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Content | Page

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Content | Page

IMPORTANCE AND OVERSIGHT OF MEDICAL RESEARCH: BANGLADESH PERSPECTIVE

Sultana Parvez

Research is defined as a systemic investigation, including research devepiopment, testing and evaluation, designed to develop or contribute to generalizable knowledge[1]. This is a broad definition that may include biomedical research ,epidemiological studies, and health sevices research, as well as studies of behavioral, social and economic factors that effect health[2]. Bangladesh is a densely populated country with a huge scope of research. Perhaps the most familiar form of health research is the clinical trial. The use of secondary data is a common research approach in fields such as epidemiology, health services research and public health research, and includes analysis of patterns of occurrences, determinants, and natural history of disease; evaluation of health care interventions and services; drug safety servilance; and some genetic and social studies[3].

The importance of research on medical science is enormous. It can provide important information about disease trends and risk factors, outcomes of treatment or public health interventions ,functional abilities, pattern of care and health care costs and use[4].

Furthermopre medical records research has demonstrated that preventive services substantially reduce mortality and morbidity at reasonable costs and has established a casual link between the nursing shortage and patient health outcomes which influences the policy decisions at the national level[5].

Public opinion surveys indicate that a majority of Americans are willing to participate in clinical research studies[6]. Even willingness to participate in research focused on specific diseases is quite high. In one survey, the percentage of respondents indicating a willingness to participate in a medical research study was 88% for cancer, 86% for heart diseasae, 83% for noncurable fatal disease, 79% for addiction, 78% for depression, and 76% for schizophrenia[7]. In Bangladesh there is a huge burden of both communicable and noncommunicable diseases. These patients are regularly checkedup their physical and mental health. Therefore, there is a tremendous scope for doing the research work in this country.

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ANALYSIS OF PERIPHERAL NATURAL KILLER CELLS IN PATIENTS WITH DIFFERENT SEVERITIES OF COVID-19

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ABSTRACT

Background: Natural killer cell population plays a major role in the anti-COVID-19 response. Evaluating peripheral blood NK cell in COVID-19 patients might help to understand the disease pathogenesis and contribute to develop novel therapeutics. **Objective:** The purpose of this study was to quantify the absolute count and exhaustion marker of peripheral natural killer cells among COVID-19 patients according to severity. **Methodology:** This cross sectional study was carried out in the Department of Microbiology & Immunology, Bangabandhu Sheikh Mujib Medical University during the period from March 2020 to January 2021. A total of 103 COVID-19 patients and 20 healthy subjects were enrolled in this study. COVID-19 patients were categorized into mild-moderate (n=56) and severe-critical (n=47) group. Peripheral venous blood was collected from study groups and NK cells were analysed with flow cytometry.**Results:** Among the study groups, the absolute counts of peripheral blood NK cells were significantly decreased in severe-critical group compared to healthy and mild-moderate group (P<.0001). Exhaustion marker CD94/NKG2A was increased on peripheral NK cells in COVID-19 patients compared to healthy group (P<.0001). Moreover, circulating CD94/NKG2A positive NK cells were significantly higher in the severe-critical group than the mild-moderate group (P<.0001). **Conclusion:** Decreased circulating counts and exhausted phenotype of NK cell could be used as indicator for COVID-19 severity. NK cell-based therapies could be useful for treatment of severe COVID-19 patients.

Key words: COVID-19, NK cell, CD94/NKG2A

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Introduction

Coronavirus Disease-19 caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), emerged in China in December 2019 and has posed a serious threat to the human population.[1] COVID-19 patients exhibit a range of clinical patterns, from mild to severe illness. Patients may develop acute respiratory distress syndrome (ARDS), multi-organ failure with a high risk of death.[2] The clinical severity of COVID-19 is largely associated with host immune responses.[3]

The innate immune system recognizes pathogens and releases pro-inflammatory cytokines to initiate an immune response in a viral infection.[4] The NK cell population is one of the crucial elements of innate immunity and is essential for the killing of target cells through the release of granzymes and perforin.[5,6] Cytokine production by NK cells indicates that NK cell activation may not only result in the resolution of infection but also contribute to the cytokine storm.[7]

However, the continuous inflammatory stimulation results in a phenomenon called immune cell exhaustion. The activities of the exhausted cells are impaired.[8] The functions of NK cells are regulated by activating and inhibitory receptors. The CD94/NK group 2 member A (NKG2A) is an inhibitory receptor expressed by NK cell. It binds to the non-classical HLA class I molecule (HLA-E) and provides an inhibitory signal, suppressing cytokine secretion and cytotoxicity. NK cells showed functional exhaustion with increased CD94 and NKG2A expression.[9,10]

In COVID-19 patients, dysregulation of the activating and inhibitory receptors, cytokine storm and decreased NK cells are significant contributors to the severity of the disease.[11] NK cell counts are significantly lower in patients with severe disease compared to those with mild disease.[12] According to a study, COVID-19 patients have elevated NKG2A expression, which indicates that the NK cells are functionally exhausted. Additionally, in patients recovering after antiviral therapy, the number of NK cells is restored with reduced expression of NKG2A.[13] Targeting the inhibitory receptors with monoclonal antibodies would be helpful to restore NK cell function. A study revealed that the anti-NKG2A monoclonal antibody (monalizumab) can enhance NK cell cytotoxic functions in COVID-19 patients.[14]

