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KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARD COVID-19 AMONG UNIVERSITY STUDENTS IN BANGLADESH: AN ONLINE CROSS-SECTIONAL SURVEY

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ABSTRACT

Background: Knowledge, attitudes, and practices (KAP) shape how well people adopt preventive measures during an outbreak. Evidence on Bangladeshi university students during the first wave of COVID-19 was limited. **Objective:** To describe the socio-demographic characteristics and the COVID-19-related knowledge, attitudes, and preventive practices of university students in Bangladesh. **Method:** A descriptive, online cross-sectional survey using a semi-structured questionnaire was conducted between February and May 2020. Convenience sampling yielded 187 students from public and private universities. Data were analyzed in SPSS using frequencies, percentages, means, and standard deviations. **Results:** Most respondents were aged 19–25 years (87.7%; *M* = 23.18, *SD* = 2.18): female (54.5%): and enrolled in private universities (81.8%). Most correctly identified COVID-19 as a viral disease (88.2%): its incubation period (89.3%): respiratory

transmission (94.1%): and its main symptoms (94.7%). Fewer recognized that anyone can be infected (72.2%) or that treatment was supportive (65.2%). Attitudes were largely positive: 98.4% endorsed mask use in crowded places and 83.4% would accept a vaccine. Reported practices were high for wearing a mask outside (100%): sanitizing hands after returning home (96.3%): and washing hands with soap and water (90.9%): but lower for sanitizing hands before putting on a mask (72.7%). **Conclusion:** Students reported generally favorable KAP, with gaps in understanding of susceptibility and treatment and in hand hygiene around mask handling. Targeted health education and larger, probability-based studies are recommended.

KEYWORDS: COVID-19, knowledge, attitudes, practices, university students, Bangladesh.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by the novel coronavirus SARS-CoV-2, the seventh coronavirus known to infect humans, which was identified in patients with pneumonia in Wuhan, China, in late 2019 (Zhu et al., 2020). Early evidence suggested that the virus was more transmissible, though less lethal, than the coronaviruses behind severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS; Paules et al., 2020; Wang et al., 2020). The World Health Organization (WHO) declared a public health emergency of international concern at the end of January 2020 (WHO, 2020a) and characterized COVID-19 as a pandemic on 11 March 2020 (WHO, 2020b).

The virus spreads from person to person through respiratory droplets and close contact, with an incubation period of up to 14 days, and older adults and people with chronic conditions face a higher risk of severe illness (WHO, 2020c). Common symptoms include fever, dry cough, shortness of breath, myalgia, and fatigue (Huang et al., 2020). Because no specific treatment or vaccine was available in the first months of the pandemic, prevention was the main line of defense (Heymann & Shindo, 2020). WHO advised physical distancing of at least one meter, frequent hand hygiene, avoiding touching the eyes, nose, and mouth, wearing masks, cleaning frequently touched surfaces, ventilating indoor spaces, and seeking care promptly for fever, cough, or breathing difficulty (WHO, 2020c).

Bangladesh announced its first confirmed cases on 8 March 2020 (Anwar et al., 2020). The government imposed a nationwide "general holiday" (lockdown) beginning 26 March 2020, extended several times until 30 May 2020 (The Business Standard, 2020): and educational institutions have been closed since 17 March 2020 (Uddin, 2020). As a lower-middle-income

country and one of the most densely populated in the world, Bangladesh faced particular difficulty with physical distancing, limited testing capacity, and shortages of test kits and protective equipment (Anwar et al., 2020; Molla, 2020). The pandemic also threatened livelihoods, with garment exports falling by 18.12% in fiscal year 2019–20 (Paul, 2020) and projections of rising poverty among student families (Uddin, 2020).

Under these conditions, preventive behavior depends heavily on what people know and believe about the disease. Knowledge is a prerequisite for forming prevention beliefs and positive attitudes, which in turn promote protective behavior (Zhou et al., 2020). KAP surveys are a standard way to measure these dimensions and to guide health education. University students are an important group: they are young, mobile, heavy users of social media, often live in crowded households or hostels, and could act as health communicators in a country with few healthcare workers (Wadood et al., 2020).

