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# KNOWLEDGE, ATTITUDES AND PRACTICES (KAP) TOWARDS COVID-19 AND IMPORTANCE OF HAND HYGIENE: A CROSS-SECTIONAL STUDY.

**Adnan Bacha[1]*, Mortuza Begum[2], Fahmida Islam Chowdhury[3], Sara Farahnaj[4], Tarek Shams[5], Md. Akram Hossain[6]**

1. *MBBS, MS. Assistant Professor, Department of Surgery, Southern Medical College and Hospital, Chattogram, Bangladesh.*
2. *MBBS, FCPS. Junior Consultant, Department of Obs and Gynae, Chittagong Medical College and Hospital, Chattogram, Bangladesh.*
3. *MBBS, FCPS. Assistant Professor, Department of Obs and Gynae, Chittagong Medical College and Hospital, Chattogram, Bangladesh.*
4. *MBBS, MPH, Assistant Professor, IAHS, Chattogram, Bangladesh.*
5. *MBBS, FCPS, Assistant Professor, Department of Medicine, Chittagong Medical College and Hospital, Chattogram, Bangladesh.*
6. *MBBS, D.Card, Senior Consultant Cardiology, Chattogram General Hospital, Chattogram, Bangladesh.*

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**Background**: Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) has accursed the world since December 2019 when it was first diagnosed in Wuhan, China. As it quickly spread to almost all the corners of the world, WHO later declared it as a global pandemic. Effective non pharmaceutical measures to control it, depends upon the knowledge and practice of basic principles of hygiene and use of facemasks. Hence educating public about it has an immense role in controlling this contagious disease.

**Material and Methods**: This cross-sectional study was conducted in Chittagong during June 2020 to December 2020 with a study population of 1489 participants. Adults with good physical and mental condition, and those who agreed to participate were included while unwilling and sick people were excluded from the study.

**Results**: Out of 1489 participants, the mean age was 28.81±8.64 years with range from 12 to 70 years. More than half (51%) of the participants were female and about 773(51.9%) participants completed above X education level. Knowledge about the disease, its causative agent, main symptoms, ultimate fate and its mode of transmission was considerably high. Majority of the participants were accustomed of the preventive measures such as social distancing, isolation of the patients, home quarantine and avoidance of large gatherings. Knowledge directly

affected both attitudes and practices as the survey revealed that the majority (91.89%) of the participants achieved a good knowledge-attitude score and 83.75% achieved a good knowledge-practice score. Overall achieved knowledge score regarding the importance of hand hygiene translated on attitude and practices.

**Conclusion**: Our findings insinuated that Bangladeshi population substantiated a decent knowledge about COVID-19 and knowledge about hand hygiene was above par and that too translated on attitude and practices. Hence widespread targeted health education programme that incorporates considerations of KAP modifying factors is further needed to prevent subsequent waves of the infection.

**Corresponding author**
**Adnan Bacha***

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**INTRODUCTION**:

Coronavirus disease 2019 (COVID-19) is a viral illness caused by the novel coronavirus which belongs to a large family of ribonucleic acid (RNA) viruses, and is now called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV). COVID-19 is an emerging respiratory tract infection, with a wide spectrum extending from asymptomatic to mild symptoms as of the common cold, to more serious diseases, such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) (1, 2). The main symptoms of COVID-19 have been identified as fever, dry cough, sore throat, loss of taste and smell, fatigue, myalgia, headache, shortness of breath, dyspnoea and chest pain (3, 4). COVID-19 virus can be transmitted either by direct contact with an infected person or by indirect contact with surfaces in the immediate environment or with objects used by the infected person. It is characterized by rapid transmission from the mouth or nose in the form of larger respiratory droplets (>5 -10µm) to smaller aerosols (<5µm) when they cough, sneeze, sing or even breathe, and hence can occur by close contact (within 1 meter) with an infected person (5, 6).

It was first discovered in December 2019, in Wuhan city, Hubei Province, China from where it almost spread to all the counties of the world in a wink (1, 2). On January 30, 2020, the World Health Organization (WHO) declared that the outbreak of COVID-19 constituted a Public Health Emergency of International Concern (PHEI C), calling for countries to take imperative action against the rapid spread of the virus (6). Later, the WHO declared COVID-19 a "global pandemic" (7). As on 15 May 2021, there have been 161,513,458 confirmed cases of COVID-19, including 3,352,109 deaths, reported to WHO from 212 countries/territories/areas (8). Bangladesh announced the first three cases of COVID-19 on March 8, 2020 and the infection rates remained low until the end of March, but a dramatic rise in cases began in April 2020, and just by April 30, the total number of confirmed cases raised to 7667 (with 168 deaths) (9).