Functional exhaustion can damage the cellular immune response in SARS-CoV-2, making individuals susceptible to severe COVID-19.[7] So, it is important to understand the immune responses generated by COVID-19 and to stratify patients who are at higher risk of developing severe disease. Therefore, the study aimed to identify peripheral NK cell alteration and NK cell exhaustion in mild-moderate and severe-critical cases of COVID-19 patients which might help to understand the pathogenesis, predict the severity of the disease and develop therapeutic strategies for COVID-19.

Materials and Methods

A total of 103 RT-PCR-confirmed COVID-19 patients and 20 healthy subjects were enrolled in this study from the COVID Unit of Bangabandhu Sheikh Mujib Medical University between March 2020 and January 2021. Healthy subjects and patients with immunosuppressive drugs, chemotherapy, and immunodeficiency disorders were excluded. COVID-19 patients were categorized into mild-moderate and severe-critical groups.[15]

Informed written consent was obtained from all subjects. Relevant data were collected on a data collection sheet, and confidentiality was maintained. The study was approved by the Institutional Review Board of BSMMU (No.BSMMU/2020/7870).

On admission, patient's 3ml venous blood was collected in a BD Vacutainer EDTA tube for flow cytometry. For each sample, 50μl anticoagulated blood was pipetted into tube. A 5μl of flurochrome conjugated monoclonal antibodies-Anti-CD45- ECD (energy coupled dye), anti-CD56- PE/Cy5 (Phycoerythrin- cyanine5), CD94/NKG2A-PE (Phycoerythrin) was added to detect NK cells and CD94/NKG2A positive NK cell. Incubation was done for 10-15 minutes in dark at room temperature and 200μl of lysing solution was added to tubes to lyse RBC. After incubation, 3ml of sheath fluid (IsoFlow) was added. Centrifugation was done for 5 minutes at 300g and the supernatant was discarded. Cells were re-suspended in sheath fluid. The tubes were run on a precalibrated flow cytometer (Beckman Coulter Cytomics FC 500) at Department of Microbiology and Immunology, Bangabandhu Sheikh Mujib Medical University and data were analyzed by CXP software. For each sample, 10,000 events were counted.

The results were expressed as medians (interquartile range) and the One-way ANOVA non-parametric test (Kruskal-Wallis test) was used for multiple comparisons, while the Mann-Whitney U test was used for two-group comparisons. P-values less than 0.05 were considered statistically significant. Statistical analysis and graphic representation of the data were performed by SPSS software version 27 and Graph Pad Prism 9.0 software.

Result

Disruption of immune response causes alteration and exhaustion of NK cell in COVID-19 patients. For analysis of the NK cells according to the disease severity, COVID-19 patients were divided into mild-moderate group (n=56) and severe-critical group (n=47), and 20 healthy subjects were in healthy group.

The comparison of NK cells in peripheral blood of COVID -19 patients and the healthy group is shown in Table 1. The absolute count of NK cell was decreased significantly in the severe-critical group compared to healthy and mild-moderate group. Absolute count of NK cell was not changed significantly between healthy and mild-moderate group.

Comparison of CD94/NKG2A expressing NK cell population between total COVID-19 patients and healthy group is shown in Figure 1. The percentage of circulating NK cells had significantly higher expression of CD94/NKG2A in the COVID-19 patients compared to healthy group 87(76-98) vs 64.50 (58-71), $P<0.0001$).

Further, the expression of CD94/NKG2A on NK cells are compared among mild-moderate, severe-critical COVID-19 group and healthy group (Table 1). A significant increase was observed in the percentage of CD94/NKG2A+ NK cells in the severe-critical group (88.00%) compared to those in the healthy group (64.50%, $P<0.0001$) and mild-moderate group (81.00%, <0.0001). The CD94/NKG2A + NK cells percentage was also significantly increased in the mild-moderate group than the healthy group ($P<0.0001$).

Table 1: Comparison of NK cells and CD94/NKG2A expressing NK cell population in peripheral blood among study groups (N=123)

