




Knowledge, Attitudes, Practices and Perceptions on COVID-19 among University Students in Bangladesh

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ABSTRACT

Objectives: The purpose of this study is to understand the knowledge, attitudes, practices and perceptions on COVID-19 among Bangladeshi university students.

Materials and Methods: This online cross sectional study reached conveniently selected university students to fill up the structured questionnaire. The questionnaire was comprised with regarding their demographic, knowledge, attitudes, practices and perceptions based variables which was then analyzed using descriptive statistics, Student's t-test and under multivariate technique, MANOVA.

Results: Study found positive knowledge of students, identifying symptoms (100%), possible medium of transmission (82.7% chose correctly) and chose elderly population as mostly jeopardized due to COVID-19. More than 36% consider themselves to be infected with within more than 2 weeks and more than 75% were feared of transmission after being infected with COVID-19. Practices of prevention measures were also different across the place of residence. There was no difference in mean perceptions on COVID-19

Conclusion: This research is one of the first attempts to study the knowledge, attitudes, practices and perceptions on COVID-19 among Bangladeshi university students. The study emphasizes university students as they are supposed to be the most educated than average population. Their awareness would improve overall community awareness and slow the transmission.

Keywords: COVID-19, knowledge, attitudes, practices, perceptions

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INTRODUCTION

Coronavirus disease, as an emerging respiratory disease caused by novel coronavirus, shortly known as "COVID-19" was first came into light in December 2019 in Wuhan, China. The major clinical symptoms of this highly infectious disease include fever, dry cough, fatigue, myalgia and dyspnea. Within short time span the virus, originated in Asia swiftly spread worldwide, concerns the World Health Organization (WHO) and Public Health Emergency of International Concern (PHEIC) to announce COVID-19 as an emergency on January 30, 2020 and finally declared it as a pandemic on March 11, 2020 [1,2]. In Bangladesh Case Fatality Rate (CFR) is 1.26% and in China severe stage COVID-19 patients were 18.5% characterizing symptoms of acute respiratory distress syndrome, septic shock, difficult-to-tackle metabolic acidosis and bleeding and coagulation dysfunction [1,3,4]. COVID-19, as most recently outburst contagious respiratory disease, has made the lives worldwide miserable. Notably COVID-19 shares the same RNA constitution as SARS-CoV and MERS-CoV [3,5].

The general knowledge about COVID-19 condition to catch on somebody requires direct mucus contact with the breath/ingestion/salivary abscess, which might prevail on hands, objects or surfaces touched by, of an infected person [6,7]. Limiting community and public interaction and activities through imposing government's rules is the most practical way to prevent the escalation of COVID-19 cases as there is no treatment or vaccine [8,9]. Maintaining social distance, self-isolation, lockdown are main courses of actions, according to WHO (2020). Most notably keeping a safe distance, minimum 3 feet or 1 meter, from other persons; washing hands immediately after touching respiratory tract; scrubbing and sterilizing frequently touched objects/surfaces and environment; allowing sufficient air flow in the house through proper ventilation; seeking medical help or treatment after being symptomized with fever, cough and difficulty in breathing are recommended advises [9-11].

According to Şencan & Kuzi, (2020) and Worldometers (2020), a reference website that provides counters and real-time statistics for diverse topics, 213 countries and territories around the world have reported a total of 10,630,286 confirmed cases of the coronavirus COVID-19 that originated from Wuhan, China, and a death toll of

514,979. Recent report of WHO depicts the fact that as of between 9 March and 29 June, 2020 in Bangladesh, according to Institute of Epidemiology, Disease control and Research (IEDCR), there were 141,801 COVID-19 confirmed by rt-PCR including 1782 related death cases [12,13].

Bangladesh, as highly cumbersome with population, is at high risk of COVID-19 as a contagious disease. Moreover any treatable vaccine is yet to come. In this study we attempted to understand the KAP, widely known as a health behavior change theory, (Knowledge, Attitudes and Practices) among university students of Bangladesh along with their perceptions about the COVID-19 virus. We assumed that university students are most conscious individuals about this pandemic and we tried to assess how their perceptions and KAP about COVID-19 differs in terms of their residential places and gender.