There is no clinically proven effective treatment for COVID-19 as of yet, and efficacy of vaccine has a big question mark, moreover to vaccinate all the people is an uphill task, that too for low and middle income countries like Bangladesh. In this situation to have an effective control, having knowledge about the epidemiological evidence of the disease, including its transmission dynamics, epidemic doubling time, and reproductive frequency, basic hygienic principles and importance of using face masks is therefore, of vital importance (10). To achieve an ultimate success against this deadly disease,

commitment to these control measures is absolutely necessary. According to the KAP theory, this is generally affected by their knowledge, attitude, and practices (KAP) concerning COVID-19 (11, 12). Public education is considered as one of the most important measures that can help control the diseases, as has been in the case regarding SARS (13). Amidst pandemics, educating, engaging, intriguing and mobilizing the public to become active participants may help achieve public health emergency preparedness and reduce the overall population's vulnerability (14). When people collectively engage in preventive behaviors like practicing personal hygiene by wearing face masks, using hand sanitizers, regular washing of hands, and maintaining social distance, it is possible to control the spread of the disease. Studies highlight that the individual behaviors may dramatically decrease morbidity and mortality rates of COVID-19 (15, 16). Recent studies on COVID-19 revealed that knowledge, perceived controllability, optimistic beliefs, emotion, and risk perception might all account for precautionary actions of the public (10). To date, several KAP studies have examined the associations of knowledge with attitudes or practices beyond understanding the prevalence of each. The results of these previous studies revealed that a higher level of knowledge is positively related to the practice of preventive measures, and attitudes also associate positively with preventive behaviors (17-20). Therefore, a routine practice of precautionary behaviors among the public must become the new status quo.

**MATERIALS AND METHODS:**

This cross-sectional study was conducted among the adult population across different Medical Colleges and Mass population in Chittagong, Bangladesh during June'2020 to December'2020. A total of 1507 participants were interviewed, and 18 were rejected because of incomplete information or failing to meet the inclusion criteria. Ultimately 1489 participants were considered, all of whom were in a good physical and mental condition (in case of self-administered and face to face interview), who agreed to participate were included in the study. Exclusion criteria included unwillingness and sickness. Considering the special situation that the pandemic had created, it could not be possible to conduct a fully community based survey with a nationally representative sample. In the rural areas a random sampling technique was adopted while as in apartment buildings, questionnaire sets were distributed and the data was collected using a structured questionnaire. The questionnaire although set in English, was translated into Bangla so that the study population can have a better understanding of the questions. It was pre-tested among a cross section of participants to ensure the clarity of questions, reduce bias if any and eliminate the ambiguity. The questionnaire was designed/constructed to collect socio-demographic characteristics that included gender, age, education, occupation and religion of the participants. Knowledge about COVID-19 was assessed by 36 factual statements about the disease, its nature and mode of transmission, high risk population, symptoms of the disease, availability of vaccine, specific treatment, preventive measures, quarantine period, social distancing and incubation period of the disease. Knowledge, attitude and practices related to importance of hand hygiene for the prevention and control of COVID-19 was assessed by separate set of questions. At the very outset of the interview, the participants were informed about the purpose of the study, and were given a choice to or not to respond. The consent was obtained from each participant before starting the interview or answering the questionnaire in written. Descriptive statistics including percentages, means, and standard deviations were calculated. Attitudes and practices in relation to knowledge were assessed with independent samples t-test, Chi-square test as

appropriate. To identify the factors associated with knowledge, multivariable linear regression analysis was performed, using all of the demographic variables as independent variables and knowledge status as the outcome variable. To identify factors associated with attitudes and practices, binary logistic regression analyses were performed, selecting the factors with a backward stepwise method. To quantify the associations between variables and knowledge, attitude and practices statistical significance was set to 0.05 or less and a confidence interval of 95% for all analyses. Data entry and statistical analyses were performed using Statistical Package for Social Science Programme for Windows (Version 23.0).

**RESULTS**:

Table 1 shows that out of 1489 participants, the mean age was 28.81±8.64 years with range 12 to 70 years. More than half of the participants were female (51%) and 730(49%) were male and more than half 773(51.9%) participants had completed above level X of education. Majority 709(47.6%) of the participants were service holders. Table 2 illustrates that majority 1289(84.6%) participants had heard about COVID-19, 1485(99.7%) had heard about corona virus, 1428(95.9%) knew that fever, dry cough and shortness of breath are the symptoms of COVID-19, 1155(77.6%) participants knew that some patients may remain asymptomatic even after getting infected, 1311(88.0%) had the knowledge that COVID-19 can be fatal for those who are Elderly, Diabetic, Asthmatic or are having any Cardiovascular problems, 1106(74.3%) mentioned that death was not the ultimate fate of COVID-19, 1150(77.2%) knew about quarantine, 1098(73.7%) knew about isolation, 1412(94.8%) had heard about social distancing, 1426(95.8%) felt that it was necessary to maintain a minimum distance of 3 feet between two persons, 1406(94.4%) had the knowledge that corona virus can enter into human body through mouth, nose and eyes, 1418(95.2%) knew that corona virus can be transmitted through coughing and sneezing, 1149(77.2%) knew that corona virus can be transmitted through air, 1372(92.1%) responded that Corona virus can be transmitted by touch (shaking hands, hugging, etc.), 1405(984.4%) recognized that Corona virus can be transmitted at gatherings (marriage ceremonies, religious congregations, shopping malls, markets, etc.), 1455(97.0%) acknowledged that Corona virus can be transmitted through travelling by public transport (buses, trains, launches, etc.), 1333(89.5%) replied that Corona virus can be transmitted through fomites, goods, fruits, meat, fish, vegetables, etc., 1154(77.5%) stated that Corona virus can be transmitted through dresses, cash (money bills), key rings, shoes etc., 1250(83.9%) answered that Corona virus can be transmitted through different electronic devices like mobiles, laptops, headphones, etc., 1170(78.6%) considered that Corona virus can be transmitted through sharing same toilet with COVID positive patient, only 573(38.5%) replied that there was a definite treatment for COVID-19 disease, 901(60.5%) mentioned that there was no vaccine against this virus (rightly so, because at the time of collection of data, vaccine was under trial and yet to be approved), 1418(92.5%) considered that regular cleaning of offices, homes, or class rooms with sanitizers can reduce the risk of infection, 1343(90.2%) knew that Corona virus transmission can be prevented by proper washing of food items (fish, meat, vegetables, etc.) prior to cooking, 995(66.8%) stated that there is more risk in eating half or semi cooked fish, meat, vegetables, etc., 1224(82.2%) acknowledged that staying home can reduce the risk of transmission of corona virus, 1371(92.1%) avoided large public gathering like going to places of worship (mosques, temples, etc.), shopping malls, markets, etc., 1128(75.8%) tried to avoid having contact with people like shaking hands, etc.,