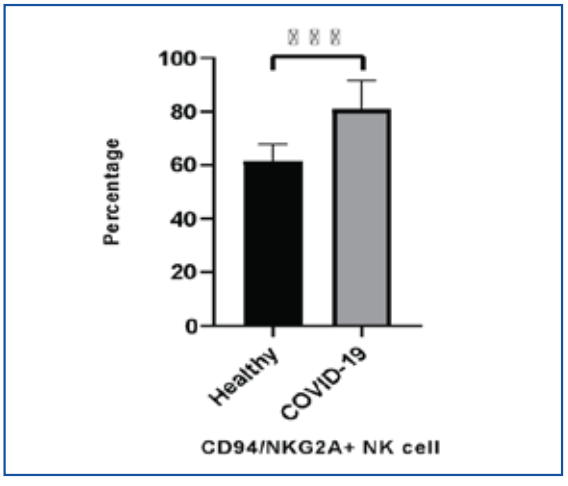
Characteristics	Healthy group (n=20)	Mild-moderate group (n=56)	Severe-critical group (n=47)	P value
NK cell (cells/uL), Median (IQR)	215(198 -232)	206.30(85.98 -326.62)	85.4(24.2 -195)	0 .0001[ab]
CD94/NKG2A+ NK cell (%), Median (IQR)	64.50(58 -71)	81.00(59 -103)	88.00(80 -96)	0 .0001[abc]

[a]Healthy vs severe-critical

[b]Mild-moderate vs severe-critical

[c]Healthy vs mild-moderate

P < .05 indicated statistical significance. P value was calculated by Kruskal-Wallis Test with Bonferroni correction to compare among different groups.



Discussion:

COVID-19 has emerged as a potentially infectious disease worldwide. Peripheral blood NK cells play a major role in COVID-19 pathogenesis. NK cell depletion and exhaustion are the key immunological factors linked to the clinical progression of this disease.

In this study, the absolute count of peripheral NK cell was decreased significantly in the severe-critical group compared to those in healthy and mild-moderate group. This result is similar to previous several studies conducted in China 5, 12, 13. However, it has been also reported that the NK cell counts are found unchangedin COVID-19 patients.[16,17] The possible explanation of reduction of the NK cell count is due to the migration of NK cells from the peripheral blood to the lung tissue which is mediated by increased level of MCP-1, IP-10 or by CXCR3 pathway in COVID-19 patients.[18]

In the current study, the expression of CD94/NKG2A was detected to analyze the exhaustion status of the NK cells. Among the study groups, the percentages of CD94/NKG2A were increased in severe-critical group and mild-moderate group compared to healthy group. Similar to this finding, a study found increased expression of CD94/NKG2A on NK cells in severe COVID-19 patients compared to healthy group.[13] In contrast, no difference in the percentage of CD94/NKG2A expressing NK cells was found between COVID-19 patients and healthy control.[19] It is considered that the high exhaustion level of NK cells is due to the direct

effect of persistent antigenic stimulation ofcoronavirus. The CD94/NKG2A up-regulation in NK cells results reduced capacity to synthesize functional markers, such as CD107a, IFN-γ, IL-2, granzyme B, and TNF-α.[13] Consequently, SARS-CoV-2 infection might compromise the innate immunity by exhausting NK cells' functions.[9,13]

Therefore, NK cell reconstitution might be a possible cure for the severe patients. Since NKG2A over-expression exhausts the functional capabilities of NK cell, blocking CD94/NKG2A receptor by monoclonal antibody (Monalizumab) in severe cases of COVID-19 can restore the function of NK cells.[14,20]

Conclusion

The number of NK cells was reduced and the percentage of CD94/NKG2A expressing NK cells was increased in severe COVID-19 patients, suggesting the depletion and exhaustion of NK cells could be related to the severity of the disease. Restoration of NK cell number and function might be a good therapeutic target.

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A RETROSPECTIVE STUDY OF DIFFERENT MANNERS OF DEATH OVER 2 YEARS PERIOD (JANUARY'2022 TO DECEMBER'2023) AT FORENSIC MEDICINE DEPARTMENT OF DHAKA MEDICAL COLLEGE

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ABSTRACT

Background: Every human being is blessed with life which is a gift from the almighty. With this life, every human has the right to be lived with happiness, peacefully, pursue wealth and power, satisfy his or her physical appetites and passion. All these demands of human lives come to an end when this life comes through a process which is known as death. However, this death can be natural and unnatural. At the same time, a great number of people die due to homicides and suicides which should also be a great concern of our country at present. **Objective:** The objective of the study is to assess the demographic statistics relating to age and gender, cause of death, type of manner and time of death to create awareness among the concern parties. **Methods:** A retrospective study, conducted in 3893 cases, data were collected from a predesigned format of autopsy reports, hospital notes and inquest reports all performed at Dhaka Medical College Hospital (DMCH) Morgue during the year of January' 2022 to December' 2023. The data received were carefully recorded later, analyzed by computer and organized in tables and pie charts. **Results:** Out of 3893 cases of death, 1495 cases were accidental (38.40%). Among these cases, the majority of age group for victims were between 16 to 30 years (41.50%) followed by 31 to 55 years (38.30%). Majority of the homicidal deaths were occured by blunt weapon (61.40%) followed by bullet injury (15.10%). 73.60% of the accidental deaths were occurred through the mode of road traffic accident. And finally the major method of suicidal death cases was occurred by Hanging.

Keywords: Death, Natural and unnatural death, Homicidal death, Road traffic accident, Suicidal death, PM examination.