MATERIALS AND METHODS

Participants and Protocols

This web-based cross sectional study was carried out among public university students in Bangladesh, which was selected conveniently as both for universities and students as face to face interactions were not feasible, from July 03 2020 to July 15 2020 during the period of nationwide imposed lockdown considering the fact that maintaining lockdown plea and restriction of movement would minimize COVID-19 spread. As the study was web-based, snowball sampling technique was also used for reaching large samples. Surveyed universities were, KU, KUET, JUST, DU, BUET, JU, RUET and RU. All of these are public universities in Bangladesh. A self-reported structured questionnaire was prepared utilizing Questionnaire Star, professional online survey evaluation and voting platform, and distributed through the authors' personal social networking websites, includes (Facebook, whatsapp, email) among selected university students. Furthermore, reached participants were requested to disperse the questionnaire link to their known circles within the intended study population.

Measures

The self-reported questionnaire for this study was developed following the WHO (2020) guideline for corona virus and Knowledge, Attitudes and Practices Survey on Zika virus produced by the WHO (2016) [14,15]. The questionnaire comprised of two parts: Demographics and KAPP variables. Demographic part contained some basic information about respondent like gender, age, place of current residency, enrolled university name and program level. The KAPP part comprised of total 33 questions among them 13 questions were Knowledge related, 9 questions for Attitudes, 11 Practices questions and Perceptions part contained 7 questions. The Cronbach's alpha coefficient for the Perception questionnaire, from pilot survey, was 0.6527, indicating acceptable internal consistency.

Statistical Analysis

The survey questionnaire was organized into five domains. Among all the domains knowledge, attitudes, perceptions and practices questions were analyzed using descriptive, frequency and percentage, statistics. Chi-square test has also been performed in assessing the association among the demographic variables with the four KAPP variables. Some multiple questions across all four sectors have been analyzed descriptive method. Student's t-test and under multivariate

Table 1. Demographic characteristics

Total participants N= 200		n (%)
Age		
Mean (+/-sd)		22 (+/- 2.093)
Gender n (%)		
Male		132 (66)
Female		68 (34)
Study program n (%)		
Undergraduate		126 (63)
Graduate		74 (37)
Area of residence n (%)		
City		89 (44.5)
Town		46 (23)
Village/ rural area		65 (32.5)

technique, MANOVA, was performed to determine mean differences in demographic variables with perceptions and practices questions. The prior level of significance was set to 0.05 (two tailed). Data was analyzed using Statistical Package for Social Science (SPSS) version 16.0 software.

Total Respondents

The survey was terminated on July 15, 2020 resulted total 211 responses. Among all the responses 200 responses were sieved out through the following consideration:

Total sample		Final sample size
Incomplete	6	0
Undesired samples	5	0
Complete and useful	200	200
Total	211	200

RESULTS

Demographics

Demographic data reveals that, from **Table 1**, out of total 200 study sample 66% and 34% were male and female respectively representing mean age of 22. From the study program perspective undergraduate students were 63% and graduate student were 37%. City residents were most observed (44.5%) followed by village residents (32.5%) and Town residents (23%).

Knowledge

In determining the knowledge on COVID-19 both male and female respondents were presented with some knowledge related questions. (From **Table 2**) Out of 132 respondents of male participants 53.3% reported that they came to know about COVID-19 in the last year and 44.7% in the last few months. But majority of the female respondents, out of 68, came to know about COVI-19 in the last few months (63.2%) and the result for both genders was statistically significant ($p < 0.011$).

Both male and female respondents first came to know about COVID-19 through social media 37.1% and 54.4% respectively out of their total responses in each group and p value is 0.012. Communities affected with COVID-19 are confirmed by 77.3% and 77.9% male and female respectively. Both genders confirm their apprehension on COVID-19 to catch on family members by 95.5% and 92.6 for male and female respondents respectively. They also think COVID-19 is really an important issue for their community throughout that apprehension.