1300(87.3%) skipped going to restaurants, 1173(78.8%) shied travelling by public transport recently, 996(66.9%) had recently avoided or post-phoned visit to doctor's chamber or hospital, 1435(96.4%) washed their dresses regularly after coming home from outside, 1320(88.7%) practiced disinfecting their shoes after come back from outside, 1251(84.0%) stopped spending time with friends outside, 1384(92.9%) maintained social distance and 1120(75.2%) answered that they avoided touching their mouth, eyes and nose with unwashed hands.

**Table No 1:** Demographic characteristics of the participants (n=1489)

| **Parameters** | | **Frequency** | **Percentage** |
|---|---|---|---|
| **Age** (in years) (Mean ± SD) | | 28.81±8.64 | |
| Range (min-max) | | (12-70) | |
| **Sex** | Male | 730 | 49.0 |
| | Female | 759 | 51.0 |
| **Educational qualification** | Illiterate | 67 | 4.5 |
| | Below V | 97 | 6.5 |
| | V – VIII | 213 | 14.3 |
| | IX – X | 339 | 22.8 |
| | Above X | 773 | 51.9 |
| **Professional status** | Service Holders | 709 | 47.6 |
| | Housewife | 460 | 30.9 |
| | Student | 207 | 13.9 |
| | Businessmen | 94 | 6.3 |
| | Daily laborer | 13 | 0.9 |
| | Unemployed | 5 | 0.3 |
| | Retd. Employee | 1 | 0.1 |

**Table No 2:** Perceptive Component of the participants about COVID-19 (n=1489)

| **Perceptive component about COVID-19** | **Yes** | | **No** | | **Not Sure** | |
|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** |
| Have you heard about COVID-19? | 1289 | 84.6 | 181 | 12.2 | 49 | 3.3 |
| Have you heard about corona virus? | 1485 | 99.7 | 2 | 0.1 | 2 | 0.1 |
| Fever, dry cough and shortness of breath are the symptoms of COVID-19? | 1428 | 95.9 | 39 | 2.6 | 22 | 1.5 |
| Do you know many patients may remain asymptomatic also? | 1155 | 77.6 | 221 | 14.8 | 113 | 7.6 |
| COVID-19 can be fatal in Elderly, Diabetic, Asthmatic and those with Cardiovascular problems? | 1311 | 88.0 | 70 | 4.7 | 108 | 7.3 |
| Is death the ultimate fate of COVID-19? | 304 | 20.4 | 1106 | 74.3 | 79 | 5.3 |
| Do you know what quarantine is? | 1150 | 77.2 | 137 | 9.2 | 202 | 13.6 |
| Do you know what isolation is? | 1098 | 73.7 | 176 | 11.8 | 215 | 14.4 |
| Have you heard about social distancing? | 1412 | 94.8 | 33 | 2.2 | 44 | 3.0 |
| Do you feel it is important to keep a minimum distance of 3 feet between two persons to | 1426 | 95.8 | 39 | 2.6 | 24 | 1.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| prevent transmission? | | | | | | |
| Corona virus can enter into human body through mouth, nose and eyes? | 1406 | 94.4 | 22 | 1.5 | 61 | 4.1 |
| Corona virus can be transmitted through coughing and sneezing of the patient? | 1418 | 95.2 | 26 | 1.7 | 45 | 3.0 |
| Corona virus can be transmitted through air? | 1149 | 77.2 | 189 | 12.7 | 151 | 10.1 |
| Corona virus can be transmitted by touch (hand shaking, hugging, etc.)? | 1372 | 92.1 | 53 | 3.6 | 64 | 4.3 |
| Corona virus can be transmitted at gatherings like marriage ceremonies, religious congregations, shopping malls, markets, etc. | 1405 | 94.4 | 37 | 2.5 | 47 | 3.2 |
| Corona virus can be transmitted through travelling by public transport (buses, trains, launches, etc.). | 1445 | 97.0 | 19 | 1.3 | 25 | 1.7 |
| Corona virus can be transmitted through fomites, goods, fruits, meat, fish, vegetables, etc. | 1333 | 89.5 | 45 | 3.0 | 111 | 7.5 |
| Corona virus can be transmitted through dresses, money (cash bills), key rings, shoes, etc. | 1154 | 77.5 | 171 | 11.5 | 164 | 11.0 |
| Corona virus can be transmitted through different electronic devices like mobiles, laptops, headphones, etc. | 1250 | 83.9 | 115 | 7.7 | 124 | 8.3 |
| Corona virus can be transmitted through sharing same toilet with COVID positive patient? | 1170 | 78.6 | 121 | 8.1 | 198 | 13.3 |
| Is there any definite treatment for COVID-19 that you know of? | 573 | 38.5 | 766 | 51.4 | 150 | 10.1 |
| Is there a vaccine against this virus? | 260 | 17.5 | 901 | 60.5 | 328 | 22.0 |
| Regular cleaning of offices, homes, or class rooms with sanitizer can reduce the risk of corona virus infection? | 1418 | 95.2 | 48 | 3.2 | 23 | 1.5 |
| Corona virus transmission can be prevented by proper washing of fish, meat, vegetables, etc. prior to cooking. | 1343 | 90.2 | 73 | 4.9 | 73 | 4.9 |
| There is more risk of transmission in eating half or semi cooked fish, meat, vegetables, etc. | 995 | 66.8 | 280 | 18.8 | 214 | 14.4 |
| Staying home can reduce the risk of transmission of corona virus? | 1224 | 82.2 | 89 | 6.0 | 176 | 11.8 |
| Do you avoid large public gatherings like going to places of worship, shopping malls, etc. | 1371 | 92.1 | 81 | 5.4 | 37 | 2.5 |
| Do you try to avoid shaking hands with people? | 1128 | 75.8 | 189 | 12.7 | 172 | 11.6 |
| Have you recently avoided going to restaurants? | 1300 | 87.3 | 149 | 10.0 | 40 | 2.7 |
| Do you avoid travelling by public transport recently? | 1173 | 78.8 | 301 | 20.2 | 15 | 1.0 |
| Have you recently avoided or post-phoned visit to doctor's chamber or hospital? | 444 | 29.8 | 996 | 66.9 | 49 | 3.3 |
| Do you wash your dress regularly after coming | 1435 | 96.4 | 51 | 3.4 | 3 | 0.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| back from outside? | | | | | | |
| Do you disinfect your shoes when you come back from outside? | 1320 | 88.7 | 157 | 10.5 | 12 | 0.8 |
| Do you regularly spend time with your friends outside? | 215 | 14.4 | 1251 | 84.0 | 23 | 1.5 |
| Do you maintain social distance? | 1384 | 92.9 | 56 | 3.8 | 49 | 3.3 |
| Do you frequently touch mouth, eyes and nose with unwashed hands? | 349 | 23.4 | 1120 | 75.2 | 20 | 1.3 |