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Introduction

Death is a tragedy in whatever form, at whatever time and in whatever way it comes[1]. The death is natural when it is due to any pathology (disease) or ageing, and is unnatural when caused prematurely against order of the nature by injury, poison or other means of violence. Unnatural deaths may be accidental, suicidal, homicidal or undetermined. The data of unnatural deaths may reflect the law-and-order situation in a particular area of jurisdiction[2]. If death is premature, unexpected and resulting from violence causes harassment/depression not only among the relatives of deceased but also have certain impacts all over the society[3].

The term Homicide means killing of a human being by another human being[4]. It may be considered as destruction of human life by the act, agency, procurement or culpable omission of some other person[5]. Homicide is punishable under certain circumstances (culpable homicide) & not punishable under other circumstances (excusable or justifiable)[6]. Thus, homicide may be lawful & unlawful. Murder is culpable homicide, section 300 BPC means killing of a person with malice aforethought, expressed or implied[7,8].

Suicidal cases are increasing in an alarming rate in many countries of the world including Bangladesh. WHO estimates that nearly 900,000 people worldwide die from suicide every year, including about 200,000 in China, 170,000 in India and 140,000 in high income countries[9,10,11]. Among all the suicidal deaths, once of the most common methods for suicide is suicide by hanging. Hanging is once of the major causes of unnatural death in Bangladesh. The number of suicidal deaths can indicate the socio-economical and health status of a society[12].

There has been a terrifying rise in road traffic accidents in the whole world and especially in Bangladesh over the past few years and has become a national problem. Everyday a considerable number of persons die in road traffic accident with the higher rate of fatality.

Materials & Methods:

A retrospective study, conducted in 3893 cases, data were collected from a predesigned format of autopsy reports, hospital notes and inquest reports all performed at Dhaka Medical College Hospital (DMCH) Morgue during the year of January' 2022 to December' 2023. The data received were carefully recorded later, analyzed by computer and organized in tables and pie charts.

Results:

The data was collected from the study of 3893 cases of deaths in Dhaka Medical College f rom the year of January' 2022 to December' 2023. Table 1 shows the mode of the deaths of the cases.

Table-1: Mode of Death Distribution

Mode of Death	Number of Cases	Percentage (%)
Homicide	646	16.60%
Accident	1495	38.40%
Suicide	470	12.08%
Natural Death	1071	27.50%
Undetermined	210	5.40%

As per Table 1, out of the total 3893 deaths, 646(16.60%) cases were due to homicides and 1495(38.40%) of accidents while 470(12.08%) were involved in suicidal deaths. There were 1071(27.50%) cases of natural deaths whereas a total number of 210(5.40%) death cases were undetermined.

Table-2: Distribution of age group

Distribution of Age Group	Number of Cases Cases	Percentage (%)
0-5 years	144	3.70%
6-15 years	160	4.10%
16-30 years	1616	41.50%
31-55 years	1491	38.30%
56 years & above	483	12.40%

As per Table 2, the age group of different types of deaths lies between 16-30 years (41.50%) followed by 31-55 years (38.30%), 56 years and above (12.40%), 6-15 years (4.10%) and 0-5 years (3.70%).

Table-3: Distribution of Methods of Homicide

Method of Homicide	Number of Cases	Percentage (%)
Blunt Weapon	397	61.40%
Bullet Injury	98	15.10%
Sharp Weapon	90	14.00%
Strangulation	48	7.40%
Others	14	2.10%

From Table 3, we can see that, among 646 deaths caused by homicide, blunt weapon injuries was for 397(61.40%) cases, followed by bullet injury 98(15.10%), sharp weapon injury 90(14.00%), strangulation cases was 48(7.40%) and other cases was for 14(2.10%) cases.

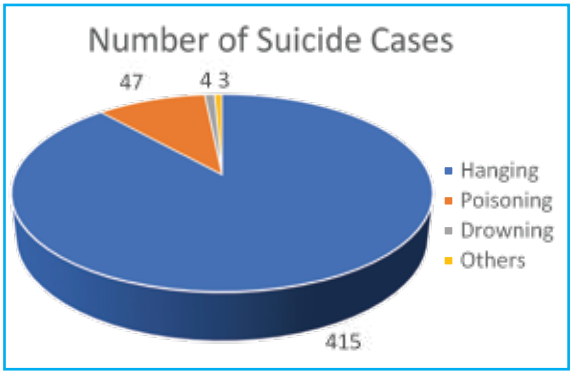
Table-4: Distribution of Mode of Accidents

Method of Accidents	Number of Cases	Percentage (%)
RTA	1100	73.60%
Burn	157	10.50%
Electric Shock	142	9.50%
Fall	58	3.90%
Drowning	25	1.70%
Intoxication	12	0.80%

From Table 4, we can see that among 1495 accidental deaths, most common death was for RTA 1100(73.60%) cases followed by burn 157(10.50%) cases, electric shock 142(9.50%) cases, fall 58(3.90%) cases, drowning 25(1.70%) cases and intoxication 12(0.80%) cases.

