# Knowledge, Attitude, Practice of personal hygiene among international passengers in Shah Amanat International Airport, Chattogram during Covid-19 pandemic



**Mohammed Zainul Abedin Sharif**

**Roll no.: 0118/01**

**Registration no.: 598**

**Session: 2018-19**

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**A thesis submitted in the partial fulfillment of the requirements  
for the degree of MPH (One Health)**

**One Health Institute  
Chattogram Veterinary and Animal Sciences University  
Chattogram-4225, Bangladesh**

**June 2020**

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**Mohammed Zainul Abedin Sharif**

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**Mohammed Zainul Abedin Sharif**

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Session: 2018-2019

Semester; Jan – June 2020

**This is to certify that I have examined the above MPH (One Health) thesis  
and have found it to be complete and satisfactory in all respects and ready for evaluation**

**-----------------------------------------**

**Prof. Dr. Sharmin Chowdhury**

**Supervisor and Chairman of the Examination Committee**

**One Health Institute**

**Chattogram Veterinary and Animal Sciences University  
Chattogram-4225, Bangladesh**

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# List of Abbreviations

|  |  |
| --- | --- |
| **Abbreviation** | **Elaboration** |
| CI | Confidence interval |
| CDC | Center for Disease Control |
| COVID-19 | Coronavirus disease 2019 |
| DGHS | Directorate General of Health Services |
| IEDCR | Institute of Epidemiology, Disease Control and Research |
| MOH&FW | Ministry of Health and Family Welfare |
| MERS-CoV | Middle East Respiratory Syndrome Coronavirus |
| RT PCR | Real Time Polymerase chain reaction |
| SARS-CoV-2 | Severe acute respiratory syndrome coronavirus 2 |
| SARS | Severe Acute Respiratory Syndrome |
| SAIA | Shah Amanat International Airport |
| US FDA | United State Food and Drug Administration |
| WHO | World Health Organization |

# Abstract

The current novel coronavirus pandemic, COVID-19, was first reported in December 2019 in Wuhan, China, and has spread globally, causing startling loss of life, stalling the global economy, and disrupting social life.It has been transmitted in Bangladesh since March 2020. International passenger who came from abroad suspected the carrier of this virus. So it is important to sort out knowledge, attitude and practice of overseas passengers. One of the challenges to contain COVID-19 is convincing people to adopt personal hygiene, social distancing, and self-quarantine practices that are related to knowledge, attitudes, and practices (KAP) of the residents of respective countries. Bangladesh, a densely populated country with a fast-growing economy and moderate literacy rate, has shown many hiccups in its efforts to implement COVID-19 policies. Understanding KAP may help policy makers produce informed decisions. This study assessed KAP in relation to COVID-19 in Bangladesh. This is a cross sectional observational, study conducted in Shah Amanat International Airport. 384participants were included and modified predesigned WHO Questionnaire was used to collect the data. 384 participants used preventive measures like masks, social distancing, hand washing, staying at home, and usage of mobile help line. The collected data was analyzed using SPSS version-22 software. Results were tabulated for demographic details, knowledge, attitude, practice analysis and statistical analysis.

39.6 % had knowledge, 68 % had attitude to adopt measures and 72.7 % were following preventive measures and 3.1 % were using mobile help line to protect themselves from COVID-19. In order to prevent the spread of COVID-19, 100 % awareness among the community is required.

**Chapter 1: Introduction**

The COVID-19 is an ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It was first identified in December 2019 in Wuhan, China. The World Health Organization declared the outbreak a Public Health Emergency of International Concern in January 2020 and a pandemic in March 2020. As of 25 January 2021, more than 99.3 million cases have been confirmed, with more than 2.13 million deaths attributed to COVID-19.

The first case in Bangladesh was detected on 8 March 2020 and we experienced the first death from COVID-19 on 18 March 2020 (Ref. Daily press release IEDCR, DGHS). 5, 32,916 cases have been confirmed and death toll rises 8055 on 27 January 2021 (IEDCR, DGHS, MOH&FW, Govt of Bangladesh daily bulletin). Introduction of the virus in Bangladesh is speculated to be, like other countries, occurred through different portal of entry, such as, airports, sea ports etc., mostly due to inadequate surveillance and monitoring.

Symptoms of COVID-19 are highly variable, ranging from none to severe illness. The virus spreads mainly through the air when people are near each other. It leaves an infected person as they breathe, cough, sneeze, or speak and enters another person via their mouth, nose, or eyes. It may also spread via contaminated surfaces. People remain infectious for up to two weeks, and can spread the virus even if they do not show symptoms (CDC, 2020)

The responses to the pandemic have resulted in global social and economic disruption, including the largest global recession since the Great Depression. It has led to the postponement or cancellation of events, widespread supply shortages exacerbated by panic buying, agricultural disruption and food shortages, and decreased emissions of pollutants and greenhouse gases. Many educational institutions have been partially or fully closed (IMF Blog, 2020).

Recommended preventive measures of COVID-19 include social distancing, wearing face masks in public, ventilation and air-filtering, hand washing, covering one's mouth when sneezing or coughing, disinfecting surfaces, and monitoring and self-isolation for people exposed or symptomatic. Several vaccines are being developed and distributed. Current treatments focus on addressing symptoms while work is underway to develop therapeutic drugs that inhibit the virus. Authorities worldwide have responded by implementing travel restrictions, lockdowns, workplace hazard controls, and facility closures. Many places have also worked to increase testing capacity and trace contacts of the infected person.

Beside treatment and vaccination, it is very important how individual are being prepared to prevent COVID-19 outbreak. Here we have conducted a survey to gather information on the knowledge, attitude, and practice regarding personal hygiene among international passengers in Shah Amanat International Airport, Chattogram, Bangladesh.

**Objectives**

* To assess the knowledge, attitude and practice measures adopted by the international passengers in Shah Amanat International Airport, Chattogram.
* To determine the prevalence of usage of mobile help center or app
* To determine impact on passengers of activities of airport regarding prevention of COVID-19 outbreak

**Chapter 2: Review of the literature**

**2.1 History of corona virus**

The earliest report of a coronavirus infection in animals occurred in the late 1920s, when an acute respiratory infection of domesticated chickens emerged in North America (Estola et al., 1970). Arthur Schalk and M.C. Hawn in 1931 made the first detailed report which described a new respiratory infection of chickens in North Dakota. The infection of new-born chicks was characterized by gasping and listlessness with high mortality rates of 40–90% (Fabricant et al., 1998). Leland David Bushnell and Carl Alfred Brandly isolated the virus that caused the infection in 1933 (Bushnell and brandly, 1933). The virus was then known as infectious bronchitis virus (IBV). Charles D. Hudson and Fred Robert Beaudette cultivated the virus for the first time in 1937 (Decaro et al., 2011). The specimen came to be known as the Beaudette strain. In the late 1940s, two more animal coronaviruses, JHM that causes brain disease (murine encephalitis) and mouse hepatitis virus (MHV) that causes hepatitis in mice were discovered. It was not realized at the time that these three different viruses were related.( Lalchhandama K et al,, 2020).