Table 3 shows 1433(96.2%) participants had a knowledge about hand hygiene, 1419(95.3%) acknowledged that many infections are transmitted through hands and can be prevented by maintaining hand hygiene, 1024(68.8%) answered that wearing hand gloves was very important part of hand hygiene, 1285(86.3%) knew that they need to maintain hand hygiene regularly even after wearing a hand gloves, 1364(91.6%) recognized that it was important to maintain hand hygiene after touching different objects, 1444(97.0%) had heard that hand hygiene can be maintained by either washing hands with soap and water or with alcohol based hand rubs (ABHR), 1381(92.7%) responded that CDC recommends washing hands with soap and water for at least 20 seconds, 1258(84.5%) knew that CDC recommends use of alcohol based hand rubs as one of the methods of hand sanitization, 957(64.3%) stated that recommended ABHR must have 60-70% alcohol, 1332(89.5%) knew that it was recommended to sanitize hands before wearing and removing facemasks, 968(65.1%) felt that washing hands with warm water and soap is superior to washing with cold water and soap. Table 4 shows 1429(96.0%) participants thought that hand hygiene was very important to control the spread of corona virus, 1398(93.6%) thought maintaining hand hygiene can actually protect from corona virus, 1006(67.6%) thought that just wearing gloves was not enough protection against corona virus, less than half (47.8%) thought wearing gloves might be a substitute for hand sanitization, 1272(85.4%) thought it was important to maintain hand hygiene even after wearing gloves, 1383(92.9%) thought it was important to maintain hand hygiene every time after touching different objects, 1058(71.1%) thought that hand washing with soap was better than using alcohol based hand rubs, 1352(90.8%) thought it was really important to wash hand with soap and water for 20 seconds, 838(56.3%) thought there was an importance in using different types of hand sanitizers, 1306(87.7%) thought it was better to carry hand sanitizers with them all the time and 1372(92.1%) thought it was important to use hand sanitizers before wearing and removing facemasks. Table 5 shows 1423(95.6%) participants practiced regular hand hygiene, 1364(91.6%) practiced hand hygiene just to prevent contracting COVID-19, 1079(72.5%) didn't practice wearing hand gloves all the time, 1274(85.6%) maintained hand hygiene even after wearing hand gloves, 1323(88.9%) maintained hand hygiene after touching different objects, 1220(81.9%) washed hands with soap and water for more than 20 seconds, 1014 (68.1%) used ABHR as per CDC recommendation, 1172 (78.7%) carried hand sanitizers with them all the time, family members of 1264 (84.9%) practiced using hand sanitizers, 1274 (85.6%) used hand sanitizers before wearing and after removing facemasks and 1340(90.0%) mentioned that there was facility of washing hands at their working place.