Table-5: Method of Suicide-wise Distribution

Method of Suicide	Number of Cases	Percentage (%)
Hanging	415	88.40%
Poisoning	47	10.00%
Drowning	4	0.90%
Others	3	0.70%



From Table 5, we can see that among 470 suicidal deaths, most common death was for hanging 415(88.40%) cases followed by poisoning 47(10.00%) cases, drowning 4(0.90%) cases and others 3(0.70%) cases.

Discussion:

In this study, out of the total 3893 cases, 646(16.60%) were homicides, 1495(38.40%) were accidents, while 470(12.08%) were suicide cases. In addition to this, 1071(27.50%) cases were found as natural deaths whereas 210(5.40%) cases were found undetermined. According to the study, the accidental deaths outnumbered homicidal and suicidal deaths. Thhis finding of present study is in allinged with the studies done by Rahim[15] and Ghulam[16], Akang[17], Srivastava[18].

Discussion:

In our study, road traffic accidents has dominated among the accidental deaths (73.60%). Other authors have reported the same results also like Ganesh[19].

The most exposed age group in our study was 16-30 years in 1616(41.50%) cases, followed by 31-55 years in 1491(38.30%) cases. This findigs are consistent with the findings of Pradipkumar Singh et al where it was observed that the age group of 21-30 years was the most vulnerable group (24.89%). The reason for getting the higher number of cases in this group is due to fact that persons belonging to the young age group are active, mobile and energetic[20]. These young individuals are short tempered and can easily become emotional which results in violence.

In our study, 646 cases of deaths were caused by homicide where blunt weapon was the main source of death which was accounted for 397(61.40%) cases followed by bullet injury 98(15.10%) cases. Bhupinder[21] had similar types of result to ours and reported that the mojority of homicidal deaths were caused by blunt weapon (46%) followed by sharp weapon (25%) and asphyxiation (12%).

In our study, another concern was found that, out of 470 cases of suicidal deaths, the most common method for suicidal death was hanging in 415(88.40%) cases which was followed by 47(10%) cases of poisoning. Studies done by Baruah[22] and Meera[23] showed that hanging and self-immolation were the most common methods applied for suicidal deaths.

Conclusion:

In our country Bangladesh, everyday various crimes are increasing every day due to having huge number of populations, corruption, poverty, unemployment, drug addiction, emotional conflicts & religious point of views as well as polictical unrests. In our study, our aim was not only amied at finding out the information about natural and unnatural deaths but also to provide information of the demographic profile, manners and modalities involved in deaths, presented to the Department of Forensic Medicine at Dhaka Medical College. The finding of this study will create awareness amoth the people about deaths related to violence, which is the important public health concern in the society. It will also be helpful for law enforcement agencies to make the strategies for prevention of such incidences.

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CORRELATION BETWEEN BEDSIDE INDEX FOR SEVERITY IN ACUTE PANCREATITIS (BISAP) SCORE AND IN-HOSPITAL OUTCOME IN PATIENTS WITH ACUTE PANCREATITIS

Mohammad Sirajul Islam[1], Ahmed Hossain[2], Daharul Islam[3], Mahmuda Abira[4]

ABSTRACT

Background and Aim: Acute pancreatitis is a potentially life-threatening disease characterized by inflammation of the pancreas. Early identification and assessing severity of disease is crucial for formulating appropriate management strategies and improving outcomes. The aim of the study was to assess correlation between BISAP score and in-hospital outcome in acute pancreatitis. **Materials and Methods:** This longitudinal study was conducted in Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka from January 2023 to December 2023. A total 107 subjects were included after ethical approval on the basis of inclusion and exclusion criteria. Severity of the disease was assessed by BISAP score. The outcome determinants were length of hospital stay, complete recovery, partial recovery with complication, transfer to ICU and mortality. Pearson's Correlation Co-efficient test and Spearman's Rank Correlation Coefficient were performed as applicable. p value <0.05 was considered as the level of significance. **Results:** In this study, mean BISAP score was 2.00 ± 0.76. Median (IQR) length of hospital stay was 7(6-7) days. Among the admitted patients about 22.4% patients were discharged with partial recovery and 77.6% were discharged with complete recovery. About 3.7% patients were transfer to ICU for further management. Our study revealed a significant ($p=<0.01$) positive correlation with BISAP scores and length of hospital stay ($r=+0.768$), ICU transfer ($r=+0.247$) and recovery status ($r=+0.602$). **Conclusion:** It can be concluded that a higher BISAP score was positively associated with increased length of hospital stay, a greater likelihood of ICU transfer and higher rates of partial recovery with complications.

Keywords: Acute pancreatitis, Bedside index for severity in acute pancreatitis (BISAP) score, in-hospital outcome.

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Introduction

Acute pancreatitis (AP) is the acute inflammation of the pancreas due to sudden activation of pancreatic enzymes leading to morphologic changes and impairment of function[1,2]. Majority of patients have a self-limited disease and mild course with no organ involvements, but around 30% of patients had severe acute necrotizing pancreatitis. The mortality rate approaches 40% in severe cases[3]. It is a potentially life-threatening disease with variable presentation[3].