Several KAP studies had been published within months of the outbreak. In Bangladesh, an online survey of 2,017 residents found that 48.3% had accurate knowledge, 62.3% had positive attitudes, and 55.1% reported frequent preventive practices (Ferdous et al., 2020). Among 707 young adults, 61.2% had adequate knowledge, 78.9% had a positive attitude, and 51.6% reported good practices (Banik et al., 2020). A survey of 305 Rajshahi University students in March 2020 reported average knowledge and unsatisfactory attitudes and practices (Wadood et al., 2020): and a study of Bangladeshi internet users found that higher knowledge scores were positively correlated with preventive practice scores (r = .291; Rahman & Sathi, 2020). International studies reported high but uneven knowledge among Chinese residents (Zhong et al., 2020): health workers (Zhou et al., 2020; Saqlain et al., 2020): and medical and non-medical university students in India, Pakistan, and Jordan (Agarwal et al., 2020; Alzoubi et al., 2020; Ikhlaq et al., 2020). Knowledge about transmission routes was lowest in a multinational Middle Eastern sample (Naser et al., 2020): and a U.S. survey of adults with chronic conditions found that nearly a third could not identify symptoms or prevention methods (Wolf et al., 2020).

Studies of KAP among Bangladeshi university students drawn from several institutions were still scarce. The present study addresses this gap. Its research question was: What are the levels of knowledge, attitudes, and practices toward COVID-19 among university students in Bangladesh? The general objective was to assess these among students of several Bangladeshi universities. The specific objectives were to (a) describe the socio-demographic

characteristics of the respondents, (b) describe their knowledge of the nature, incubation period, transmission, symptoms, susceptibility, and treatment of COVID-19, (c) describe their attitudes toward preventive measures, vaccination, and the impact of the outbreak, and (d) describe their self-reported preventive practices.

METHOD

Design, Setting, and Period

We conducted a descriptive, online cross-sectional survey of students enrolled in several public and private universities in Bangladesh. The study ran for four months, from February to May 2020, during the early phase of the outbreak and the national lockdown. The study is reported in line with the STROBE guidance for cross-sectional studies.

Participants and Sampling

The target population was university students in Bangladesh. Students were eligible if they were willing to participate and had an internet connection. Students who were physically or mentally unable to take part at the time of data collection and students who had dropped out of university were excluded. Participants were recruited through convenience sampling. The required sample size was calculated as $n = z^2pq/d^2$, where $z = 1.96$ (95% confidence): $p = 0.5$, $q = 1 - p = 0.5$, and $d = 0.05$, giving $n \approx 384$. Because of time limits and restrictions during the pandemic, 187 students completed the survey. With this sample, the margin of error for a proportion of 50% is approximately ±7.2% at the 95% confidence level.

Instrument and Data Collection

Data were collected with an online, semi-structured questionnaire with closed-ended items in four sections: (a) socio-demographic characteristics (age, sex, religion, marital status, type of university, year of study, residence, and number of family members); (b) knowledge (type of disease, incubation period, transmission route, susceptibility, symptoms, treatment, and mortality); (c) attitudes (perceived importance of masks, perceived impact of the outbreak on studies, hope for a quick end to the outbreak, worry about family members' infection, willingness to be vaccinated, and maintaining a healthy lifestyle); and (d) practices (use of tissue when coughing or sneezing, social distancing, handwashing, hand sanitizing, avoiding touching the face, and mask use). The questionnaire was pre-tested before the main survey and checked for completeness and correctness before analysis.

Operational Definitions

Knowledge was defined as awareness and understanding of facts about COVID-19, acquired through experience or education. *Attitude* was defined as beliefs, feelings, and dispositions toward COVID-19 and its prevention. *Practice* was defined as self-reported use of preventive behaviors in daily life. *Lockdown* referred to the government-imposed general holiday restricting movement from 26 March to 30 May 2020. Correct answers were defined by WHO guidance available at the time of the survey; for the incubation period, "4–14 days" was keyed as correct.

Data Analysis

Responses were entered into SPSS (Statistical Package for the Social Sciences) and checked in Microsoft Excel. Categorical variables are presented as frequencies and percentages and age as mean and standard deviation. Items were analyzed individually; no composite scores or inferential tests were computed.

RESULTS

Participant Characteristics

A total of 187 students participated. Table 1 summarizes their characteristics. Most were aged 19–25 years (M = 23.18, SD = 2.18): female, Muslim, unmarried, urban residents, and enrolled in private universities. Representation was balanced across years of study, with the largest group in the fourth year (23.0%).