Human coronaviruses were discovered in the 1960s using two different methods in the United Kingdom and the United States (Monto, 1984). E.C. Kendall, Malcolm Bynoe, and David Tyrrell working at the Common Cold Unit of the British Medical Research Council collected a unique common cold virus designated B814 in 1961 (Kendall et al.,1962.The virus could not be cultivated using standard techniques which had successfully cultivated rhinoviruses, adenoviruses and other known common cold viruses. In 1965, Tyrrell and Bynoe successfully cultivated the novel virus by serially passing it through organ culture of human embryonic trachea (Tyrrell and Bynoe 1965). The new cultivating method was introduced to the lab by Bertil Hoorn (Tyrrell and Blane., 2002). The isolated virus when intra-nasally inoculated into volunteers caused a cold and was inactivated by ether which indicated it had a lipid envelope (Hagan et al., 1988). Dorothy Hamre and John Procknow at the University of Chicago isolated a novel cold from medical students in 1962. They isolated and grew the virus in kidney tissue culture, designating it 229E. The novel virus caused a cold in volunteers and, like B814, was inactivated by ether (Hamre et al., 1966).

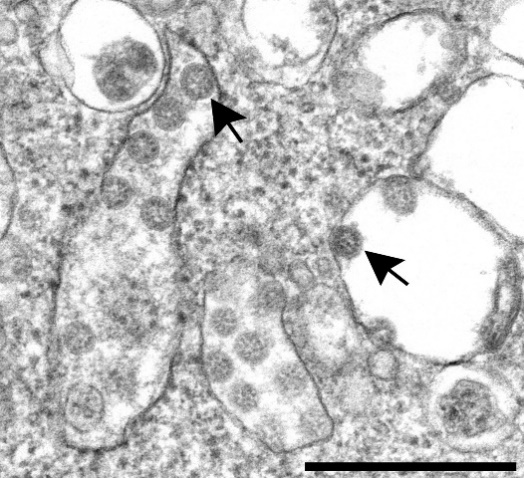


Fig 1. Electron micrograph of corona virus

Using electron microscopy, the three viruses were shown to be morphologically related by their general shape and distinctive club-like spikes. This new group of viruses were named coronaviruses after their distinctive morphological appearance. Human coronavirus 229E and human coronavirus OC43 continued to be studied in subsequent decades (Geller et al., 2012). Other human coronaviruses have since been identified, including SARS-CoV in 2003, HCoV NL63 in 2003, HCoV HKU1 in 2004, MERS-CoV in 2013, and SARS-CoV-2 in 2019. There have also been a large number of animal coronaviruses identified since the 1960s (Zhu et al., 2020).

**2.2 Microbiology**

**2.2.1 Structure**

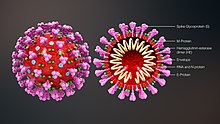
[](https://en.wikipedia.org/wiki/File:3D_medical_animation_coronavirus_structure.jpg)

Figure 2: Cross-sectional model of a coronavirus (Goldsmith et al., 2004)

Coronaviruses are large, roughly spherical particles with unique surface projections. Their size is highly variable with average diameters of 80 to 120 nm. Extreme sizes are known from 50 to 200 nm in diameter. The total molecular weight is on average 40,000 kDa. They are enclosed in an envelope embedded with a number of protein molecules. The lipid bilayer envelope, membrane proteins, and nucleocapsid protect the virus when it is outside the host cell (Neuman et al., 2006).

The viral envelope is made up of a lipid bilayer in which the membrane (M), envelope (E) and spike (S) structural proteins are anchored. The ratio of E: S: M in the lipid bilayer is approximately 1:20:300. The E and M protein are the structural proteins that combined with the lipid bilayer to shape the viral envelope and maintain its size. S proteins are needed for interaction with the host cells. But human coronavirus NL63 is peculiar in that its M protein has the binding site for the host cell, and not its S protein. The diameter of the envelope is 85 nm. The envelope of the virus in electron micrographs appear as a distinct pair of electron-dense shells (Neuman et al., 2006).

The M protein is the main structural protein of the envelope that provides the overall shape and is a type III membrane protein. It consists of 218 to 263 amino acid residues and forms a layer 7.8 nm thick. It has three domains, a short N-terminal ectodomain, a triple-spanning transmembrane domain, and a C-terminal endo-domain. The C-terminal domain forms a matrix-like lattice that adds to the extra-thickness of the envelope. Different species can have either N- or O-linked glycans in their protein amino-terminal domain. The M protein is crucial during the assembly, budding, envelope formation, and pathogenesis stages of the virus lifecycle (Schoeman et al., 2019).

The E proteins are minor structural proteins and highly variable in different species. There are only about 20 copies of the E protein molecule in a coronavirus particle. They are 8.4 to 12 kDa in size and are composed of 76 to 109 amino acids. They are integral proteins (i.e., embedded in the lipid layer) and have two domains namely a transmembrane domain and an extramembrane C-terminal domain. They are almost fully α-helical, with a single α-helical transmembrane domain, and form pentameric (five-molecular) ion channels in the lipid bilayer. They are responsible for virion assembly, intracellular trafficking and morphogenesis (budding) (Lalchhandama, 2020).

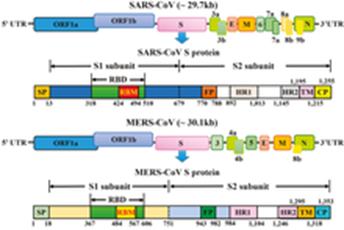


Figure 3: Diagram of the genome and functional domains of the S protein for SARS-CoV and MERS-CoV (https://wikimili.com/en/Coronavirus)

The spikes are the most distinguishing feature of coronaviruses and are responsible for the corona- or halo-like surface. On average a coronavirus particle has 74 surface spikes. Each spike is about 20 nm long and is composed of a trimmer of the S protein. The S protein is in turn composed of an S1 and S2 subunit. The homotrimeric S protein is a class I fusion protein which mediates the receptor binding and membrane fusion between the virus and host cell. The S1 subunit forms the head of the spike and has the receptor-binding domain (RBD). The S2 subunit forms the stem which anchors the spike in the viral envelope and on protease activation enables fusion. The two subunits remain non covalently linked as they are exposed on the viral surface until they attach to the host cell membrane. In a functionally active state, three S1 are attached to two S2 subunits. The subunit complex is split into individual subunits when the virus binds and fuses with the host cell under the action of proteases such as cathepsin family and transmembrane protease serine 2 (TMPRSS2) of the host cell (J Alsaadi et al.,2019).