Table 2. Knowledge items stratified by gender

Variables	Male (out of) N= 132	Female (out of) N= 68	χ^2	P
<i>When came to know about COVID-19 n (%)</i>				
In the last year	73 (53.3)	24 (35.3)	8.992 ^a	.011*
In the last few months	59 (44.7)	43 (63.2)		
In the last few weeks	0 (0)	1 (1.5)		
<i>First heard about COVID-19 from n (%)</i>				
Television	27 (20.5)	11 (16.2)	14.589 ^a	.012*
Posters	1 (.8)	0 (0)		
Newspapers	11 (8.3)	4 (5.9)		
Internet	40 (30.3)	9 (13.2)		
Social media	49 (37.1)	37 (54.4)		
Friends	4 (3)	7 (10.3)		
<i>Know anyone with COVID-19 in community n (%)</i>				
Yes	102 (77.3)	53 (77.9)	.012	.915
No	30 (22.7)	15 (22.1)		
<i>Consideration of being affected with COVID-19 n (%)</i>				
Yes	126 (95.5)	63 (92.6)	.681	.409
No	6 (4.5)	5 (7.4)		
<i>COVID-19 is an important issue</i>				
Yes	127 (96.2)	67 (98.5)	.931 ^a	.335
No	5 (3.8)	1 (1.5)		
<i>COVID-19 is a viral disease</i>				
Yes	131 (99.2)	67 (98.5)	.218 ^a	.640
No	1 (.8)	1 (1.5)		

*Statistical significance at < .05. ^a explained by Likelihood ratio

COVID-19 is a viral disease 99.2% of male and 98.5% female reported so.

Attitudes

Under the residence type, cumulated in 100 percent in each category, out of total 200 responses, from **Table 3**, 29.2% city residents,

Table 3. Attitudes items stratified by place of residence

N= 200	City n (%)	Town n (%)	Village/rural area n (%)	χ^2 (P)
<i>Possible time span of being affected with COVID-19</i>				
Less than a week	16 (18)	1 (2.2)	8 (12.3)	16.512 (.036)
A week	10 (11.2)	3 (6.5)	11 (16.9)	
More than 2 weeks	26 (29.2)	20 (43.5)	27 (41.5)	
More than 5 weeks	14 (15.7)	13 (28.3)	9 (13.8)	
Never	23 (25.8)	9 (19.6)	10 (15.4)	
<i>Reaction after being diagnosed with COVID-19</i>				
Fear	38 (42.7)	21 (45.7)	36 (55.4)	9.044 ^a (.171)
Sadness	39 (43.8)	19 (41.3)	19 (29.2)	
Shame	----	2 (4.3)	2 (3.1)	
Surprise	12 (13.5)	4 (8.7)	8 (12.3)	
<i>After being tested positive</i>				
Go to hospital	24 (27)	13 (28.3)	24 (36.9)	6.505 ^a (.165)
Stay at home	62 (69.7)	33 (71.7)	41 (63.1)	
Run away from community	3.3.4)	--	--	
<i>Bangladesh at high risk of COVID-19</i>				
Yes	85 (95.5)	46 (100)	63 (96.9)	3.398 ^a (.183)
No	4. (4.5)	--	2 (3.1)	
<i>Tensed about after being positive for COVID-19</i>				
Fear of death	17 (19.1)	11 (23.9)	18 (27.7)	5.761 ^a (.450)
Fear of transmitting	64 (71.9)	32 (69.6)	45 (69.2)	
Fear of cost of treatment	6 (6.7)	3 (6.5)	1 (1.5)	
Fear of being kicked off	2 (2.2)	--	1 (1.5)	
<i>Way to treat COVID-19 patient</i>				
Family look after (Stay home)	47 (52.8)	19 (41.3)	36 (55.4)	2.884 (.577)
Put in some recluse environment	34 (38.2)	20 (43.5)	22 (33.8)	
Admit into hospital	8 (9)	7 (15.2)	7 (10.8)	

N= Total number of people responded to the questions. n= number of responses within particular category ^a. Interpretation of likelihood ratio

Table 3 (continued). Attitudes items stratified by place of residence

N= 200	City n (%)	Town n (%)	Village/rural area n (%)	χ^2 (P)
<i>What would you do if family member is COVID-19 patient</i>				
Provide treatment while stay at home	78 (87.6)	41 (89.1)	55 (84.6)	6.566 ^a (.161)
Send her to hospital	5 (5.6)	5 (10.9)	6 (9.2)	
Put her in reclude environment	6 (6.7)	--	4 (6.2)	

