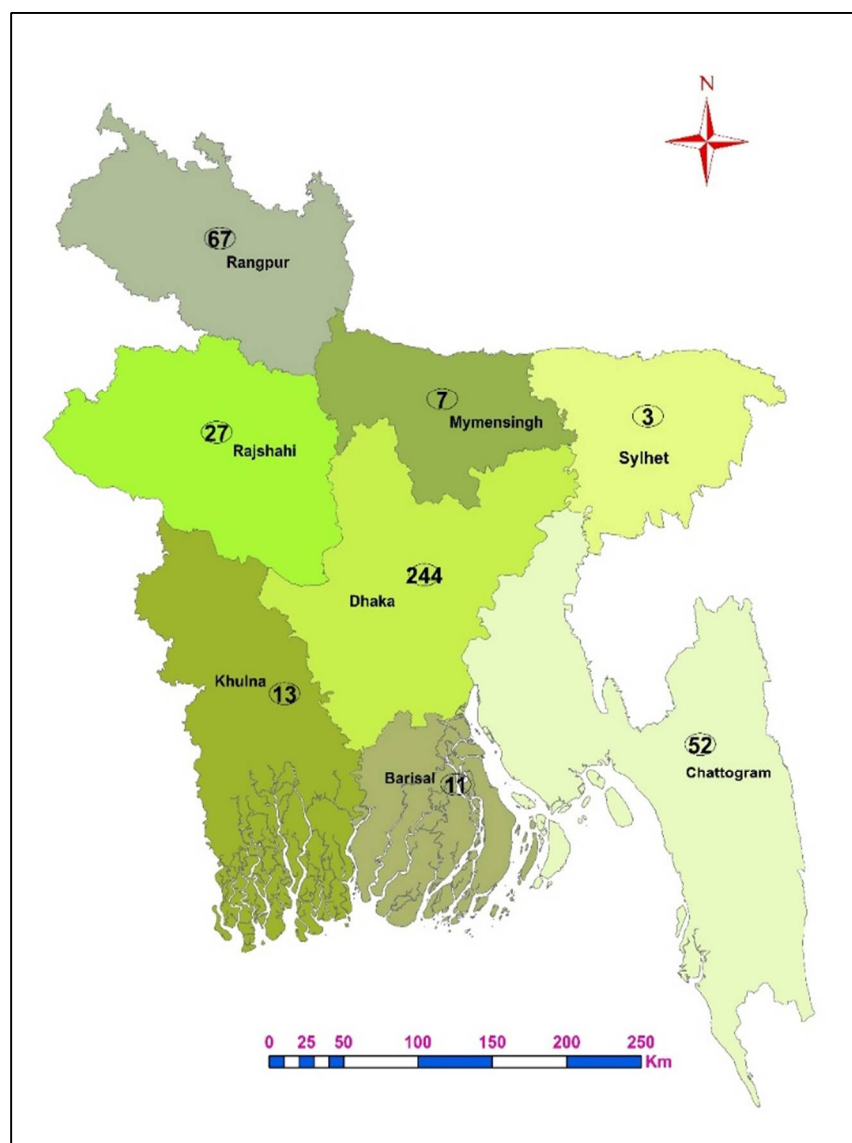
Figure 1. Distribution of participants across different divisions in Bangladesh.

Table 2. Demographic characteristics of participants (N= 424).

Characteristic	Sub-Group	Number	Percentage
Gender	Male	252	59.4
	Female	172	40.6
Age (Years)	< 30	391	92.2
	≥ 30	33	7.8
Residence Area	Inside city corporation	331	78.1
	Outside city corporation	93	21.9
Occupation	Student	276	65.1
	Others	148	34.9