Table 1: Socio-Demographic Characteristics of the Respondents (N = 187).

Characteristic	n	%
Age (years)		
19–25	164	87.7
26–32	23	12.3
Sex		
Female	102	54.5
Male	85	45.5
Religion		
Islam	169	90.4
Hinduism	18	9.6
Marital status		
Unmarried	149	79.7
Married	38	20.3
Type of university		
Private	153	81.8
Public	34	18.2

Year of study		
First	37	19.8
Second	40	21.4
Third	38	20.3
Fourth	43	23.0
Fifth	29	15.5
Residence		
Urban	132	70.6
Rural	55	29.4
Family members living together		
More than 5	107	57.2
Fewer than 5	80	42.8

Note. Age: *M* = 23.18, *SD* = 2.18. Percentages may not sum to 100 because of rounding.

Knowledge

Table 2 presents knowledge items. Most students knew that COVID-19 is a viral disease (88.2%): that the incubation period is 4–14 days (89.3%): that it spreads mainly through respiratory droplets and close contact (94.1%): and that its main symptoms are fever, dry cough, and shortness of breath (94.7%). Nearly nine in ten (89.8%) knew that COVID-19 can cause death, and all respondents knew that handwashing and mask wearing are necessary for prevention. Knowledge was weaker for susceptibility and treatment: 27.8% did not recognize that anyone can be infected (25.1% believed only older adults and children are at risk, and 2.7% did not know): and 34.8% did not identify supportive care as the treatment (30.5% named a vaccine and 4.3% did not know). Because no licensed vaccine existed during the study period, naming a vaccine was classed as incorrect.

Table 2: Knowledge of COVID-19 among Respondents (N = 187).

Item	**Correct response**	**n**	**%**
Type of infectious disease	Viral	165	88.2
Incubation period	4–14 days	167	89.3
Major transmission route	Respiratory droplets/close contact	176	94.1
Who is susceptible	Anyone	135	72.2
Main symptoms	Fever, dry cough, dyspnea	177	94.7
Treatment	Supportive care	122	65.2
COVID-19 can lead to death	Yes	168	89.8
Handwashing is necessary for prevention	Yes	187	100.0
Mask wearing is necessary for prevention	Yes	187	100.0

Note. Incorrect or "don't know" responses: disease type, bacterial 8.6%, doesn't know 3.2%; incubation period, 3–7 days 8.0%, doesn't know 2.7%; transmission, food and water 2.1%, don't know 3.7%; symptoms, fatigue/myalgia/sore throat only 3.2%, don't know 2.1%.

Attitudes

Attitudes were largely positive (Table 3). Almost all respondents (98.4%) considered mask use in crowded places important and reported that the outbreak had affected their studies. Most (85.0%) were worried that a family member might be infected, 82.4% hoped the outbreak would end quickly so that they could return to their institutions, and 83.4% said they would be vaccinated if a vaccine became available; 13.4% said they would not and 3.2% were undecided. Most (92.0%) said they were maintaining a healthy lifestyle during the outbreak.

Table 3: Attitudes toward COVID-19 among respondents (N = 187)

Item	Positive Response	n	%
It is important to use a face mask in crowded places	Agree	184	98.4
The outbreak has affected my studies	Yes	184	98.4
Hope the outbreak stops quickly so I can return to my institution	Yes	154	82.4
Worried that a family member may get infected	Yes	159	85.0
Would take a COVID-19 vaccine if available	Yes	156	83.4
Maintaining a healthy lifestyle during the outbreak	Yes	172	92.0

Note. Other responses: hope outbreak stops quickly, no 14.4%, undecided 3.2%; vaccine, no 13.4%, undecided 3.2%; healthy lifestyle, no 5.3%, sometimes 2.7%.

Practices

Self-reported preventive practices were generally high (Table 4). All respondents wore a mask when going outside. Most sanitized their hands after returning from outside (96.3%): washed their hands frequently with soap and water (90.9%): maintained social distancing (88.2%): used a tissue or handkerchief when coughing or sneezing (87.2%): and avoided touching their face and eyes before sanitizing their hands (83.4%). Figure 1 shows the full distribution of responses. Practices around mask handling were weaker: 72.7% sanitized their hands before putting on a mask and 80.2% after removing it.