**Table No 3:** Knowledge about importance of Hand hygiene for the prevention of transmission of COVID-19 (n=1489)

| **Knowledge about importance of Hand Hygiene** | **Yes** | | **No** | | **Not Sure** | |
|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** |
| Do you know what hand hygiene is? | 1433 | 96.2 | 9 | 0.6 | 47 | 3.2 |
| Do you know many infections are transmitted through hands and can be prevented by maintaining hand hygiene? | 1419 | 95.3 | 31 | 2.1 | 39 | 2.6 |
| Wearing gloves are very important part of hand hygiene? | 1024 | 68.8 | 354 | 23.8 | 111 | 7.5 |
| Do you know that you need to maintain hand hygiene regularly even if you wear hand gloves? | 1285 | 86.3 | 130 | 8.7 | 74 | 5.0 |
| Do you know it is important to maintain hand hygiene after touching different objects? | 1364 | 91.6 | 67 | 4.5 | 58 | 3.9 |
| Do you know that hand hygiene can be maintained by either washing hands with soap and water or alcohol based hand rubs? | 1444 | 97.0 | 6 | 0.4 | 39 | 2.6 |
| Do you know that CDC recommends washing of hands with soap and water for at least 20 seconds? | 1381 | 92.7 | 36 | 2.4 | 72 | 4.8 |
| Do you know CDC recommends use of alcohol based hand rubs as one of the methods of hand sanitization? | 1258 | 84.5 | 93 | 6.2 | 138 | 9.3 |
| Do you know that ABHR recommended for use must have 60-70% of alcohol? | 957 | 64.3 | 216 | 14.5 | 316 | 21.2 |
| Do you know it is recommended to use hand sanitizers before wearing and removing facemasks? | 1332 | 89.5 | 85 | 5.7 | 72 | 4.8 |
| Washing hands with warm water and soap is superior to washing with cold water and soap? | 968 | 65.1 | 337 | 22.6 | 183 | 12.3 |

**Table No 4:** Attitude of the participants about importance of Hand hygiene for the prevention of transmission of COVID-19 (n=1489)

| **Attitude about importance of Hand Hygiene** | **Yes** | | **No** | | **Not Sure** | |
|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** |
| Do you think hand hygiene is very important to control spread of corona virus? | 1429 | 96.0 | 21 | 1.4 | 39 | 2.6 |
| Do you think maintaining hand hygiene can protect you from corona virus? | 1398 | 93.6 | 41 | 2.8 | 50 | 3.4 |
| Do you think just wearing gloves is enough protection against corona virus? | 333 | 22.4 | 1006 | 67.6 | 150 | 10.1 |
| Do you think wearing gloves may be a substitute for hand washing? | 711 | 47.8 | 636 | 42.7 | 142 | 9.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Do you think it is important to maintain hand hygiene even after wearing gloves? | 1272 | 85.4 | 119 | 8.0 | 98 | 6.6 |
| Do you think it is important to maintain hand hygiene every time after touching different objects? | 1383 | 92.9 | 56 | 3.8 | 50 | 3.4 |
| Do you think that hand washing with soap is better than using alcohol based hand rubs? | 1058 | 71.1 | 255 | 17.1 | 176 | 11.8 |
| Do you think it is really important for us to wash hand with soap and water for 20 seconds? | 1352 | 90.8 | 53 | 3.6 | 84 | 5.6 |
| Do you think there is any importance in using different types of hand sanitizers? | 838 | 56.3 | 392 | 26.3 | 259 | 17.4 |
| Do you think it is better to carry hand sanitizers with you all the time? | 1306 | 87.7 | 123 | 8.3 | 60 | 4.0 |
| Do you think it is important to use hand sanitizers before wearing and removing facemasks? | 1372 | 92.1 | 76 | 5.1 | 41 | 2.8 |

**Table No 5:** Practice about importance of Hand hygiene for the prevention of COVID-19 (n=1489)

| **Practice of Hand Hygiene** | **Yes** | | **No** | | **Not Sure** | |
|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** |
| Do you practice hand hygiene? | 1423 | 95.6 | 29 | 1.9 | 37 | 2.5 |
| Do you practice hand hygiene to prevent yourself from contracting COVID-19 disease? | 1364 | 91.6 | 100 | 6.7 | 25 | 1.7 |
| Do you wear hand gloves all the time? | 347 | 23.3 | 1079 | 72.5 | 63 | 4.2 |
| Do you maintain hand hygiene even after wearing hand gloves? | 1274 | 85.6 | 157 | 10.5 | 58 | 3.98 |
| Do you maintain hand hygiene after touching different objects? | 1323 | 88.9 | 126 | 8.5 | 40 | 2.7 |
| Do you wash your hands with soap and water for more than 20 seconds? | 1220 | 81.9 | 211 | 14.2 | 58 | 3.9 |
| Do you use ABHR as per CDC recommendation for hand hygiene? | 1014 | 68.1 | 280 | 18.8 | 195 | 13.1 |
| Do you carry hand sanitizer with you all the time when you go outside? | 1172 | 78.7 | 285 | 19.1 | 32 | 2.1 |
| Do your family members also practice using hand sanitizers? | 1264 | 84.9 | 183 | 12.3 | 42 | 2.8 |
| Do you use hand sanitizer before wearing and removing facemasks? | 1274 | 85.6 | 144 | 9.7 | 71 | 4.8 |
| Is there facility of hand washing at your working place? | 1340 | 90.0 | 121 | 8.1 | 28 | 1.9 |