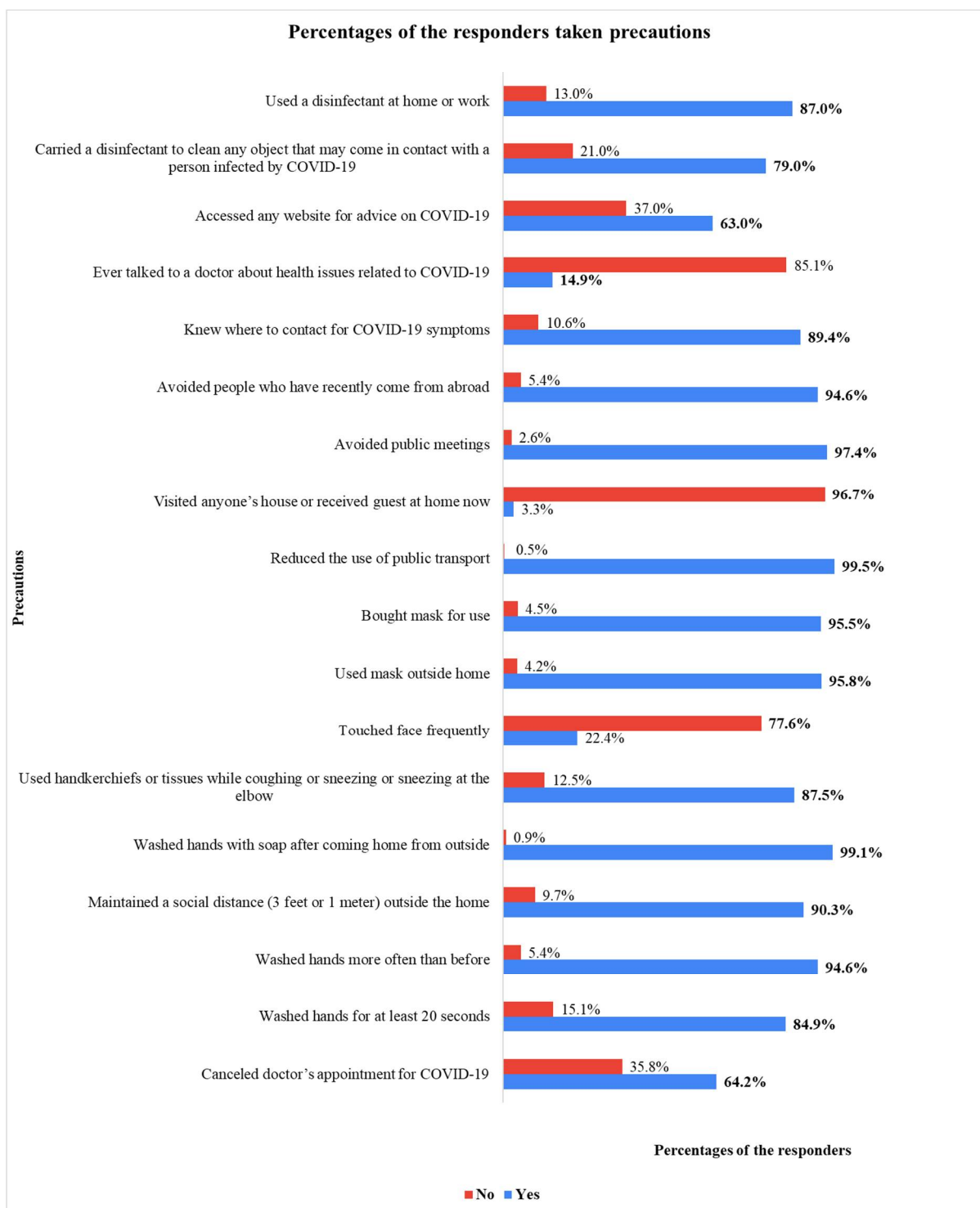Figure 2. Proportions of participants (percentage) taken precautions.

Table 3. Precautions against COVID-19 by demographic variables.