Table 4: Preventive practices reported by respondents (N = 187)

Practice	Yes, n	Yes, %	Sometimes, %	No, %
Wear a mask before going outside	187	100.0	0.0	0.0
Sanitize hands after returning from outside	180	96.3	1.1	2.7
Wash hands frequently with soap and water	170	90.9	2.1	7.0
Maintain social distance	165	88.2	2.1	9.6
Use tissue or handkerchief when coughing or sneezing	163	87.2	1.6	11.2

Avoid touching face and eyes before sanitizing hands	156	83.4	3.7	12.8
Sanitize hands after removing mask	150	80.2	4.8	15.0
Sanitize hands before wearing mask	136	72.7	3.7	23.5

Note. Percentages may not sum to 100 because of rounding.

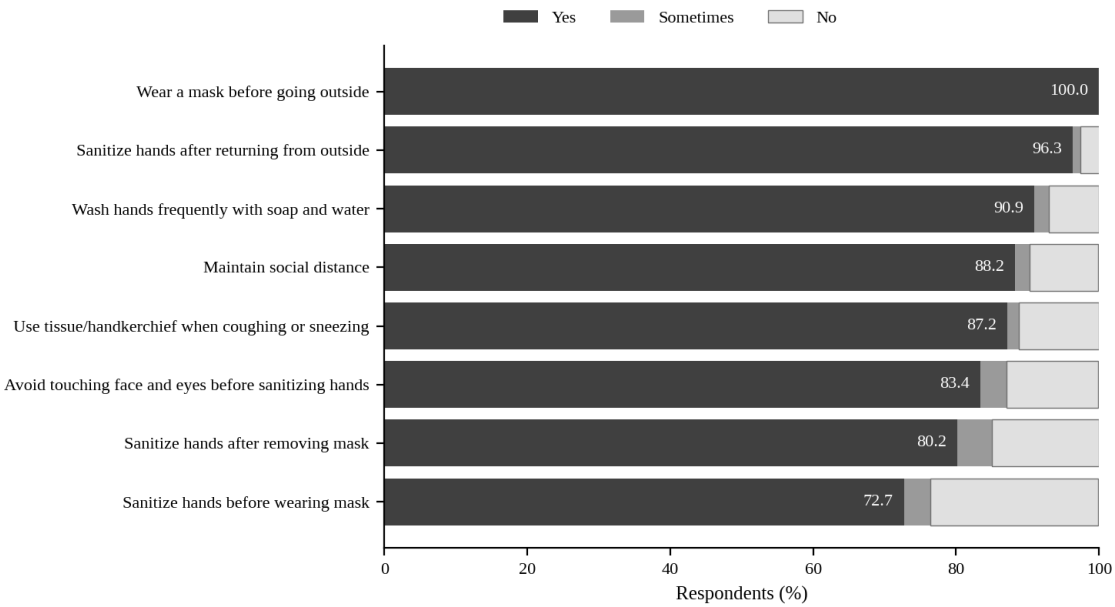


Figure 1: ***Preventive Practices Reported by Respondents (N = 187)***

Note. Bars show the percentage of respondents who answered yes, sometimes, or no for each practice. Percentages may not sum to 100 because of rounding.

DISCUSSION

This study described the knowledge, attitudes, and practices of 187 university students in Bangladesh toward COVID-19 during the first months of the pandemic. Overall, respondents showed high levels of correct knowledge and favorable attitudes, and reported high adherence to most preventive practices, with specific gaps in knowledge of susceptibility and treatment and in hand hygiene around mask handling.

KNOWLEDGE

The proportion of students who correctly identified the main symptoms (94.7%) and the transmission route (94.1%) is consistent with reports from university students in Jordan, where fever, cough, and breathing difficulty were recognized by more than 90% (Alzoubi et al., 2020): and in Pakistan, where more than 90% knew the cause, transmission, and symptoms (Ikhlaq et al., 2020). It is higher than in a multinational Middle Eastern sample, in

which transmission routes were the weakest knowledge domain (Naser et al., 2020): and then among Rajshahi University students surveyed in March 2020, whose knowledge was only average (Wadood et al., 2020). Knowledge of the incubation period (89.3%) was also better than that of Indian medical students, whose understanding of incubation and time to symptoms was less than satisfactory (Agarwal et al., 2020). Students in this study were surveyed later in the outbreak than some of these samples, so rising public awareness may explain part of the difference; the surveys also used different instruments, so direct comparison should be cautious.