N= Total number of people responded to the questions. n= number of responses within particular category ^a. Interpretation of likelihood ratio

Table 4. Mixed multiple responses (knowledge and practices)

Multiple responses	Male= 132	Female=68
<i>Symptoms of COVID-19 n (%)</i>		
Difficulty in breathing	121 (91.7)	67 (98.5)
Dry cough	100 (75.8)	52 (76.5)
Stuffy nose	71 (53.8)	35 (51.5)
Fever	120 (90.9)	62 (91.2)
Joint pain	58 (43.9)	31 (45.6)
Conjunctivitis	31 (23.5)	17 (25)
Skin rashes	38 (28.8)	15 (22.1)
Tiredness	81 (61.4)	40 (58.8)
Aches and pains	51 (38.6)	26 (38.2)
Sore throat	62 (47)	36 (52.9)
Diarrhea	73 (55.3)	38 (55.9)
<i>COVID-19 spreads by n (%)</i>		
Droplets (coughs, spits, nasal mucus)	127 (96.2)	66 (97.1)
Touched surfaces of affected person	114 (86.4)	60 (88.2)
Handling money	100 (75.8)	55 (80.9)
Pet animals*	29 (22)	17 (25)
Using public washrooms	86 (65.2)	46 (67.6)
Riding public transports	107 (81.1)	57 (88.3)
Mosquito bites*	9 (6.8)	4 (5.9)
<i>Mostly jeopardized people in COVID-19 n (%)</i>		
Elderly population	112 (84.8)	54 (79.4)
Chronic diseased people	101 (76.5)	53 (77.9)
Pregnant women	60 (45.5)	34 (50)
Healthcare providers	74 (56.1)	44 (64.7)
New born babies	45 (34.1)	24 (35.3)
Teenagers	23 (17.4)	7 (10.3)
<i>Taken action in preventing COVID-19 n (%)</i>		
Proper hand wash	128 (97.7)	64 (94.1)
Maintain safe distance	120 (91.6)	62 (91.2)
Abstain from rubbing (face, nose, mouth)	108 (82.4)	58 (85.3)
Wearing mask in public places	110 (84)	54 (79.4)

* Incorrect options

43.5% town residents and 41.5% village/rural residents think they would be affected with COVID-19 within more than 2 weeks' time expansion. But the town residents consider themselves being susceptible to catch on COVID-19 more than 5 weeks (28.3%) is the second possible time span, while other two residents' type considers themselves out of COVID-19 threats. City residents would be more sad (43.8%) while town and village/rural residents would react with fear (45.7%) and (55.4%) respectively after being diagnosed with COVID-19. All three types of residents people report that stay at home treatment is better than go to hospital and running away from community. They also confirm that Bangladesh is at high risk of COVID-19. Most surprisingly they would be more terrified to transmission 71.9%, 69.6% and 69.2% city, town and village/rural residents respectively than fear of death and cost of treatment. If the family member is diagnosed with COVID-19 they would provide family care treatment rather than sending the patient to the hospital. City

residents (87.6%), town residents (89.1%) and village/rural residents (84.6%) were accorded with this statement.

From Table 4 in articulating the symptoms of COVID-19 out of 132 male students most highly consensus symptoms were breathing difficulty (91.7%), fever (90.9%), dry cough (75.8%), tiredness (61.4%), stuffy nose (53.8%) and diarrhea (53.3%). For female students, out of 68, they also agreed highly with first four symptoms conceded by male students respectively but they also prioritized diarrhea (55.9%), sore throat (52.9%) and stuffy nose (51.5%) as fifth, sixth and seventh priority symptoms consecutively. As for the selecting mediums through which COVID-19 spreads by both male and female concede that droplets (coughs, spits and nasal mucus) 96.2% and 97.1% respectively responsible for prime cause. In choosing other mediums both male and female have different picks. As male prioritize touched surfaces of affected persons (86.4%), riding public transports (81.4%) and handling money (75.8%) as major causes while female students think handling money (88.9%), riding public transports (88.2%) and touched surfaces

Table 5. Perceptions on COVID-19 (n= 200)