S1 proteins are the most critical components in terms of infection. They are also the most variable components as they are responsible for host cell specificity. They possess two major domains named N-terminal domain (S1-NTD) and C-terminal domain (S1-CTD), both of which serve as the receptor-binding domains. The NTDs recognize and bind sugars on the surface of the host cell. An exception is the MHV NTD that binds to a protein receptor carcinoembryonic antigen-related cell adhesion molecule 1 (CEACAM1). S1-CTDs are responsible for recognizing different protein receptors such as angiotensin-converting enzyme 2 (ACE2), amino peptidase N (APN), and dipeptidyl peptidase 4 (DPP4) (Lalchhandama, 2020).

**2.2.2 Genome**

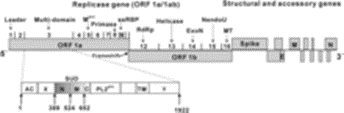


Fig 4: SARS-CoV genome and proteins (Fehr et al., 2015)

Coronaviruses contain a positive-sense, single-stranded RNA genome. The genome size for coronaviruses ranges from 26.4 to 31.7 kilobases. The genome size is one of the largest among RNA viruses. The genome has a 5′ methylated cap and a 3′ polyadenylated tail. The genome organization for a coronavirus is 5′-leader-UTR-replicase (ORF1ab)-spike (S)-envelope (E)-membrane (M)-nucleocapsid (N)-3′UTR-poly (A) tail. The open reading frames 1a and 1b, which occupy the first two-thirds of the genome, encode the replicasepolyprotein (pp1ab). The replicasepolyprotein self cleaves to form 16 nonstructural proteins (nsp1–nsp16). The later reading frames encode the four major structural proteins: spike, envelope, membrane, and nucleocapsid (Snijder et al., 2003) Interspersed between these reading frames are the reading frames for the accessory proteins. The number of accessory proteins and their function is unique depending on the specific coronavirus (Fehr and Perlman, 2015).

**2.3 The life cycle of a coronavirus**

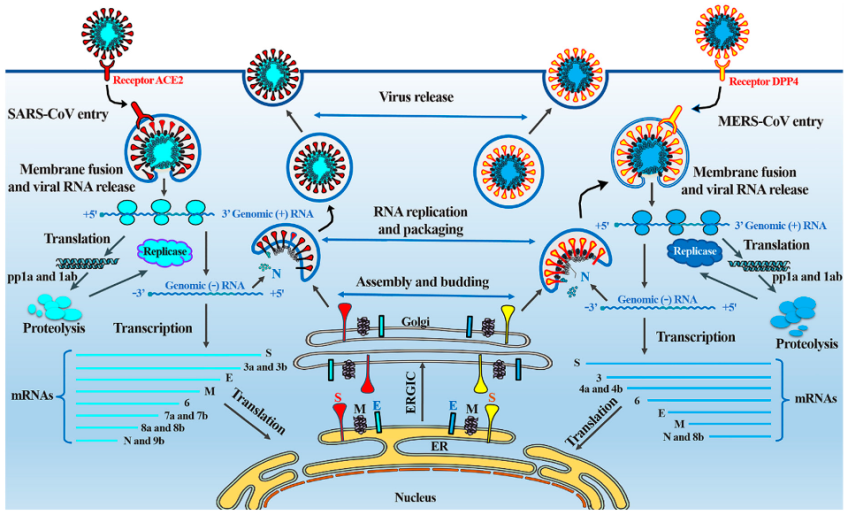
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Figure 5: The life cycle of a coronavirus (Ref. The virus tracker)

Infection begins when the viral spike protein attaches to its complementary host cell receptor. After attachment, a protease of the host cell cleaves and activates the receptor-attached spike protein. Depending on the host cell protease available, cleavage and activation allows the virus to enter the host cell by endocytosis or direct fusion of the viral envelope with the host membrane.

**2.3.1 Genome translation**

On entry into the host cell, the virus particle is uncoated, and its genome enters the cell cytoplasm. The coronavirus RNA genome has a 5′ methylated cap and a 3′ polyadenylated tail, which allows it to act like a messenger RNA and be directly translated by the host cell's ribosomes. The host ribosomes translate the initial overlapping open reading frames ORF1a and ORF1b of the virus genome into two large overlapping polyproteins, pp1a and pp1ab.

The larger polyprotein pp1ab is a result of a -1 ribosomal frameshift caused by a slippery sequence (UUUAAAC) and a downstream RNA pseudoknot at the end of open reading frame ORF1a. The ribosomal frameshift allows for the continuous translation of ORF1a followed by ORF1b.

The polyproteins have their own proteases, PLpro (nsp3) and 3CLpro (nsp5), which cleave the polyproteins at different specific sites. The cleavage of polyprotein pp1ab yields 16 nonstructural proteins (nsp1 to nsp16). Product proteins include various replication proteins such as RNA-dependent RNA polymerase (nsp12), RNA helicase (nsp13), and exoribonuclease (nsp14).

A number of the nonstructural proteins coalesce to form a multi-protein replicase-transcriptase complex. The main replicase-transcriptase protein is the RNA-dependent RNA polymerase (RdRp). It is directly involved in the replication and transcription of RNA from an RNA strand. The other nonstructural proteins in the complex assist in the replication and transcription process. The exoribonuclease nonstructural protein, for instance, provides extra fidelity to replication by providing a proofreading function which the RNA-dependent RNA polymerase lacks (Sexton et al., 2016).

**2.3.2 Replication**

One of the main functions of the complex is to replicate the viral genome. RdRp directly mediates the synthesis of negative-sense genomic RNA from the positive-sense genomic RNA. This is followed by the replication of positive-sense genomic RNA from the negative-sense genomic RNA (Fehr and Perlman, 2015).

**2.3.3 Transcription**

The other important function of the complex is to transcribe the viral genome. RdRp directly mediates the synthesis of negative-sense sub genomic RNA molecules from the positive-sense genomic RNA. This process is followed by the transcription of these negative-sense subgenomic RNA molecules to their corresponding positive-sense mRNAs.[ Fehr AR et al,2015] The sub genomic mRNAs form a "nested set" which have a common 5'-head and partially duplicate 3'-end (Payne , 2017).

**2.3.4 Recombination**

The replicase-transcriptase complex is also capable of genetic recombination when at least two viral genomes are present in the same infected cell (Payne, 2017). RNA recombination appears to be a major driving force in determining genetic variability within a coronavirus species, the capability of a coronavirus species to jump from one host to another and, infrequently, in determining the emergence of novel coronaviruses. The exact mechanism of recombination in coronaviruses is unclear, but likely involves template switching during genome replication (Su et al., 2016).