The weakest knowledge areas deserve attention. More than a quarter of students did not recognize that anyone can be infected, a belief that may lower perceived personal risk and reduce adherence. Similar misconceptions were found among Rajshahi University students, some of whom saw no need to keep distance from infected people (Wadood et al., 2020). In addition, nearly a third (30.5%) named a vaccine as the treatment. During the study period no vaccine existed, so this answer reflects either confusion between prevention and cure or anticipation of a vaccine; either way, it indicates a need for clearer messaging.

Attitudes

Attitudes were largely favorable. Nearly all students supported mask use in crowded places, and 83.4% would accept a vaccine, slightly more than the 73.0% of Egyptian adults who looked forward to a vaccine (Abdelhafiz et al., 2020). The 16.6% who would refuse or were undecided is notable, because vaccine acceptance would later be essential to controlling the pandemic. Most students (85.0%) worried about infection among family members, which is understandable given that many lived with large households, and almost all said the outbreak had affected their studies, in line with the national closure of educational institutions and the economic strain on student families (Uddin, 2020).

Practices

Self-reported practice was higher than in several earlier Bangladeshi studies. Mask use outside the home was universal here, compared with 98.7% for masks in crowded places in the national sample of Ferdous et al. (2020) and 70.6% in young adults (Banik et al., 2020). Handwashing with soap and water (90.9%) was similar to the 93.8% reported by Ferdous et al. (2020) and higher than the 75.2% reported by Banik et al. (2020). Rajshahi University students described their practice as unsatisfactory in March 2020 (Wadood et al., 2020): suggesting that practices may have improved as the outbreak and lockdown progressed.

However, self-reported behavior tends to overstate actual behavior because of social desirability, and 100% mask use is unlikely to be fully accurate in practice. The lower rates of hand sanitizing before putting on and after removing a mask (72.7% and 80.2%) show that students adopted the visible behavior (wearing a mask) more consistently than the hygiene steps that make masks safe to use. This is a practical, teachable gap for health education.

Implications

Because knowledge supports attitudes and practice (Zhou et al., 2020): and because knowledge and preventive practice have been positively correlated among Bangladeshi respondents (Rahman & Sathi, 2020): education aimed at the gaps found here is likely to be worthwhile. Messages should state clearly that everyone is at risk, distinguish supportive care from prevention and vaccination, and teach correct hand hygiene when putting on and removing masks. Given the shortage of healthcare workers in Bangladesh, informed university students can serve as peer educators (Wadood et al., 2020).

Strengths and Limitations

This study covered students from several universities and examined knowledge, attitudes, and practices together, using a sample-size calculation based on a recognized formula. Its limitations should be considered when interpreting the findings. First, the cross-sectional design prevents causal inference. Second, the sample (187) was below the calculated size (384): and convenience sampling through an online survey introduces selection bias; respondents were mostly young, urban, and from private universities, and students with limited internet access, including those from rural areas or low-income families, were probably under-represented. Third, responses were self-reported and subject to social desirability and recall bias. Fourth, the number of items per domain was limited, and items were analyzed individually, without composite KAP scores, validated scales, or tests of association by demographic factors. Fifth, the data describe a specific moment in early 2020. Since then, vaccines have been developed, and WHO ended the COVID-19 public health emergency of international concern on 5 May 2023 (WHO, 2023). The findings are therefore best read as a record of student awareness during the first wave and as a guide for future outbreak communication.

CONCLUSION

University students in this survey reported high levels of correct knowledge, mostly positive attitudes, and good adherence to key preventive practices during the early phase of the

COVID-19 pandemic in Bangladesh. Important gaps remained: more than a quarter did not know that anyone can be infected, about one in three did not identify supportive care as the treatment, one in six would not or might not accept a vaccine, and hand hygiene around mask use was inconsistent. We recommend targeted health education that addresses these gaps, and the use of knowledgeable students as peer educators. Future research should use larger, probability-based samples drawn from multiple institutions, validated KAP scales with composite scores, and analyses of associations with age, sex, residence, and field of study, as well as the sources from which students obtains COVID-19 information.

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