Precau-tions	Gender			Age (Years)			Residence Area			Occupation		
	Male N=252	Female N=172	p-value	Below 30 N=391	Above 30 N=33	p-value	Inside City corporation N=331	Outside City corporation N=93	p-value	Student N=276	Others N=148	p-value
P1:												
Yes[a]	205 (81.3)	164 (95.3)	**<0.0001**	341 (87.2)	28 (85.8)	0.600	306 (92.4)	3 (67.7)	**<0.0001**	237 (85.9)	132 (89.2)	0.366
No	47 (19.7)	8 (4.7)		50 (12.8)	5 (15.2)		25 (7.6)	30 (32.3)		39 (14.1)	16 (10.8)	
P2:												
Yesa	187 (74.2)	148 (86.0)	**0.003**	310 (79.3)	25 (75.8)	0.657	274 (82.8)	61 (65.6)	**<0.001**	219 (79.3)	116 (78.4)	0.804
No	65 (25.8)	24 (14.0)		81 (20.7)	8 (24.2)		57 (17.2)	32 (34.4)		57 (20.7)	32 (21.6)	
P3												
Yes[a]	167 (66.3)	100 (58.1)	0.101	258 (66.0)	9 (27.3)	**<0.0001**	223 (67.4)	44 (47.3)	**<0.001**	183 (66.3)	84 (56.8)	0.058
No	85 (33.7)	72 (41.9)		133 (34.0)	24 (72.7)		108 (32.6)	49 (52.7)		93 (33.7)	64 (43.2)	
P4												
Yes[a]	34 (13.5)	39 (16.9)	0.404	57 (14.6)	6 (18.2)	0.609	49 (14.8)	14 (15.10)	1.000	36 (13.0)	27 (18.2)	0.155
No	218 (86.5)	143 (83.1)		334 (85.4)	27 (81.8)		282 (85.2)	79 (84.9)		240 (87.0)	121 (81.8)	
P5												
Yes[a]	225 (89.3)	154 (89.5)	1.000	357 (91.3)	22 (66.7)	**<0.0001**	308 (93.1)	71 (76.3)	**<0.0001**	249 (90.2)	130 (87.8)	0.509
No	27 (10.7)	18 (10.5)		34 (8.7)	11 (33.3)		23 (6.9)	22 23.7)		27 (9.8)	18 (12.2)	
P6												
Yes[a]	237 (94.0)	164 (95.3)	0.665	371 (94.9)	30 (90.9)	0.409	313 (94.6)	88 (94.6)	1.000	261 (94.6)	140 (94.6)	1.000
No	15 (6.0)	8 (4.7)		20 (5.1)	3 (9.1)		18 (5.4)	5 (5.4)		15 (5.4)	8 (5.4)	
P7												
Yes[a]	242 (96.0)	171 (99.4)	**0.032**	385 (98.5)	28 (84.8)	**<0.001**	326 (98.5)	87 (93.5)	**0.017**	270 (97.8)	143 (96.6)	0.526
No	10 (4.0)	1 (0.6)		6 (1.5)	5 (15.2)		5 (1.5)	6 (6.5)		6 (2.2)	5 (3.4)	
P8												
Yes	11 (4.4)	3 (1.7)	0.172	14 (3.6)	0 (0)	0.614	8 (2.4)	6 (6.5)	0.091	8 (2.9)	6 (4.0)	0.573
No[a]	241 (95.6)	169 (98.3)		377 (96.4)	33 (100)		323 (97.6)	87 (93.5)		268 (97.1)	142 (96.0)	
P9												
Yes[a]	251 (99.6)	171 (99.4)	1.000	390 (99.5)	32 (97.0)	0.150	330 (99.7)	92 (98.9)	0.391	275 (99.6)	147 (99.3)	1.000
No	1 (0.4)	1 (0.6)		1 (0.5)	1 (3.0)		1 (0.3)	1 (1.1)		1 (0.4)	1 (0.7)	
P10												
Yes[a]	243 (96.4)	162 (94.2)	0.340	373 (95.4)	32 (97.0)	1.000	316 (95.5)	89 (95.7)	1.000	261 (94.6)	144 (97.2)	0.227
No	9 (3.6)	10 (5.8)		18 (4.6)	1 (3.0)		15 (4.5)	4 (4.3)		15 (5.4)	4 (2.8)	
P11												
Yes[a]	241 (95.6)	165 (95.9)	1.000	376 (96.2)	30 (90.9)	0.157	321 (97.0)	85 (91.4)	0.035	264 (95.7)	142 (95.9)	1.000
No	11 (4.4)	7 (4.1)		15 (3.8)	3 (9.1)		10 (3.0)	8 (8.6)		12 (4.3)	6 (4.1)	
P12												
Yes	54 (21.4)	41 (23.8)	0.556	88 (22.5)	7 (21.2)	1.000	73 (22.1)	22 (23.7)	0.779	69 (25.0)	26 (17.6)	0.088
No[a]	198 (78.6)	131 (76.2)		303 (77.5)	26 (78.8)		258 (77.9)	71 (76.3)		207 (75.0)	122 (82.4)	
P13												
Yes[a]	218 (86.5)	153 (89.0)	0.550	345 (88.2)	26 (78.8)	0.163	292 (88.2)	79 (84.9)	0.381	244 (88.4)	127 (85.8)	0.445
No	34 (13.5)	19 (11.0)		46 (11.8)	7 (21.2)		39 (11.8)	14 (15.1)		32 (11.6)	21 (14.2)	
P14												
Yes[a]	249 (98.8)	171 (99.4)	0.650	388 (99.2)	32 (97.0)	0.278	330 (99.7)	90 (96.8)	**0.035**	273 (98.9)	147 (99.3)	1.000
No	3 (1.2)	1 (0.6)		3 (0.8)	1 (3.0)		1 (0.3)	3 (3.2)		3 (1.1)	1 (0.7)	
P15												
Yes[a]	220 (87.3)	163 (94.8)	**0.012**	355 (90.8)	28 (84.8)	0.350	304 (91.8)	79 (84.9)	0.071	250 (90.6)	133 (89.9)	0.864
No	32 (12.7)	9 (5.2)		36 (9.2)	5 (15.2)		27 (8.2)	14 (15.1)		26 (9.4)	15 (10.1)	
P16												
Yes[a]	241 (95.6)	160 (93.0)	0.278	379 (94.4)	32 (97.0)	1.000	311 (94.0)	90 (96.8)	0.437	258 (93.5)	143 (96.6)	0.260
No	11 (4.4)	12 (7.0)		22 (5.6)	1 (3.0)		20 (6.0)	3 (3.2)		18 (6.5)	5 (3.4)	
P17												
Yes[a]	207 (82.1)	153 (89.0)	0.072	332 (84.9)	28 (84.8)	1.000	281 (84.9)	79 (84.9)	1.000	228 (82.6)	132 (89.2)	0.087
No	45 (17.9)	19 (11.0)		59 (15.1)	5 915.2)		50 (15.1)	14 (15.1)		48 (17.4)	16 (10.8)	
P18[b]												
Yes[a]	24 (61.5)	28 (66.7)	0.651	48 (63.2)	4 (80.0)	0.650	48 (67.6)	4 (40.0)	0.155	31 (60.8)	21 (70.0)	0.476
No	15 (39.5)	14 (33.3)		28 (36.8)	1 (20.0)		23 (32.4)	6 (60.0)		20 (39.2)	9 (30.0)	