**2.3.5 Assembly and release**

The replicated positive-sense genomic RNA becomes the genome of the progeny viruses. The mRNAs are gene transcripts of the last third of the virus genome after the initial overlapping reading frame. These mRNAs are translated by the host's ribosomes into the structural proteins and a number of accessory proteins. RNA translation occurs inside the endoplasmic reticulum. The viral structural proteins S, E, and M move along the secretory pathway into the Golgi intermediate compartment. There, the M proteins direct most protein-protein interactions required for assembly of viruses following its binding to the nucleocapsid. Progeny viruses are then released from the host cell by exocytosis through secretory vesicles. Once released the viruses can infect other host cells (Fehr and perlman, 2015).

**2.3.6 Transmission**

Infected carriers are able to shed viruses into the environment. The interaction of the coronavirus spike protein with its complementary cell receptor is central in determining the tissue tropism, infectivity, and species range of the released virus. Coronaviruses mainly target epithelial cells. They are transmitted from one host to another host, depending on the coronavirus species, by either an aerosol, fomite, or fecal-oral route (Decaro et al., 2011).

Human coronaviruses infect the epithelial cells of the respiratory tract, while animal coronaviruses generally infect the epithelial cells of the digestive tract. SARS coronavirus, for example, infects the human epithelial cells of the lungs via an aerosol route by binding to the angiotensin-converting enzyme 2 (ACE2) receptor. Transmissible gastroenteritis coronavirus (TGEV) infects the pig epithelial cells of the digestive tract via a fecal-oral route (Decaro et al., 2011).

**2.4 Classification**

Coronaviruses form the subfamily Orthocoronavirinae, which is one of two sub-families in the family Coronaviridae, order Nidovirales, and realm Riboviria (International Committee on Taxonomy of Viruses, 2010). They are divided into the four genera: Alphacoronavirus, Betacoronavirus, Gammacoronavirus and Deltacoronavirus. Alphacoronaviruses and betacoronaviruses infect mammals, while gammacoronaviruses and deltacoronaviruses primarily infect birds (Wertheim et al., 2013).

**2.5 Origin**

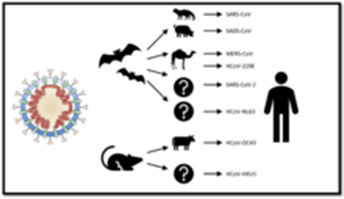


Figure 6: Origin of human coronaviruses with possible intermediate hosts (Wertheim et al., 2013)

The most recent common ancestor (MRCA) of all coronaviruses is estimated to have existed as recently as 8000 BCE, although some models place the common ancestor as far back as 55 million years or more, implying long term coevolution with bat and avian species (Wertheim et al., 2013). The most recent common ancestor of the alphacoronavirus line has been placed at about 2400 BCE, of the betacoronavirus line at 3300 BCE, of the gammacoronavirus line at 2800 BCE, and of the deltacoronavirus line at about 3000 BCE. Bats and birds, as warm-blooded flying vertebrates, are an ideal natural reservoir for the coronavirus gene pool (with bats the reservoir for alphacoronaviruses and betacoronavirus – and birds the reservoir for gammacoronaviruses and deltacoronaviruses). The large number and global range of bat and avian species that host viruses has enabled extensive evolution and dissemination of coronaviruses (Woo et al., 2012).

Many human coronaviruses have their origin in bats (Forni et al., 2017) between 1190 and 1449 CE. The human coronavirus 229E shared a common ancestor with a bat coronavirus (GhanaGrp1 BtCoV) between 1686 and 1800 CE. More recently, alpaca coronavirus and human coronavirus 229E diverged sometime before 1960. MERS-CoV emerged in humans from bats through the intermediate host of camels. MERS-CoV, although related to several bat coronavirus species, appears to have diverged from these several centuries ago. The most closely related bat coronavirus and SARS-CoV diverged in 1986. The ancestors of SARS-CoV first infected leaf-nose bats of the genus Hipposideridae; subsequently, they spread to horseshoe bats in the species Rhinolophidae, then to Asian palm civets, and finally to humans (Cui et al., 2019).

Unlike other betacoronaviruses, bovine coronavirus of the species Betacoronavirus 1 and subgenus Embecovirus is thought to have originated in rodents and not in bats (Lau et al., 2015). In the 1790s, equine coronavirus diverged from the bovine coronavirus after a cross-species jump. Later in the 1890s, human coronavirus OC43 diverged from bovine coronavirus after another cross-species spillover event. It is speculated that the flu pandemic of 1890 may have been caused by this spillover event, and not by the influenza virus, because of the related timing, neurological symptoms, and unknown causative agent of the pandemic (Vijgen et al., 2005). Besides causing respiratory infections, human coronavirus OC43 is also suspected of playing a role in neurological diseases. In the 1950s, the human coronavirus OC43 began to diverge into its present genotypes. Phylogenetically, mouse hepatitis virus (Murine coronavirus), which infects the mouse's liver and central nervous system, is related to human coronavirus OC43 and bovine coronavirus. Human coronavirus HKU1, like the aforementioned viruses, also has its origins in rodents (Forni et al., 2017)

**2.6 Infection in humans**

Coronaviruses vary significantly in risk factor. Some can kill more than 30% of those infected, such as MERS-CoV, and some are relatively harmless, such as the common cold. Coronaviruses can cause colds with major symptoms, such as fever, and a sore throat from swollen adenoids. Coronaviruses can cause pneumonia (either direct viral pneumonia or secondary bacterial pneumonia) and bronchitis (either direct viral bronchitis or secondary bacterial bronchitis). The human coronavirus discovered in 2003, SARS-CoV, which causes severe acute respiratory syndrome (SARS), has a unique pathogenesis because it causes both upper and lower respiratory tract infections (Forgie et al., 2009).