Items	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	
1. COVID-19 is a fatal disease	105	(52.5)	78	(39)	17	(8.5)	--	--	--	--	
2. Social stigma (shaming, fearing, abandoning) is related with COVID-19	50	(25)	101	(50.5)	33	(16.5)	11	(5.5)	5	(2.5)	
3. Concern about family member to catch on COVID-19	81	(40.5)	90	(45)	20	(10)	9	(4.5)	--	--	
4. COVID-19 was developed as biological weapon	29	(14.5)	72	(36)	69	(34.5)	27	(13.5)	3	(1.5)	
5. Media is transparent about COVID-19 information	21	(10.5)	28	(14)	21	(10.5)	73	(36.5)	57	(28.5)	
6. Tested results are credible	18	(9)	36	(18)	12	(6)	98	(49)	36	(18)	
7. Health care providers are treating patients properly	9	(4.5)	28	(14)	38	(19)	84	(42)	41	(10.5)	
	Mean perceptions						Test of Sig. (P)				
	Mean \pm SD										
Gender	Male		2.69 \pm .417				F= 4.85 (.029*)				
	Female		2.61 \pm .55				t= 1.08 (.275)				

n= number of responses, t= Student's t test, F= Levene's test for equality of variances

*Statistically significant at $p < 0.05$

Table 6. Practices and mask wearing trends

<i>Mean practice trend of COVID-19 preventive actions</i>						
	Categories	Mean \pm SD	Mean difference	MS (Error)	F	P
Male (n=132)	City	1.85 \pm 0.66	-.2548			.060 (a vs. b)
	Town	2.24 \pm 0.67	-.1528			.285 (b vs. c)
	Village/ rural area	2.21 \pm 0.83	-.4076			.001* a vs. c
Female (n=68)	City	1.86 \pm 0.69				
	Town	1.88 \pm 0.78				
	Village/ rural area	2.36 \pm 0.85				
Gender				.174 (.584)	.317	.574
Area of residence				3.10	5.65	.004*
<i>Mean mask wearing time</i>						
Male (n=132)	City	1.55 \pm .77	-.1991			.248 (a vs. b)
	Town	1.72 \pm .92	-.5920			.000* (a vs. c)
	Village/rural area	2.23 \pm 1.04	-.3930			.032* (b vs. c)
Female (n=68)	City	1.59 \pm .91				
	Town	1.82 \pm 1.13				
	Village/rural area	2.0 \pm 1.11				
Gender				.044 (.896)	.048	.825
Area of residence				5.02	5.61	.004*
Multivariate test statistics						
Wilk's λ		Value	Partial η^2	F		P
Gender		.998	.002	.159		.853
Area of residence		.926	.038	3.76		.005*

* Statistically significant at $p < .05$. Multiple comparisons between each 2 categories are done by post hoc analysis (LSD), MS= Mean

of affected persons are most responsible mediums for spreading COVID-19. In determining mostly jeopardized people due to the COVID-19 infection both male and female students pick elderly population (aged people) (84.8% and (79.4%), chronic diseased people (76.5% and 77.9%) and health care providers (56.1% and 64.7%) respectively. Preventive practices both for male and female students comprises of proper hand wash (97.7% and 94.1%) and maintain safe distance in social situation (91.6% and 91.2%) consecutively. As for third pick male students prioritize wearing mask in public places (84%) and female students prioritize abstain oneself from rubbing face, nose and mouth (85.3%).

Perceptions

Perception on COVID-19 was measured using likert scale measurement. Total seven questions were posed using five scale likert measurements assessing their opinions on COVID-19 situation. Agreed questions reflect positive perceptions and disagreed questions depict negative perception. From **Table 5** perceptions on first four items were

highly agreed. But in later questions start from media's transparency on COVID-19 information and lastly on health care provider's treating method have greatly been disagreed, which means participants have negative perceptions on these questions. From t test mean difference perceptions of both male female students appear less different.