Fisher's Exact Test. Bold values are significant P-values. [a] Correct Precautions. [b] Results for only applicable data.

Binary logistic regression analysis showed that female gender (vs. male, OR: 3.756, p =.001), residence area "inside city corporation" (vs. outside city corporation, OR: 4.755, p = .0001) were significantly associated with using (vs. outside city corporation, OR: 2.279, p = .002) were significantly associated with carrying a disinfectant to clean any object that may come in contact with a person infected by COVID-19. Female gender (vs. male, OR: 0.548, p=.006), participants aging <30 years (vs. ≥ 30 years, OR: 4.582, p=.001), residence area "inside city corporation" (vs. outside city corporation, OR: 2.633, p = .0001) were significantly associated with accessing any website for advice on COVID-19. Participants aging <30 years (vs. ≥ 30 years, OR: 5.819, p =. 001), residence area "inside city corporation" (vs. outside city corporation, OR: 4.180, p = .0001) were significantly associated with knowing where to contact for COVID-19 symptoms. Participants aging < 30 years (vs. ≥ 30 years, OR: 25.167, p = .007) was significantly associated with avoiding public meetings. Female gender (vs. male, OR: 2.387, p =.029) was significantly associated with maintaining social distance (3 feet or 1 meter) outside the home (Table 4).

Assessment of attitudes against quarantine and isolation: Over 9 out of 10 participants were agreed to be quarantined or isolated if necessary. No significant association between attitude towards quarantine and isolation, and demographic variables was found (Table 5).

Assessment of knowledge on COVID-19: Differences in knowledge score among various demographic variables were analyzed by using t-test. The results showed significant association between knowledge score and age group. The knowledge score of people aged less than 30 years is higher than the counterpart (Table 6). The overall knowledge score was 3.11 out of 4.