A number of scoring systems like Modified Glasgow, Acute physiology and chronic health evaluation (APACHE) II and Ranson scores have been used in estimating severity of AP[4]. As a simple and effective method, the Bedside Index for Severity in AP (BISAP) has been proposed for early identification of patients at risk for in-hospital mortality[5]. It is very simple, inexpensive, easy to calculate and remember, stratifies patients within the first 24 hours of admission 6 and is able to identify patients at increased risk of mortality prior to the onset of organ failure[5,7]. Various study[7,8,9] found significant positive relations between BISAP score and in-hospital outcome but less published data are available in our country with this scoring scale. Therefore, present study has been designed to assess correlation between BISAP score and in-hospital outcome in acute pancreatitis.

Materials & Methods:

This longitudinal study was conducted in Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh from January 2023 to December 2023. A total 107 patients with acute pancreatitis were included by purposive sampling. Patients were diagnosed on the basis of revised Atlanta classification (2012)[10]. Ethical approval was obtained from the ethical review board prior of study. Informed written consent was taken from the participants. Patients with relapsing pancreatitis, chronic pancreatitis, pancreatic malignancy, diabetes ketoacidosis, chronic kidney disease, chronic liver disease, hepatic encephalopathy were excluded from the study. The demographic variables, history of disease, risk factors, clinical examination, laboratory investigations were recorded. Bedside index for severity in acute pancreatitis (BISAP) score[6] was used for assessment of severity of the disease. The outcome determinants was length of hospital stay, complete recovery, partial recovery with complication, transfer to ICU and mortality. All the information were recorded in a structured data collection. Pearson's Correlation Co-efficient test and Spearman's Rank correlation coefficient were done to assess correlation of BISAP with outcome of pancreatitis by windows software using IBM SPSS (statistical package for social sciences) Statistics for Windows, Version 26.0. p-value <0.05 was considered as the level of significance.

Results:

In this study, population had a mean age of 52.09 ± 14.94 years, with 33.6% being female and 66.4% being male (Table-I). The mean BISAP score was 2.00 ± 0.76. Median (IQR) length of hospital stay was 7(6-7) days. Among the admitted patients about 22.4% patients were discharged with partial recovery and 77.6% were discharged with complete recovery. About 3.7% patients were transfer to ICU for further management (Table-II). Our study revealed a significant ($p = < 0.01$) positive correlation with BISAP scores and length of hospital stay ($r = +0.768$), ICU transfer ($r = +0.247$) and recovery status ($r = +0.602$) (Figure 1,2,3).

Table I: Distribution of study subject according to age and gender (N=107)

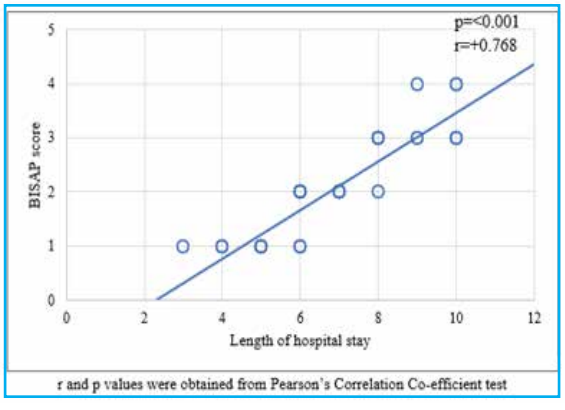
Variable	Study subjects
Age (Years)	52.09±14.94
Gender	
Male	71 (66.4%)
Female	36 (33.6%)

Data were expressed as Mean±SD, frequency and percentage

Table II: Distribution of the study subjects according to in-hospital outcome (N=107)

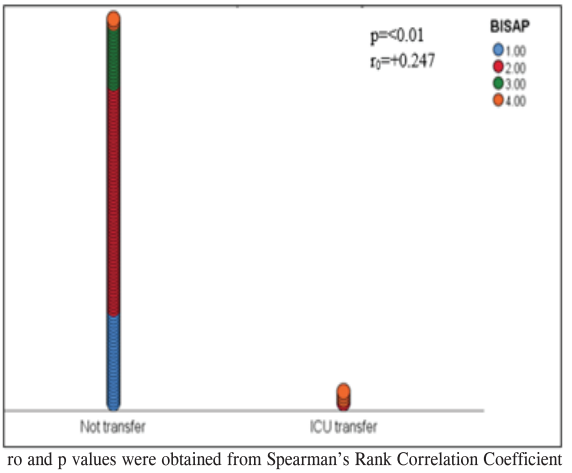
Outcome	Frequency	Percentage
BISAP score (Mean±SD)	2.00±0.76	
Length of hospital stay (day)		
≤7	84	78.5
>7	23	21.5
Median (IQR)	7(6-7)	
Transfer to ICU	4	3.7
Partial recovery with complication	24	22.4
Complete recovery	83	77.6
Death	0	0

Data were expressed as frequency, percentage, Mean±SD, median and interquartile range (IQR)