Knowledge, Attitude and Practice of the respondents about the importance of hand sanitization and hand hygiene to control COVID-19 was assessed by questionnaire based interviewing. Questions were constructed in a manner that the answers were

recorded as yes, not sure and no, and the responses were scored, and correct response got 2, not sure 1 and incorrect 0. 11 questions each were asked to assess Knowledge, Attitude and Practice, and each variable was divided into good (score≥14), moderate (score 07-13) and poor (score≤6). Table 6 shows association between knowledge to attitude of the participants towards hand hygiene, findings of which were statistically significant (p <0.001). It showed that 93.82% (1397) participants had good knowledge score, while 5.78% (86) participants had moderate knowledge and meager 06 had poor knowledge about importance of hand hygiene. 94.49% (1407) participants had good attitude about the importance of hand hygiene, while 79 showed a moderate attitude and 03 showed poor attitude towards maintaining hand hygiene. 91.89% (1368) showed a good knowledge-good attitude score, 29 (1.95%) had a good knowledge- moderate attitude score, 2.62% (39) participants evinced moderate knowledge- good attitude score and 44 (2.96%) showed a moderate knowledge-moderate attitude score. Table 7 shows association between knowledge to practice of the participants towards importance of hand hygiene, findings of which were statistically significant (p <0.001). It showed that 1397 (93.82%) participants had good knowledge about hand hygiene while 86 (5.78%) had moderate knowledge and meager 06 had poor knowledge about the importance of maintaining hand hygiene. 1304 (87.58%) participants had good practice of hand hygiene, while 154 (10.34%) showed a moderate practice score and 31 poor practice of maintaining hand hygiene. 83.75% (1247) showed a good knowledge-good practice score, 04 participants scored a poor knowledge- poor practice score, only 135 (9.07%) participant had a good knowledge-moderate practice score, and 57 (3.83%) participants scored a moderate knowledge-good practice. Pearson correlation between knowledge and attitude was 0.548 and between knowledge and practice was 0.541, all the values where statistically significant for p-value < 0.05.

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**Table No 6:** Association of Knowledge and Attitude of the participants about the hand sanitization and maintenance of hand hygiene.

| Attitude about Hand Hygiene | Knowledge about Hand Hygiene | | | Total | Pearson Correlation Coefficient |
|---|---|---|---|---|---|
| | Good Knowledge | Moderate Knowledge | Poor Knowledge | | |
| Good Attitude | 1368 (91.89%) | 39 (2.62%) | 00 (00.00%) | 1407 (94.49%) | 0.548 |
| Moderate Attitude | 29 (1.95%) | 44 (2.96%) | 06 (0.40%) | 79 (5.31%) | |
| Poor Attitude | 00 (00.00%) | 03 (00.20%) | 00 (00.00%) | 03 (0.20%) | |
| Total | 1397 (93.82%) | 86 (5.78%) | 06 (0.40%) | 1489 | |

**Table No 7:** Association of Knowledge and Practice of the participants about the hand sanitization and maintenance of hand hygiene.

| Practice about Hand Hygiene | Knowledge about Hand Hygiene | | | Total | Pearson Correlation Coefficient |
|---|---|---|---|---|---|
| | Good Knowledge | Moderate Knowledge | Poor Knowledge | | |
| Good Practice | 1247 (83.75%) | 57 (3.83%) | 00 (00.00%) | 1304 (87.58%) | 0.540 |
| Moderate Practice | 135 (9.07%) | 17(1.14%) | 02 (0.13%) | 154 (10.34%) | |
| Poor Practice | 15 (1.01%) | 12 (0.81%) | 04 (0.27%) | 31 (2.08%) | |
| Total | 1397 (93.82%) | 86 (5.78%) | 06 (0.40%) | 1489 | |

**DISCUSSION**:

Bangladesh, a low middle-income country and one of the most densely populated one in the world has slipshod to combat COVID-19. Success in this battle is partly determined by the knowledge and behavioral changes of the general population as well as how effectively these non-pharmacological control measures are being implemented and thereafter abided by the citizens. This study was conducted aiming at measuring the level of knowledge for COVID-19 and knowledge, attitude and practices involved in maintaining hand hygiene as an essential preventive measure in regard to the disease. Among 1489 participants in this study, the mean age was 28.81±8.64 years with range from 12 to 70 years. More than half of the participants were female (51.0%) and 730(49.0%) were male. More than half 773(51.9%) participants had completed above X education level. Majority 709(47.6%) participants were service holders. In a study by Rahman SMM, et al.[21] they showed that 30.0% of respondents had completed their graduation, 29.0% were students, 16.2% were housewives and 9.5% were unemployed.