The outbreak of COVID-19 has been declared as a public health emergency due to the rapid transmission of SARS-CoV-2 virus and its devastating effects which could endanger life (Hossain *et al.*, 2021b; Azlan *et al.*, 2020; Quadri

et al., 2020). During the period of any epidemic and pandemic, people face several difficulties. Lack of awareness therefore leads to an unpredictable attitudes which ultimately have a tremendous impact on the society and jeopardize the preparedness strategy to meet the challenge (Roy *et al.*, 2020). Hence, this study sought to assess public's response to take precautions, their attitudes and knowledge regarding COVID-19 pandemic.

Our study showed that people were very cautious and were willing to take precautions against COVID-19. Similar result was found from different studies in Asian countries (Zhong *et al.*, 2020; Tomar *et al.*, 2020; Hussain *et al.*, 2020). After comparing the subgroups of different demographic groups in terms of taking precautions to protect COVID-19, it was found that only 7 out of the 18 precautions are significantly related to at least one demographic variable. Female and city corporation residents were more likely to use disinfectant at home or work and carry a disinfectant to clean any object that may come in contact with a person infected by COVID-19. As the young people and people who live inside city corporation accessed website more for advice on COVID-19 pandemic, they know more about where to contact for COVID-19 symptoms (Foth and Hearn, 2007). Significant association was found between avoiding public meetings and gender, age and residence area. City corporation residents are more likely to wash hand after coming home from outside. Females are more likely to maintain social distance than males. Most of the people took almost all of the precautions. Unfortunately, large majorities don't ever talk to any doctor for advice on COVID-19. Bringing all this into account, it can be said that participants have a general willingness to make behavioral changes in the face of the COVID-19 pandemic.

Previous research showed that home or institutional isolation for confirmed COVID-19 cases delay the infection peak and significantly reduce the transmission (Dickens *et al.*, 2020). According to CDC, worldwide 40% of the patients show no symptoms while a study by IEDCR and ICDDR, B

claimed more than 78% of the patients in Dhaka are asymptomatic (Ciaccia, 2020). So, regardless of symptomatic profile, immediate isolation of people who come in contact with a COVID-19 affected person is important for reducing transmission. Majority of the participants of our study showed positive attitude towards quarantine and isolation.

Like the result of a study in India, we found that more than nine out of ten participants are agreed to be quarantined and isolated if necessary (Roy *et al.*, 2020). Though a study in China claimed women are more likely to be quarantined and isolated than men, no significant difference between these subgroups was found in our study (Lu *et al.*, 2020).

Table 4. Results of binary logistic regression analysis on precautions taken by participants significantly to combat COVID-19.

Variables	OR (95% CI)	p-value
Used disinfectant at home or work		
Gender (Female vs. Male)	3.756 (1.689, 8.349)	**0.001**
Age-group(Years) (< 30 vs. ≥ 30)	1.006 (0.306, 3.302)	0.992
Residence area (Inside City corporation vs. Outside City corporation)	4.755 (2.556, 8.847)	**0.0001**
Occupation (Students vs. Others)	0.805 (0.386, 1.678)	0.562
Carried a disinfectant to clean any object that may come in contact with a person infected by COVID-19		
Gender (Female vs. Male)	1.875 (1.106, 3.179)	**0.020**
Age-group(Years) (< 30 vs. ≥ 30)	0.957 (0.376, 2.436)	0.927
Residence area (Inside City corporation vs. Outside City corporation)	2.279 (1.337, 3.886)	**0.002**
Occupation (Students vs. Others)	1.120 (0.648, 1.93)	0.686
Accessed any website for advice on COVID-19		
Gender (Female vs. Male)	0.548 (0.356, 0.844)	**0.006**
Age-group(Years) (< 30 vs. ≥ 30)	4.582 (1.917, 10.951)	**0.001**
Residence area (Inside City corporation vs. Outside City corporation)	2.633 (1.591, 4.357)	**0.0001**
Occupation (Students vs. Others)	1.249 (0.780, 1.999)	0.354
Knew where to contact for COVID-19 symptoms		
Gender (Female vs. Male)	0.700 (0.352, 1.392)	0.309
Age-group(Years) (< 30 vs. ≥ 30)	5.819 (2.044, 16.658)	**0.001**
Residence area (Inside City corporation vs. Outside City corporation)	4.180 (2.102, 8.311)	**0.0001**
Occupation (Students vs. Others)	0.812 (0.349, 1.887)	0.628
Avoided public meetings		
Gender (Female vs. Male)	5.168 (0.628, 42.519)	0.127
Age-group(Years) (< 30 vs. ≥ 30)	25.167 (2.462, 257.228)	**0.007**
Residence area (Inside City corporation vs. Outside City corporation)	2.654 (0.727, 9.692)	0.140
Occupation (Students vs. Others)	0.2829 (0.028, 2.805)	0.280
Washed hands with soap after coming home from outside		
Gender (Female vs. Male)	1.162 (0.109, 12.383)	0.901
Age-group(Years) (< 30 vs. ≥ 30)	8.233 (0.245, 276.617)	0.240
Residence area (Inside City corporation vs. Outside City corporation)	8.501 (0.797, 90.719)	0.076
Occupation (Students vs. Others)	0.254 (0.008, 7.866)	0.434
Maintained a social distance (3 feet or 1 meter) outside the home		
Gender (Female vs. Male)	2.387 (1.094, 5.208)	**0.029**
Age-group(Years) (< 30 vs. ≥ 30)	1.560 (0.491, 4.955)	0.451
Residence area (Inside City corporation vs. Outside City corporation)	1.658 (0.809, 3.400)	0.168
Occupation (Students vs. Others)	0.971 (0.451, 2.090)	0.939