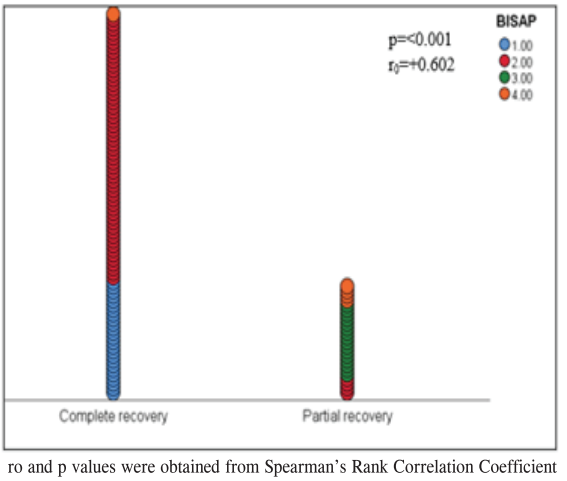
r and p values were obtained from Pearson's Correlation Co-efficient test

Figure 1: Correlation of BISAP scores with length of hospital stay (N=107)



ro and p values were obtained from Spearman's Rank Correlation Coefficient

Figure 2: Correlation of BISAP score with ICU transfer of the study subjects (N=107)



ro and p values were obtained from Spearman's Rank Correlation Coefficient

Figure 3: Correlation of BISAP score with recovery status of the study subjects (N=107)

Discussion:

Early diagnosis is important goals in the initial evaluation and management of acute pancreatitis. Due to the risk of rapid worsening in acute pancreatitis, the assessment of severity of disease becomes crucial to a clinician. Present study was undertaken to evaluate the correlation of BISAP score with in-hospital outcome of acute pancreatitis patients.

Contemporary study observed mean BISAP score was 2.00±0.76. Similar observation was observed by Kuntoji and Karimulla6 and Cho et al.[11]. Length of hospital stay was 7(6-7) days. Gurleyik et al.[12] found mean hospital stay was 10 days in mild cases and a mean hospital stay was 21 days in severe cases. Karim et al.[13] informed that duration of hospital stay was significantly higher in severe acute pancreatitis probably due to increased tissue damage by inflammatory mediators.

In contemporary study, 22.4% patients were discharged with partial recovery and 3.7% patients were transfer to ICU for further management. Karim et al.[13] showed that 38.71% patients developed complication and 61.29% patients were discharged with complete recovery. Out of the 50 patients, 80% were discharged, 8% died, 10% were discharged against medical advice and 24% had to undergo ICU care observed by Manjunath et al.[14].

In existing study, a significant positive correlation was observed in length of hospital stay (r=+0.768), recovery status (r=+0.602) and ICU transfer (r=+0.247) with BISAP score. These findings are parallel with other studies.[7,8,9.]

Conclusion:

The study findings demonstrate that BISAP score was directly related with in-hospital outcomes in patients with acute pancreatitis. A higher BISAP score was significantly associated with increased length of hospital stay, a greater likelihood of ICU transfer and higher rates of partial recovery with complications. However, further prospective and multicenter studies with larger sample size are needed to corroborate to corroborate these findings in acute pancreatitis patients.

Limitations:

Small sample size and this single hospital-based study did not reflect exact scenario of the whole community.

Conflict of Interest:

The authors stated that there is no conflict of interest in this study

Acknowledgement:

The authors acknowledge all the study subjects for their active participation.

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ACCESSIBILITY TO UPAZILLA HEALTH COMPLEX SERVICES DURING COVID-19 PANDEMIC

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ABSTRACT

Background: The health sector has been one of the most badly affected sectors during the ongoing COVID-19 pandemic. The accessibility to UHC services is crucial for rural people to meet their basic healthcare needs. But there is a scarcity of relevant data regarding accessibility to UHC services. The aim of this study was to assess the level of accessibility to upazila health complex services during the COVID-19 pandemic. **Methods:** The study was a descriptive cross-sectional study, which was conducted at Sreenagar UHC of Munshigonj district in Bangladesh. The duration of the study was one year from 1st January to 31st December 2021. The study included 402 conveniently selected rural adults. After taking informed written consent, data were collected for 26 days by face-to-face interview with the help of a semi-structured questionnaire. Accessibility was measured by a set of ten questions. Privacy and confidentiality were maintained strictly. **Results:** The study revealed that among the respondents, most of the participants (71.9%) thought that physical distance was not maintained in the UHC while seeking services. Almost 80% of the respondents got full course of prescribed drugs and the majority (75.4%) got access to advised laboratory facilities. Most of the respondents (67.4%) resided near the UHC and 92.8% found available transport while coming to UHC. More than three fourths (76.6%) of the respondents were vaccinated against COVID-19. Accessibility to UHC services was found good among 60.2% followed by average which was found among 38.8%. It was found that accessibility to UHC services was better in males than females. The majority of respondents with masters level of education (80.0%) had good accessibility while 48.1% of Illiterate people had average accessibility, which was found statistically significant ($p<0.05$). Most of the students (77.1%) and businessmen (62.5%) had good accessibility to UHC whereas average accessibility was observed among 50% of day laborers and 47.8% of farmers. Most of the respondents (84.6%) who had to wait a short time to get the service had good accessibility while more than half (54.6%) had average accessibility who had to wait long, which was found statistically significant ($p<0.05$). Almost three-fourths (74.5%) had good accessibility who had a short distance of residence from UHC, and it was found statistically significant ($p<0.05$). **Conclusion:** This study involving one UHC reveals that around two-fifths of the service seekers did not have good accessibility. This issue of accessibility should be further studied involving more number of health care centers.