Six species of human coronaviruses are known, with one species subdivided into two different strains, making seven strains of human coronaviruses altogether. Four human coronaviruses produce symptoms that are generally mild, even though it's contended they might have been more aggressive in the past:

1. Human coronavirus OC43 (HCoV-OC43), β-CoV

2. Human coronavirus HKU1 (HCoV-HKU1), β-CoV

3. Human coronavirus 229E (HCoV-229E), α-CoV

4. Human coronavirus NL63 (HCoV-NL63), α-CoV

**Three human coronaviruses produce symptoms that are potentially severe:**

1. Middle East respiratory syndrome-related coronavirus (MERS-CoV), β-CoV

2. Severe acute respiratory syndrome coronavirus (SARS-CoV), β-CoV

3. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), β-CoV

**2.7 COVID-19 pandemic**

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019 (COVID-19), the respiratory illness responsible for the COVID-19 pandemic. Colloquially known as simply the coronavirus, it was previously referred to by its provisional name, 2019 novel coronavirus (2019-nCoV) and has also been called human coronavirus 2019 (HCoV-19 or hCoV-19) (CDC, 2020)

**2.7.1 Signs and symptoms:**

Symptoms of COVID-19 are variable, ranging from mild symptoms to severe illness. Common symptoms include headache, loss of smell and taste, nasal congestion and rhinorrhea, cough, muscle pain, sore throat, fever and breathing difficulties. People with the same infection may have different symptoms, and their symptoms may change over time. In people without prior ears, nose, and throat disorders, loss of taste combined with loss of smell is associated with COVID-19 with a specificity of 95% (Bénézit et al., 2020)

Most people (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging) and 5% of patients suffer critical symptoms (respiratory failure, shock, or multi organ dysfunction) (Lai et al.,20200). At least a third of the people who are infected with the virus do not develop noticeable symptoms at any point in time. These asymptomatic carriers tend not to get tested, and they can spread the disease. Other infected people will develop symptoms later (called pre-symptomatic) or have very mild symptoms, and can also spread the virus (Oran et al., 2021).

As is common with infections, there is a delay, known as the incubation period, between the moment a person first becomes infected and the appearance of the first symptoms. The median incubation period for COVID-19 is four to five days. Most symptomatic people experience symptoms within two to seven days after exposure, and almost all symptomatic people will experience one or more symptoms before day twelve. (Gandhi et al., 2020)

Most persons recover from the acute phase of the disease. However, some patients continue to experience a range of effects, known as long COVID, for months after recovery, and damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease (CDC, 2020).

**2.7.2 Transmission**

COVID-19 spreads from person to person mainly through the respiratory route after an infected person coughs, sneezes, sings, talks or breathes. A new infection occurs when virus-containing particles exhaled by an infected person, either respiratory droplets or aerosols, get into the mouth, nose, or eyes of other people who are in close contact with the infected person (WHO, 2020). During human-to-human transmission, an average 1000 infectious SARS-CoV-2 virions are thought to initiate a new infection.

The closer people interact, and the longer they interact, the more likely they are to transmit COVID-19. Closer distances can involve larger droplets (which fall to the ground) and aerosols, whereas longer distances only involve aerosols. The larger droplets may also evaporate into the aerosols (known as droplet nuclei). The relative importance of the larger droplets and the aerosols is not clear as of November 2020; however, the virus is not known to spread between rooms over long distances such as through air ducts. Airborne transmission is able to particularly occur indoors, in high-risk locations such as restaurants, choirs, gyms, nightclubs, offices, and religious venues, often when they are crowded or less ventilated. It also occurs in healthcare settings, often when aerosol-generating medical procedures are performed on COVID-19 patients.

The number of people generally infected by one infected person varies; as of September 2020, it was estimated that one infected person will, on average, infect between two and three other people. This is more infectious than influenza, but less so than measles (CDC, 2020) It often spreads in clusters, where infections can be traced back to an index case or geographical location.

**2.7.3 Diagnosis**

The standard method of testing for presence of SARS-CoV-2 is real-time reverse transcription polymerase chain reaction (rRT-PCR), which detects the presence of viral RNA fragments. As this test detects RNA but not infectious virus, its ability to determine duration of infectivity of patients is limited. The test is typically done on respiratory samples obtained by a nasopharyngeal swab; however, a nasal swab or sputum sample may also be used. Results are generally available within a few hours to two days. Blood tests can be used, but these require two blood samples taken two weeks apart, and the results have little immediate value. The WHO has published several testing protocols for the disease (CDC, 2020).

Chest CT scans may be helpful to diagnose COVID-19 in individuals with a high clinical suspicion of infection but are not recommended for routine screening. Bilateral multi lobar ground-glass opacities with a peripheral, asymmetric, and posterior distribution are common in early infection. Sub pleural dominance, crazy paving (lobular septal thickening with variable alveolar filling), and consolidation may appear as the disease progresses. Characteristic imaging features on chest radiographs and computed tomography (CT) of people who are symptomatic include asymmetric peripheral ground-glass opacities without pleural effusions (CDC, 2020)

**2.7.4 Treatment**

There is no specific, effective treatment or cure for coronavirus disease 2019 (COVID-19), the disease caused by the SARS-CoV-2 virus. Thus, the cornerstone of management of COVID-19 is supportive care, which includes treatment to relieve symptoms, fluid therapy, oxygen support and prone positioning as needed, and medications or devices to support other affected vital organs.(Siemieniuk et al., 2020)

Most cases of COVID-19 are mild. In these, supportive care includes medication such as paracetamol or NSAIDs to relieve symptoms (fever, body aches, and cough), proper intake of fluids, rest, and nasal breathing. Good personal hygiene and a healthy diet are also recommended. The U.S. Centers for Disease Control and Prevention (CDC) recommend that those who suspect they are carrying the virus isolate themselves at home and wear a face mask. (CDC, 2020)

People with more severe cases may need treatment in hospital. In those with low oxygen levels, use of the glucocorticoid dexamethasone is strongly recommended, as it can reduce the risk of death. Non-invasive ventilation and, ultimately, admission to an intensive care unit for mechanical ventilation may be required to support breathing. Extracorporeal membrane oxygenation (ECMO) has been used to address the issue of respiratory failure, but its benefits are still under consideration(CDC, 2020)

Several experimental treatments are being actively studied in clinical trials. Others were thought to be promising early in the pandemic, such as hydroxyl chloroquine and lopinavir/ritonavir, but later research found them to be ineffective or even harmful. Despite ongoing research, there is still not enough high-quality evidence to recommend so-called early treatment. Nevertheless, in the United States, two monoclonal antibody-based therapies are available for early use in cases thought to be at high risk of progression to severe disease. The antiviral ‘Remdesivir’ is available with varying restrictions; however, it is not recommended for people needing mechanical ventilation, and is discouraged altogether by the World Health Organization (WHO) due to limited evidence of its efficacy (CDC,2020)

**2.7.5 Prognosis**

The severity of COVID-19 varies. The disease may take a mild course with few or no symptoms, resembling other common upper respiratory diseases such as the common cold. In 3-4% of cases (7.4% for those over age 65) symptoms are severe enough to cause hospitalization. Mild cases typically recover within two weeks, while those with severe or critical diseases may take three to six weeks to recover (Baranovskii et al., 2020).