Binary Logistic Regression. Bold values are significant P-values.

Table 6. Demographic characteristics of participants and knowledge score of COVID-19 by demographic variables.

Characteristics		Number of participants (%)	Knowledge score (Mean ± Standard deviation)	t/F	P
Gender	Male	252 (59.4%)	3.16±0.923		
	Female	152 (40.6%)	3.03±0.973	1.328	0.185
Age (Years)	< 30	391 (92.2%)	3.42±1.001		
	≥ 30	33 (7.8%)	3.08±0.936	2.008	**0.045**
Residence area	Inside City corporation	331 (78.1%)	3.24±0.993		
	Outside City corporation	93 (21.9%)	3.07±0.928	1.483	0.139
Occupation	Student	276 (65.1%)	3.12±0.914	0.498	0.461
	Others	148 (34.9%)	3.08±1.000		

Independent sample t test. 1 score is assigned for correct answer and 0 is assigned for incorrect and Do not know answer

Table 5. Attitude towards quarantine and isolation by demographic variables.

	Demographic variables											
	Gender			Age (Years)			Residence Area			Occupation		
Precau-tions	Male N=252	Female N=172	P-value	< 30 N=391	≥ 30 N=33	P-value	Inside City corporation N=331	Outside City corporation N=93	P-value	Student N=276	Others N=148	P-value
A1 Yes[a] No	242 (96.0) 10 (4.0)	168 (97.7) 4 (2.3)	0.418	379 (96.9) 12 (3.1)	31 (93.9) 2 (6.1)	0.298	322 (97.3) 9 (2.7)	88 (94.6) 5 (5.4)	0.201	267 (96.7) 9 (3.3)	143 (96.6) 5 (3.4)	1.000
A2 Yes[a] No	247 (98.0) 5 (2.0)	167 (97.1) 5 (2.9)	0.535	383 (98.0) 8 (2.0)	31 (93.9) 2 (6.1)	0.179	324 (97.9) 7 (2.1)	90 (96.8) 3 (3.2)	0.463	271 (98.2) 5 (2.8)	143 (96.6) 5 (3.4)	0.329

Fisher's Exact Test. [a] Positive attitude.

Proper precautions and appropriate attitudes, the key elements to conquer against pandemics are highly associated with the level of knowledge. Higher the level of knowledge, the more the individuals would show positive attitude and take precautions (Zhong *et al.*, 2020). The participants of our study had good knowledge about contagious nature of the disease and spreading process of the virus. Most of them knew that there is no vaccine and effective medical treatment against COVID-19. The overall knowledge score was 3.11 out of 4 which is quite satisfactory. Male and female, urban and rural residents, student and others have equal knowledge. Though people younger than 30 years are more knowledgeable than those of 30 years old or more, there is no difference between them regrading attitude towards quarantine and isolation.