Karim A, et al.[22] reported that the percentages of participants having good knowledge about COVID-19 were 57.6%, 75.1%, and 95.8% over phone (n=1426), online non-medical participants (n=1097), and online medical participants (n=382), respectively. In that online survey, a total of 1521 participated amongst whom 98.6% (1500) had heard about COVID-19. The correct response rates to the 20 knowledge questions ranged from 54.3-99.1%, 64-99.6%, 71.1-99.9%, and 88-100% over phone (unadjusted), over phone (adjusted to online non-medical), online non-medical, and online medical participants respectively. Kakemam E, et al.[23] reported that the majority of respondents (84.5%) had heard about COVID-19. Overall, 84.5% of respondents were aware that it is possible to survive and recover from it. Almost 60% of respondents perceived themselves to be at some risk of contracting COVID-19. In an open-ended question, the most common cause of coronavirus disease was "virus" (94.4%); only 31.7% Linked coronavirus to "bats, monkeys, and wild animals." Very few respondents mentioned that coronavirus was caused by "Bacteria" (6.7%), "Evil doing/Sin" (4.1%), or "Parasites" (3.7%). Our study showed that majority of the participants had a good knowledge about COVID-19 and its causative agent, depicted from the questions asked to the participants the result of which is given in

Table 2. 95.9% of the participants knew about the main symptoms of the disease, more than 90% answered correctly for modes of transmission, 88% thought it was a risk factor for elderly and those with comorbidities. Kakemam E, et al.[23] reported that the most frequently cited modes of transmission was shaking hands with an infected person (91.9%), kissing and hugging (90.1%), and being in contact with the saliva of an infected person. Overall, 80% of respondents could state three key signs/symptoms of the disease: "difficulty breathing" (97.7%), "fever" (97.6), and "cough" (94.3%). Rahman MM, et al.[24] observed many respondents (54.06%) reported unexpected responses to questions regarding main clinical symptoms (fever, fatigue and dry cough) of COVID-19 and development of severe form of illness in elderly people with co-morbidities. Most participants responded expectedly to questions regarding knowledge about any cure to recover from COVID-19 (68.99%), spread of infection may occurs from the pre-symptomatic or asymptomatic persons with COVID-19 and also through contact with the infected one (77.92%), mode of transmission is via respiratory droplets of infected person (61.04%), wear general medical mask, avoid crowded places, regular wash of hands can prevent contraction of infection (95.78%), and minimum preventive measures were fine for children and young adults was wrong action to prevent spread of COVID-19 infection (60.23%). In South Korea a similar study done by Lee M, et al.[10] showed comparably similar results, 93.2% knew that the mode of transmission of this disease is through respiratory droplets. Further in that study it was also noticed that 42.2% participants had a misunderstanding that the infection could occur through eating or having wild animals. Ferdous MZ, et al.[25] evaluated the perception component in the participants and found 93.7% participants thought the virus spreads through close contact with infected persons, 66.4% thought that it occurs as direct transmission through coughing, 61.3% thought that touching contaminated surfaces is one of the causes of spread of infection while only 0.5% had no idea about the mode of transmission. Their study also found that 99.4 % had a knowledge about common symptoms (fever, dry cough, shortness of breath, etc.). They further reported 86.1% participants thought that it was fatal in older age and 74.6% knew that cancer, Diabetes, Chronic Renal disease patients are at higher risk. Al-Hanawi et al.[26] reported that 98% participants were well aware of COVID-19 symptoms but only 50% thought that the spread may occur when in close proximity with infected patient. They further mentioned in their study that 96% of the participants knew about the clinically approved treatment (as of the date of that manuscript), while in our study it was found that 766(51.4%) replied that there was no definite treatment for COVID-19 disease, 901(60.5%) mentioned that there was no vaccine against this virus (rightly so, because at the time of collection of data, vaccine was under trial). These findings were also consistent with the studies of Zhong BL, et al.[27] conducted among the Chinese residents and of Alzoubi H et al.[28] conducted among the students in Jordan. Their knowledge regarding the availability of vaccines and treatment was also similar to other studies. Al- Hanawi et al.[26] reported that 95% refrained from attending social events, 94% participants avoided crowded places and 88% avoided shaking hands, compared to our study in which 92.1% avoided large public gathering, 75.8% tried to avoid having contact with people like shaking hands, etc., 87.3% skipped going to restaurants, 78.8% shied traveling by public transport recently, 66.9% had avoided visiting a doctor. Kakemam E, et al.[23] reported that the knowledge of prevention and treatment was higher among respondents in their study as nearly everyone knew that the spread of this disease can be prevented by staying at home, reducing contact with people

(95.3%) as well as constant hand washing and using disinfectants (92.5%). 75.1% of respondents expressed that early treatment of coronavirus could increase survival and reduce the chance of transmission within the household.