Some early studies suggest 10% to 20% of people with COVID-19 will experience symptoms lasting longer than a month. A majority of those who were admitted to hospital with severe disease report long-term problems including fatigue and shortness of breath.

**2.7.6 Prevention and control strategies**

Preventive measures to reduce the chances of infection include staying at home, wearing a mask in public, avoiding crowded places, keeping distance from others, ventilating indoor spaces, washing hands with soap and water often and for at least 20 seconds, practicing good respiratory hygiene, and avoiding touching the eyes, nose, or mouth with unwashed hands. Those diagnosed with COVID-19 or who believe they may be infected are advised by the CDC to stay home except to get medical care, call ahead before visiting a healthcare provider, wear a face mask before entering the healthcare provider's office and when in any room or vehicle with another person, cover coughs and sneezes with a tissue, regularly wash hands with soap and water and avoid sharing personal household items.

The first COVID-19 vaccine was granted regulatory approval on 2 December by the UK medicines regulator MHRA. It was evaluated for emergency use authorization (EUA) status by the US FDA, and in several other countries. Initially, the US National Institutes of Health guidelines do not recommend any medication for prevention of COVID-19, before or after exposure to the SARS-CoV-2 virus, outside the setting of a clinical trial. Without a vaccine, other prophylactic measures, or effective treatments, a key part of managing COVID-19 is trying to decrease and delay the epidemic peak, known as "flattening the curve". This is done by slowing the infection rate to decrease the risk of health services being overwhelmed, allowing for better treatment of current cases, and delaying additional cases until effective treatments or a vaccine become available. In 27 January 2021 vaccination has started in Bangladesh.

**2.7.6.1 Strategies taken by Bangladesh government**

On 23 March, when Bangladesh had 33 confirmed cases, the government declared a ten-day nationwide holiday for the period 26 March – 4 April, ordering all public and private offices to be closed, with the exception for emergency services. People have been asked to practice social distancing and stay at home. Public transport would be limited and advice was given to avoid them (The Daily Star, 23 March 2020). The measure has been described as a "lockdown" by the media. The government asked the Army to ensure social distancing. (ABC News, 28 March 2020). Educational institute is being closed rather online class and examination is going. On 9 April, Bangladesh imposed a 'complete lockdown' on the Cox's Bazar District where the majority of the Rohingya refugee camps are located (The Straits Times, 9 April 2020). From September 2020 gradually lifted restriction were implemented.

Government emphasize wide range of diagnosis facilities and treatment of severe COVID pneumonia patients. Strengthening of ICU facilities in government hospitals and RT PCR lab has been established in major districts where initially it was few in number. In Chattogram BITID and CMCH is the government organization for COVID test. Initially CVASU and CU have done an emergency contribution by using PCR labs (CVASU Facebook page 23 April 2020).

Private hospital and diagnostic laboratory got permission and observed. Now (end of January 2021) burden of COVID patient in hospital is not high.

**2.7.6.2 Strategies taken at different portal of entry**

Bangladesh has 3 international airports (Dhaka, Chattogram and Sylhet), 3 sea ports (Chattogram, Mongla and Paira) and 13 land ports. With the signing to International Health Regulations (IHR) in 2005, Bangladesh is bound to follow WHO guideline to strengthen capacities in point of entries. In ChattogramShahAmanat International Airport health desks were rearranged both arrival and departure point for international passengers by the help of International Organization of Migration (IOM). Suspected COVID 19 patients is being screened by thermal scanner in arrival point. Medical personnel is increased to verify Corona certificate during travel of all international passengers. All international arrival passengers are advised to take ‘home quarantine’ for 14 days and it is observed by police and local authority. Institutional quarantine is arranged in Chattogram Railway Hospital. If a passenger cannot able to show corona negative certificate or have fever or suspicious COVID 19 symptoms medical team will hand over to army escorted ambulance to send institutional quarantine (MOH&FW). In addition airport authority has taken noticeable changes in operation such as wearing PPE by ground staff, disinfection of aircrafts, supplying gloves, face shield to passengers, maintaining social distance, increase hand washing facilities etc. (CAAB).

**Chapter 3: Materials and Methods**

**3.1 Description of the study point:**

Shah Amanat International Airport, Chattogram is the second largest international airport of Bangladesh. More than 1 million passenger per year travel through this airport. During COVID-19 pandemic 60 percent of flights has been reduced. At present average 1000 passengers carried by 5 to 6 flights of different airlines daily from and to 6 destinations of India, Oman and UAE. (CAAB,2020)



Image 1: Front view Shah Amanat International Airport, Chattogram.



Image 2 : Departure passengers in SAIA

**3.2 Study Design:**

It’s a cross sectional, observational study carried across Shah Amanat International Airport, Chattogram.

Sampling and Sample Size Sample Size was calculated taking population of 1million with considering 5 % of confidence interval and confidence level at 95 % and sample size was 385 using sample size calculator software ‘Calulator.net’. The subjects were enrolled using simple random sampling method.

Predesigned WHO standard Knowledge, Attitude and Practice questionnaire, is modified on COVID infection about covering nose and face with mask or with handkerchief or with elbow, regular hand washing, maintain about 2-meter social distance, strictly staying at home, usage of mobile help center or app for knowing about COVID pandemic.

**3.3 Case definition:**

Three hundred and eighty five who were travelled as international passengers, above 18 years included in the study. Prior to collection of data, approval was obtained from airport authority of Shah AmanatInternatinal Airport, Chattogram. Participants who gave verbal consent and are above 18 years were included. Noncompliant participants, below 18 years, sick with preexisting comorbid conditions and with no verbal consent were excluded from the study.

**3.4 Study period:**

The study was conducted in a three months time period from October to December 2020.

**3.5 Data collection**

Data were collected from both arrival and departure passengers and recorded in pre-tested semi structured questionnaire. The questionnaire used for epidemiological data collection are given in the appendix



Image 3 :Data collection from an arrival passenger

Study was briefed in advance to the supporting medical staffs and security personnel by taking precautions and standardize the information collection process in order to maximize reliability and minimize the bias. Questionnaire required 10 minutes on an average for completion by the participant. The collected data were coded, complied, entered in EXCEL spread sheet and data cleansing was done to rule out data duplication. Data imported into SPSS version-22 software. Results were tabulated and statistically analyzed to obtain frequency tables along with their percentages and cross tabulated using Pearson’s chi square test. A p-value of less than 0.05 were considered as statistically significant.

**Chapter 4: RESULTS**

In a total of 385 male were 301,female were 83, purpose of travel expatriates 243, Business 34,treatment purpose 99, tourist and others 8. 270 were 18yrs -50yrs and 114 were above 50 yrs.