Survey studies in different countries found significant association between precautions, attitude and knowledge score and different demographic variables but we found no association for most of the cases (Azlan *et al.*, 2020; Zhong *et al.*, 2020; Tomar *et al.*, 2020; Hussain *et al.*, 2020; Erfani *et al.*, 2020). The reason behind this might be late detection of first patient in the country. The first case in Bangladesh was confirmed on March 8, 2020, 2.5 months after the outbreak in China when already globally 1,05,586 cases were confirmed, and 3,584 individuals were died. On April 12, the day we started the survey worldwide confirm cases were 16,96,588 and total deaths were 1,05,952. This skyrocketing confirmed cases and death numbers made people anxious, depressed and frightened (Roy *et al.*, 2020; Shigemura *et al.*, 2020). People perceived the deadly nature and rapid transmission ability after seeing the

devastating condition of the countries affected by this virus via different social media, news media and other electronics media. The Government and different NGOs took many steps for building awareness like miking, distributing leaflets, postering, tv advertisements. The health ministry and IEDCR arranged COVID-19 bulletin daily. So, people gained proper knowledge and perceived the necessity of taking precautions to escape from this virus. Social media and different electronic media have the potential, if responsibly and appropriately used, to provide rapid and effective information during a pandemic.

As the surveys were administered through researchers' networks and distributed through Facebook and Messenger using a convenient method, there was a possibility for sample bias, as underprivileged communities may not have been able to participate in the study. Another limitation was the representativeness of the sample. There were over representative of male, people below the age of 30, living inside city corporation and students.

Conclusion

In summary, our findings suggest that people have taken proper precautions, and have acceptable knowledge, positive attitudes towards COVID-19 in Bangladesh. The findings of the study evident by the disastrous condition of our neighboring country during the delta variant wave but our country handled the condition well due to people's adequate precautions, positive attitudes and proper knowledge about the disease. Though the findings can't be generalized due to the limitations of representativeness, it can be said that collaborative efforts of Government, NGOs, social media, news media and print media have a positive impact on mitigating the drastic consequences of the pandemic.

References

Azlan, A. A., Hamzah, M. R., Sern, T. J., Ayub, S. H. and Mohamad, E. 2020. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS ONE* **15**, 1-15.

Bari, M.S., Hossain, M.J., Akhter, S. and Emran, T.B., 2021. Delta variant and black fungal invasion: a bidirectional assault might worsen the massive second/third stream of COVID-19 outbreak in South-Asia. *Ethics, Med. Public Health*, **19**, 100722.

Blendon, R. J., Benson, J. M., DesRoches, C. M., Raleigh, E. and Taylor-Clark, K. 2004. The public's response to severe acute respiratory syndrome in Toronto and the United States. *Clin. Infect. Dis.* **38**, 925-931.

Dickens, B. L., Koo, J. R., Wilder-Smith, A. and Cook, A. R. 2020. Institutional, not home-based, isolation could contain the COVID-19 outbreak. *The Lancet* **395**, 1541-1542.

Erfani, A., Shahriarirad, R., Ranjbar, K., Mirahmadizadeh, A. and Moghadami, M. 2020. Knowledge, attitude and practice toward the novel coronavirus (COVID-19) outbreak- A population-based survey in Iran. *Bull. world Health Organ.* **30**, 10-2471.

Foth, M. and Hearn, G., 2007. Networked individualism of urban residents: discovering the communicative ecology in inner-city apartment buildings. *Inf. Commun. Soc.*, **10**, 749-772.

Geldsetzer, P. 2020. Use of rapid online surveys to assess people's perceptions during infectious disease outbreaks: a cross-sectional Survey on COVID-19. *J. Med. Internet Res.* **22**, 1-13.

Gorbalenya, A. E., Baker, S. C., Baric, R. S., de Groot, R. J., Drosten, C., Gulyaeva, A. A., Haagmans, B. L., Lauber, C., Leontovich, A. M., Neuman, B. W., Penzar, D., Perlman, S., Poon, L. L. M., Samborskiy, D. V., Sidorov, I. A., Sola, I., and Ziebuhr, J. 2020. The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat. Microbiol.* **5**, 536-544.

Hossain, M.J., Ahmmed, F., Kuddus, M.R., Alam, S. and Rahman, S.M.A. 2021a. Exploring public awareness and spreading pattern analysis of COVID-19 outbreak in Bangladesh. *Bangladesh J. Med. Sci.* **20**, 108-117.

Hossain, M.J., Kuddus, M.R. and Rahman, S.M.A. 2021b. Knowledge, attitudes and behavioral responses toward COVID-19 during early phase in Bangladesh: a questionnaire-based study. *Asia Pacific J. Public Health* **33**, 141-144.