The Knowledge, Attitude and Practices regarding importance of hand hygiene in the prevention and control of COVID-19 has not been reported comprehensively as has been in this study. For each question of knowledge, the distribution of responses from the participants is presented in Table 3, while attitude component in Table 4 and practices component in Table 5. Al-Hanawi et al.[26] reported that the score of the knowledge component in the study population was 17.96 (SD=2.24, Range 3-22) and the overall accuracy rate was 81.64 indicating good knowledge. Mean attitude score was 28.23 (SD=2.76, Range 6-30) indicating good attitude and mean score for practice 4.34 (SD=0.89, Range=0-5) which too indicated good practice. Ferdous MZ, et al.[25] in their study reports 93.5% of the participants knew that washing hands with water and soap, maintaining social distance (93.5%) and avoiding touching the eyes, nose with hands (90.4%) was a preventive measure against COVID-19. Erfani AH et al.[29] conducted a study in Iran and claimed that the study population had a moderate knowledge (46.5% and 56.2%) about COVID-19 and personal hygiene and observed that mean knowledge score was 48.8, they added that mean correct answer score for attitude was 40.6 (SD= 2.4, Range 15-45) and average correct answer score of the 12 questions regarding COVID-19 and personal hygiene practices was 32.1 (SD=2.9, Range12-36), establishing a moderate practice of the participants. Rahman MM, et al.[24] also revealed majority of the respondents (more than 90%) reported good practices to prevent COVID-19 infection. However, many respondents (26.30%) lacked practice to avoid touching their eyes, nose and mouth to prevent the main route of transmission of Corona virus into human body. Altaher et al.[30] reported most of the participants had a high level of personal hygiene and healthy practices during the COVID-19 outbreak. Their study revealed that the overall score of personal hygiene and healthy practices was 77.4%. In this study 96.2% participants had a knowledge about hand hygiene, 95.3% acknowledged that many infections are transmitted through hands and can be prevented by maintaining hand hygiene.

Table 6 and Table 7 of the study describes the relation of knowledge to attitude, and knowledge to practices of the participants toward maintaining hand hygiene respectively. It was seen that those who had higher knowledge about the importance of maintaining hand hygiene displayed a higher efficacy belief for personal hygiene hence practiced hand hygiene as per guidelines. Lee M, et al.[10] in their study had similar observation in which higher knowledge was associated with higher attitude and practices for personal hygiene that included wearing of facemask and practicing hand hygiene. Influence of Knowledge and Attitude on practices for those with higher knowledge were more likely to wear mask ($\beta$=0.31, P<0.001) and similar for Hand hygiene ($\beta$=0.20, P<0.001). Erfani AH, et al.[29] states that based on the data and the score of the participants, there was a significant association among the participants Knowledge, Attitude and Practices (P<0.001). Rahman MM, et al.[24] reported that the majority of the respondents reported positive attitudes and strongly agreed on the importance of measures towards COVID-19, such as lock-down (74.3%), followed by maintaining personal hygiene (65.7%), home quarantine (52%), isolation and treatment of infected people (51.3%), with significantly higher ($p < 0.01$) positive attitude among urban respondents compared to rural respondents. Regarding attitude scores, 84.9%

of the urban respondents had a significantly higher positive attitude ($p < 0.01$) compared to rural respondents. The majority of the respondents (88.8%) identified staying away from the infected person as a good preventive practice against COVID-19 infection, followed by frequent hand washing using hand sanitizer (83.2%), avoiding touching nose, mouth, and eyes (78.2%), using a face mask (77.6%), practicing self-isolation/home quarantine (88%), and avoiding hugging (75.7%). Significantly higher responses about preventive practices of COVID-19 infection such as practicing respiratory hygiene (57.7%) and maintaining social distance (min. 1 meter) (56.4%) were more common among urban respondents compared to rural respondents ($p < 0.01$), except for avoiding handshake (50.3%). Regarding overall practice scores, only 32.5% of the urban respondents had good preventive practices against COVID-19, though these were significantly higher compared to rural respondents (22%) ($p < 0.01$).

In this study it was observed that the association of knowledge and attitude about hand hygiene and association between knowledge and practice was almost identic. Knowledge -practice association about hand sanitization and hand hygiene was statistically significant ($p<0.001$) most of the participants had good knowledge- good practice score (83.75%) about hand hygiene. Knowledge-Attitude association of the participants also revealed similar findings (91.89%). A study on a Malaysian community by Li H, et al.[31] has reported an overall rate of the knowledge of 80.5%, and most participants (83.1%) demonstrated positive attitudes toward the prevention of COVID-19.

## CONCLUSION

Our findings suggest that Bangladeshi population demonstrated a decent Knowledge about COVID-19, and Knowledge about the personal hygiene and hand sanitization, and its importance in preventing the spread of the disease was also good and that too translated on attitude and practices. These factors might attribute to not so exponential spread as was expected being it one of the most densely populated and low middle income country. Further strictly maintaining personal hygiene and abiding by the guidelines is essential for appropriate control, prevent further surge, and future consecutive waves and preventing community transmission of the corona virus is necessary which might help easing restrictions like lockdown, closing of educational institutions, etc. by the government. Awareness campaigning on social media and mass media platforms should be done more aggressively, and other measures to control the spread. Health education directed to the vulnerable population by the development of effective health education programmes that incorporate considerations of KAP modifying factors is the need of the time. Programme that change the attitude and encourage the practice of hand hygiene need to be enforced to close the gap of KAP towards COVID-19 and its preventive.

## LIMITATIONS

Only a smaller region of Bangladesh was used for taking the sample, which doesn't represent the whole country. Data used in this analysis were self-reported hence might suffer reporting bias. There were a limited number of questions used to measure the level of knowledge, attitude and practice. In-depth interviews and focused group discussions is required to accurately access the level of attitude and practices of an individual. More than half (54.9%) of the study population had the educational qualification of more than X standard, which does not represent the true picture of Bangladesh, hence might be the reason for better results in this study.

## RECOMMENDATIONS:

Community based national survey is most appropriate to cover all the regions of the country. General health education aiming to improve the knowledge, and thereby leading to

a more favorable attitude and practices is the need during this challenging period.

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