Fig 7: Demographic pattern of travelers in COVID situation

Fig8 : Educational status of international passengers

|  |  |  |
| --- | --- | --- |
| **4.1 Knowledge** | n = 384 | Percentage |
| **How does the Corona Spread?** | | |
| Droplets generated form cough | 226 | 58.9 |
| Sneeze | 0 | 0 |
| Nasal Discharge | 3 | 1.6 |
| Not Known | 152 | 39.6 |
| **Can you Contract the Corona Virus Disease by Touching a Surface?** | | |
| Yes | 155 | 40.4 |
| No | 147 | 38.3 |
| Not known | 82 | 21.4 |
| **How Long does the Corona Virus Last on Surface?** | | |
| Few hours to several days | 3 | 0.8 |
| Months | 328 | 85.4 |
| Years | 53 | 13.8 |
| Not known | 0 | 0 |
| **What Happens When You Get Affected with Corona Virus?** |  |  |
| Mild respiratory symptoms with fever | 136 | 35.4 |
| Infection starts on an average of 5-6 days | 0 | 0 |
| Headache and body pains | 0 | 0 |
| All | 248 | 64.6 |
| Not known | 0 | 0 |
| **What Are the Symptoms of Corona Virus Disease?** | | |
| Fever, cough, shortness of breath | 42 | 10.9 |
| Breathing difficulties like pneumonia | 25 | 6.5 |
| Severe acute respiratory syndrome | 79 | 20.6 |
| All | 47 | 12.2 |
| Not known | 191 | 49.7 |
| **What is the Treatment for Corona Disease?** | | |
| No specific treatment | 157 | 40.9 |
| No Vaccine | 47 | 12.2 |
| Prevention | 180 | 46.9 |
| Not known |  | 0 |
| **Do You Know About Quarantine?** |  |  |
| Yes | 194 | 50.5 |
| No | 128 | 33.3 |
| Not Known | 62 | 16.1 |
| **Has Airport official informed 14 days ‘HomeQuarantine?** | | |
| Yes | 376 | 98 |
| No | 8 | 2 |
| **Do You Wear Face Mask?** | | |
| Yes | 90 | 23.4 |
| No | 294 | 76.6 |
| **Do You Know About Hand Washing?** | | |
| Yes | 96 | 25.0 |
| No | 288 | 75.5 |
| **Do You Know About Social Distancing?** | | |
| Yes | 85 | 21.0 |
| No | 299 | 77.9 |
| **Do You Stay at Home?** | | |
| Yes | 53 | 13.8 |
| No | 331 | 86.2 |
| **Do You Know About Mobile helpline?** | | |
| Yes | 42 | 10.9 |
| No | 342 | 89.1 |
| **How Do You Prevent Spread of Corona Virus Disease?** | | |
| Know (Wearing face mask + Hand wash + Social distancing + Staying at Home) | 279 | 72.7 |
| Not known | 105 | 27.3 |

Table 1. Questionnaire on Knowledge on COVID - 19

**4.2 Attitude** n=384 Percentage

|  |  |  |
| --- | --- | --- |
| **How Do You Clean Your Hands?** | | |
| With soap and water | 142 | 37 |
| Alcohol based Hand Sanitizer | 0 | 0 |
| Only Water | 20 | 6 |
| Wipe with Tissue paper |  |  |
| Using both Soap and Water and Hand Sanitizer | 114 | 29.7 |
| Occasionally with Soap and Water | 105 | 27.3 |
| **How Many Times Do You Wash Your Hands?** | | |
| Daily Once / twice | 0 | 0 |
| Washing after every activity | 114 | 29.7 |
| Washing Before and After eating and After going to Rest room | 162 | 42.2 |
| Washing Occasionally | 108 | 28.1 |
| **How Do You Protect from Cough, Sneeze and Cold?** | | |
| Wearing Mask | 35 | 9.1 |
| Covering with Handkerchief | 31 | 8.1 |
| Keep Elbow to cover nose and mouth | 10 | 2.6 |
| All | 261 | 68 |
| Do Not cover mouth | 47 | 12.2 |
| **What Do You Mean by Social Distancing?** | | |
| Keep 2-meter Distance | 290 | 75.5 |
| Keep 1 feet Distance | 9 | 2.3 |
| Keep 1 Square Feet Distance | 0 | 0 |
| Keep 1 Shoulder Distance | 13 | 3.4 |
| Do Not Know | 72 | 18.8 |
| **Do You Think Staying at Home Can Prevent Corona Spread in Community?** | | |
|  |  |  |
| Yes | 248 | 64.6 |
| No | 0 | 0 |
| Not Known | 136 | 35 |
| **Are You Willing to use Mobile helpline?** | | |
| Yes | 11 | 2.9 |
| No | 373 | 97.1 |
| Not Known | 0 | 0 |
| **Is there available hand wash facility in SAIA** | | |
| Yes | 268 | 70 |
| No | 15 | 3.7 |
| Not known | 101 | 26.3 |

Table 2. Questionnaire on Attitude on COVID - 19

**4.3 Practice:** n=385 Percentage

|  |  |  |
| --- | --- | --- |
| **Are You Following Hand Wash Regularly?** | | |
| Following | 249 | 64.8 |
| Not following | 135 | 35.2 |
| Are You Covering Yourself with Face Mask to Prevent from Droplet Infection? | | |
| Following | 269 | 70.1 |
| Not following | 115 | 29.9 |
| **Are You Maintaining Social Distancing?** | | |
| Following | 234 | 60.9 |
| Not Known | 150 | 39.1 |
| **Are You Staying at Home?** | | |
| Following | 268 | 69.8 |
| Not Known 116 30.2 |  |  |
| **Are You Practicing Using Mobile helpline?** | | |
| Following | 12 | 3.1 |
| Not following | 372 | 96.9 |

Table 3. Questionnaire on Practice on COVID - 19

Knowledge regarding corona spread for general population revealed that 152 (39.6 %). 180 (46.9 %) knew only prevention is better and 157 (40.9 %) knew that there is no specific treatment. 36 (9.4 %) had knowledge on mobile help line (333 and 16263) Attitude towards washing hands, 114 (29.7 %) used both soap water and hand sanitizer. 114 (29.7 %) had attitude to follow hand washing after every activity. 261 (68%) covered themselves using all methods. 290 (75.5 %) had attitude to follow social distancing. 248 (64.6 %) were staying at home. 11 (2.9 %) had attitude of using mobile help line for protection. 279 (72.7 %) were practicing all measures. 249 (64.8 %) practiced regular hand washing. 269 (70.1 %) were wearing masks. 234 (61 %) were maintaining social distancing 268 (69.8 %) were staying at home. 12 (3.1 %) were following mobile help line (Table 3). The results obtained in this table helps in assessing the behavior gap between knowledge and practice followed by the participants in the study on various factors that mitigate on corona spread like wearing face mask (p = 0.101) showing statistically not significant, following hand washing (p = 0.002) showing statistically significant, maintaining social distancing (p = 0.035) showing statistically significant, staying at home (p = 0.005) showing statistically significant and usage of mobile help line (p = 0.559) showing statistically not significant (Table 4).