Hossain, M. J. and Rahman, S. M. A. 2021. Repurposing therapeutic agents against SARS-CoV-2 infection: most promising and neoteric progress. *Expert Rev. Anti-infect. Ther.* **19**(8), 1009-1027.

Hossain, M.J., Ahmmed, F., Khan, M.R., Rashid, P. T., Hossain, S., Rafi, M.O., … and Mohamed, I.N. 2022. Impact of Prolonged COVID-19 Lockdown on body mass index, eating habits, and physical activity of University students in Bangladesh: a web-based cross-sectional study. *Front. Nutr.* **9**, 873105.

Hussain, A., Garima, T., Singh, B. M., Ram, R. and Tripti, R.P. 2020. Knowledge, attitudes, and practices towards COVID-19 among Nepalese residents: a quick online cross-sectional survey. *Asian J. Med. Sci.* **11**, 6-11.

Islam, T., Talukder, A.K., Siddiqui, N. and Islam, T. 2020. Tackling the COVID-19 pandemic: the Bangladesh perspective. *J. Public Health Res.* **9**, jphr-2020.

Islam, M. R., Jannath, S., Moona, A. A., Akter, S., Hossain, M. J., and Islam, S. M. A. 2021. Association between the use of social networking sites and mental health of young generation in Bangladesh: a cross-sectional study. *J. Comm. Psychol.* **49**, 2276-2297.

Kang, Y., Chen, T., Mui, D., Ferrari, V., Jagasia, D., Scherrer-Crosbie, M., Chen, Y. and Han, Y. 2020. Cardiovascular manifestations and treatment considerations in COVID-19. *Heart* **106**, 1132-1141.

Jones, T. L., Baxter, M. and Khanduja, V. 2013. A quick guide to survey research. *Ann. R. Coll. Surg. Engl.* **95**, 5–7.

Lai, C. C., Shih, T. P., Ko, W. C., Tang, H. J. and Hsueh, P. R. 2020. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *Int. J. Antimicrob. Agents* **55**, 105924.

Lu, H., Nie, P. and Qian, L. 2021. Do quarantine experiences and attitudes towards COVID-19 affect the distribution of mental health in China? A quantile regression analysis. *Appl. Res. Qual. Life* **16**, 1925-1942.

Nearly 20 lakh Dhaka residents could be Covid-19 positive, 78% asymptomatic: study / *The Daily Star*.

Quadri, M. F. A., Jafer, M. A., Alqahtani, A. S., Al mutahar, S. A. B., Odabi, N. I., Daghriri, A. A. and Tadakamadla, S. K. 2020. Novel corona virus disease (COVID-19) awareness among the dental interns, dental auxiliaries and dental specialists in Saudi Arabia: a nationwide study. *J. Infect. Public Health* **13**, 856-864.

Rothan, H. A. and Byrareddy, S. N. 2020. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J. Autoimmun.* **109**, 102433.

Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K. and Kaushal, V. 2020. Study of knowledge, attitude, anxiety and perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J. Psychiatry* **51**, 102083.

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., and Benedek, D. M. 2020. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: mental health consequences and target populations. *Psychiatry Clin. Neurosci.* **74**, 281-282.

Singhal, T. 2020. A review of coronavirus disease-2019 (COVID-19). *Indian J. Pediatr.* **87**, 281-286.

Tomar, B. S., Singh, P., Suman, S., Raj, P. and Nathiya, D., Tripathi, S. and Chauhan,D.S. 2020. Indian community's knowledge attitude and practice towards Covid-19 *MedRxiv*.

Wang, L., Wang, Y., Ye, D. and Liu, Q. 2020. Review of the 2019 novel coronavirus (SARS-CoV-2) based on current evidence. *Int. J. Antimicrob. Agents* **55**, 105948.

Wilder-Smith, A., Chiew, C. J. and Lee, V. J. 2020. Can we contain the COVID-19 outbreak with the same measures as for SARS? *Lancet Infect. Dis.* **20**, e102-e107.

Zhong, B. L., Luo, W., Li, H. M., Zhang, Q. Q., Liu, X. G., Li, W. T., and Li, Y. 2020. Knowledge, attitudes and practices towards COVID-19 among chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int. J. Biol. Sci.* **16**, 1745-1752.