Practices

The mean difference in practice of COVID-19 preventive measurements between demographic characteristics is demonstrated in **Table 6**. Observed mean practice of COVID-19 preventive measures were almost similar for town and village/rural male students (2.24 \pm 0.67 and 2.21 \pm 0.83 respectively) and city and town female students (1.86 \pm 0.69 and 1.88 \pm 0.78 respectively) with no statistically significant differences. But both city and village/rural male and female students have statistically significant ($p < .001$) practice mean differences (1.85 \pm 0.66 and 2.21 \pm 0.83) for male and (1.86 \pm 0.69 and 2.36 \pm 0.85) for female respectively). On the other hand in mean mask wearing practice

also have the similar trends no differences in city vs. town students, both male and female, but have different mean in city and village/ rural ($1.55 \pm .77$ and 2.23 ± 1.04) for male students and ($1.59 \pm .91$ and 2.0 ± 1.11) for female students respectively with statistical significance of ($p < .000$). Statistical significance also observed ($p < .032$) in town vs. village both for male and female students with mean differences ($1.72 \pm .92$ and 2.23 ± 1.04) for male students and (1.82 ± 1.13 and 2.0 ± 1.11) for female students. Practice differences were more observable in residence category of the students rather than gender category.

DISCUSSIONS

To the best of our knowledge, from existing available information, this study was the first to highlight university students in understanding their knowledge, attitudes, practices and perceptions on COVID-19. In our study we found major chunk of the respondents were male 66%, undergraduate 63% city 44.5% residents. In knowledge section male students 55.3% came to know about COVID-19 earlier than female students 35.3%. Social media 43% was the most selected source from where students came to about COVID-19. Elrggal, (2018); Huynh et al., (2020) also found out the internet was abundantly enriched with COVID-19 knowledge [16,17]. Study participants have rich knowledge about the symptoms of COVID-19 as majority express their knowledge in all possible, severe or common, symptoms with the study of Huang et al., 2020; Li et al., 2020 and Wang et al., 2020 [18,19,20]. In understanding the vulnerable group due to COVID-19 our participants have perfect knowledge as 26.3% chose elderly population and 24.4% chose people with chronic diseases. Study of Wang et al., (2020) confirms that our study participants are accurate, as their study put most susceptible to SARS-CoV-2 is elderly people (median age at death 75 years) and people who had previous surgery history and comorbidities [21].

Students, in the study, have apprehensive attitudes toward COVID-19 to catch on either by themselves or their family members, this apprehensive situation is fostered due to the rapid escalation of COVID-19 patients in Bangladesh and other developed and developing countries [13,22]. Majorities are afraid of transmitting, after being diagnosed with, to others and among family members. Because of the easy transmission as the study of Wang et al., (2020) described the routes, common, of transmission of SARS-CoV-2 are droplets and close contact of infected person. In treating COVID-19 patients students prioritizes stay at home treatment rather than sending patients to the hospitals [23].

In measuring perceptions, students express negative perception in health care systems. Testing procedures are also less credible to the students. Information, disseminated by media, on COVID-19 is less transparent.

COVID-19 as a viral disease, possibility to infect students or their family members and social stigma related to this viral is highly perceptible to the study respondents' similar association also found in Zhong et al., (2020) [24].

Actions to prevent COVID-19 spread were unanimously followed by all participants. Hand wash, wearing masks and refrain from touching face, nose and mouth were mostly followed practices. Following the study of Guan et al., (2020) individual can effectively prevent COVID-19 infection improving personal hygiene, wearing medical mask, adequate rest and good ventilation. Our study found

substantial practice difference in three residence level, city, town and village/rural [25].

In conclusion participant in this study has good knowledge. Knowledge is mainly retained from social media and internet, but show apprehensive attitudes to COVID-19 infection due to rapid spread across the country. Perceptions about COVID-19 test and treatment in hospitals are negative among students. Practices are all around maintained by majority test subjects but the proportions are discriminant in city, town, village/rural areas. As proven medication or vaccine is yet to discover it is highly productive to follow the preventive measures.

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ABBREVIATIONS

KU	: Khulna University
KUET	: Khulna University of Engineering and Technology
JUST	: Jashore University of Science and Technology
DU	: Dhaka University
BUET	: Bangladesh University of Engineering and Technology
JU	: Jahangirnagar University
RUET	: Rajshahi University of Engineering and Technology
RU	: Rajshahi University

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