|  |  |  |  |
| --- | --- | --- | --- |
| **Knowledge Regarding Various Behavioral Factors That Mitigate the**  **Disease Spread** | **Practice**  **Yes No** | | **P-Value** |
| **Face Mask** | | | |
| **Yes** | **202**  **(72.4)** | **77 (27.6)** | **0.101** |
| **No** | **67**  **(63.8)** | **38 (36.2)** |
| **Hand wash** | | | |
| **Yes** | **194 (69.5)** | **85**  **(30.5)** | **0.002** |
| **No** | **55 (52.4)** | **50**  **(47.6)** |
| **Social Distancing** | | | |
| **Yes** | **179 (64.2)** | **100**  **(35.8)** | **0.035** |
| **No** | **55**  **(52.4)** | **50**  **(47.6)** |
| **Staying at Home** | | | |
| **Yes** | **206 (73.8)** | **73**  **(26.2)** | **0.005** |
| **No** | **62**  **(59.0)** | **43**  **(41.0)** |
| **Mobile help lie use** | | | |
| |  |  |  |  | | --- | --- | --- | --- | | **Yes** | **12**  **(4.3)** | **267**  **(96.7)** | **0.559** | | **No** | **6**  **(5.7)** | **99**  **(94.3)** | | | | |

Table 4.  Assessment of Various Behavioral Factors That Mitigate the Disease Spread         –  Knowledge vs. Practice.

**Chapter 5: DISCUSSION**

In this study male were higher than female, expatriates were heist traveler where tourists were significantly less in COVID pandemic time. Elder citizen is one third of study sample. 33 (9%) were below primary level and it shows risk of capable knowledge of corona virus.

This study showed 152 (39.6 %) respondents had knowledge on disease spread which is more compared to the study conducted by Huda F. Abbag during 2017 in general population found to be 19.5 % had knowledge on MERS-CoV, in Ahba, Saudi Arabia and concluded that poor knowledge was the cause for rapid spread of disease and could be the same in Chattogram (Abbag HF et al.,2018) 155 (40.45 %) knew that virus can spread by touching surfaces, and 3 (0.8 %) knew that virus can survive few hours to several days. 248 (64.6%) had knowledge on corona signs, 47 (12.2 %) knew about symptoms and 180 (46.9 %) had knowledge that prevention is the only way and 194 (50.5 %) had knowledge on quarantine which is similar to study of Prasad RV et al.,2020. One of the challenges in fighting against COVID- 19 is that we have little knowledgeon the pathogen and pathogenesis (Qian X et al.,2020). Though Government is spreading message about importance of mobile app among community to adopt, so as to minimize the mobility and to identify the COVID cases to interrupt further transmission, only 36 (9.4%) of people are having knowledge on mobile help line application (Peng W et al., 2016) 142 (37 %) respondents had attitude on washing hands with soap and water, 114 (29.7 %) used both soap and water along with hand sanitizer. 114 (29.7 %) washed hands regularly (Lau JTF et al.,2004). 268 (70%) find available hand wash facility in SAIA but 101(26.3) had no idea about this issue. 261 (68 %) thought to cover face wearing mask, handkerchief or with elbow. 290 (75.5 %) had attitude for social distancing and 248 (64.6 %) to stay at home and 11 (2.9 %) thought to follow mobile helpline which is very poor (Peng W et al.,2016). 279 (72.7 %) practiced hand wash, wearing mask, maintaining social distancing and staying at home. 249 (64.8 %) followed regular hand washing is less compared to Issac et. al, 2003 study, where in 75.9 % were washing hands regularly among general public of Hong Kong.20 269 (70.1 %) were wearing mask, majority were from 28 - 47 years (115 + 88 = 203 [75.5 %]), found significantly high in younger age group compared to the Tang et, al. study, where elderly above 50 years (68 %) were wearing masks. The worst affected people in this situation is only elderly may be due to less usage of face mask (Tang CSK et al., 2004). Shin Wei Sim et al. 2014 concluded that usage of face mask helps in prevention of respiratory infections, at present COVID-19 spread can be controlled from lessons learned from SARS epidemic. 234 (60.9 %) were maintaining 2-meter social distancing and 268 (69.8%) were strictly following staying at home during lockdown period. Wang et, al. concluded that in his phase-adjusted estimation in number of COVID cases in Wuhan suggested, that following preventive measures like maintaining social distance and staying at home has reduced the human-to- human contact and found less spread of infection (Wang H et al.,2020). Study from SaviMaharaj et al, proved using graphic representation showing that social distancing by one group has reduced the spread of infection compared to other who did not follow (Maharaj S et al.,2012). Prevalence of practicing mobile help lone is 12 (3.1 %), which is very less and shows people have no interest in using app rather interested in other social apps is showing inequalities among the community, which have to be answered and could be reason for spread of COVID-19 in Chattogram (Nadine B et al.,2018).

**Chapter: 6 Limitations**

More number of studies are required across the country with regard to hand washing, social distancing, wearing masks, staying at home and regarding usage of mobile help line or app among the general population. This study should have included more participants from all corners of the community like all professionals, businessmen, traders, healthcare workers, police departments, frequent travelers, scavengers, animal handlers, butchers, etc.

**Chapter: 7 Conclusion**

Knowledge, attitudes, and practices of the general public specially international passengers are crucial to contain COVID-19 and implement mitigation measures. An understanding of the public’s KAP helps policy makers and public health managers design and implement policies and mitigation measures by pro- viding them with insights into pertinent crucial factors.

This study helps us to understand the need for increase in preparedness and response actions to be designed for air traveler to prevent transmission of the disease.

39.6 % had knowledge with regard to COVID, 68 % had attitude to fight against infection, and 72.7 % were practicing preventive measures. 3.1 % were using mobile technology, which is very low and this need to be addressed to attract more people to use the virtual media.

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Biography

Dr Mohammed Zainul Abedin Sharif , Airport Health Officer, Shah Amanat International Airport passed M B B S from Khulna Medical College in 2000. He joined government service by B C S (Health) in 2008. Dr Sharif worked as research assistant in MRG (Malaria research Group) headed by Prof M A Faiz from 2001 to 2006). He is enthusiastic of research in One Heath conception .Recently he is awarded as ‘COVID HERO’ by civil aviation welfare association ,Chattogram for his support in airport.