Keywords: Accessibility, accessibility to healthcare, Level of accessibility to healthcare, COVID-19 pandemic

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Introduction

The world has faced significant difficulties imposed by the COVID-19 pandemic. Till 25th January 2022, COVID-19 cases have crossed 349 million globally, with over 5.59 million fatalities and more than 281 million recoveries[1]. The nationwide lockdown measures implemented to restrict the transmission by a good number of countries, including Bangladesh, limited general people's access to health care & required necessities. Besides, the temporary shutdown of public transportation meant that people who used to take those services to visit health facilities were prevented from accessing general and emergency care[2]. The COVID-19 pandemic has challenged the provision of healthcare services and their accessibility. It has even affected many countries with high availability of healthcare facilities, high-tech technologies, and a sufficient number of healthcare professionals[3].

This virus has a high mutation rate and its enormous transmission contaminates individuals rapidly. Severe Acute Respiratory Syndrome is a significant complication that occurs in the patient experiencing COVID-19 contamination. Around 219 nations have been impacted by this destructive infection bringing about a heightening in the number of cases. World Health Organization (WHO) has declared COVID-19 as a pandemic as a result of its critical spread all through the world[4]. Bangladesh, a south Asian densely populated developing country with a total population of around 167.14 million faces a debacle because of the rise and spread of this infection[5]. Accessibility to healthcare services refers to the ease with which people can get required healthcare. It is by and large characterized as the opportunity to use appropriate services in proportion to healthcare needs. If services are available, an open door exists to get medical care; still, it is additionally restricted by different obstructions, for example, monetary, organizational, social, cultural issues, and so on. In this sense, the level of access impacts the utilization of healthcare services, and in this manner the health status of the population[3]. Most researchers perceive that access is connected with the timely use of services according to need. Although a few researchers recognize between the supply and opportunity for utilization of services and the actual use of health services. They are namely-geographic accessibility, availability, financial accessibility, and acceptability. Geographic accessibility means the actual distance or on the other hand travel time from the service delivery point to the user. Availability means having the right care available to the individuals who need it. Financial accessibility means the relationship between the cost of services and the willingness and ability of individuals to pay for those health care services. Acceptability means the match between how responsive health care service providers are to the social and cultural expectations of individuals and communities[6].

Access was an issue earlier to the pandemic. Thus, lacking or unavailability of healthcare services has exacerbated the current social burdens, stressing the system significantly more[3]. In the context of Bangladesh, the nation has an effective public health infrastructure network. The country's health care delivery system comprises a three-tier network of healthcare facilities. The first tiers are Upazila Health Complexes (UHC), Union Health and Family Welfare Centers (UH&FWC), and Community Clinics (CC). These are outpatient facilities for both health and family planning services. The UHC's provide treatment to the cases referred from the union level and also refer them to the district/ medical college hospitals when required[7]. To provide healthcare to the rural

people, the government healthcare-delivery systems at the upazila level, there are 424 UHC's. Among them, 50 bedded hospitals are 297, 31 bedded hospitals are 113, 10 bedded hospitals are 11, and 0 bedded hospitals are 3 in number with the bed capacity of 18463. They provide in-patient care to its population as well as provides emergency care, out-patient care, primary healthcare, family planning services, and other preventive & promotive healthcare services to its population[8].

It is apparent that the accessibility of the rural people to primary level public health facilities, particularly to the upazila health complexes is not up to the mark and they are not well satisfied with the healthcare services of the UHCs[7]. In the time of the COVID-19 pandemic, the chance of getting healthcare services changed as there was some new situation like lockdown, social distancing, and so on. Moreover, there is an absence of sufficient information about COVID-19 which makes individuals confused and reluctant to get healthcare services from UHC's. Also, we don't have adequate information about the variables connected with accessing healthcare services during the pandemic time frame. Vaccination against COVID-19 is taking place in the upazila health complex, which covers a large number of rural people. Besides, EPI and other vaccination programs were running regularly before the pandemic. Accessibility is an important issue to take such necessary health services. Considering these realities, this specific study aims to assess the accessibility of the rural people to healthcare services of the UHC's during COVID-19.

Rationale:

"Is nowhere near over"-these were the words stated by Dr. Tedros Adhano Ghebeyesus, the head of the WHO about the ending of the coronavirus pandemic to issue a warning to the world leaders. This statement reaffirms that the COVID-19 pandemic is unlikely to end shortly[9].

COVID-19 pandemic has become a global health threat and WHO already declared the outbreak, a public health emergency of international concern (PHEIC). Health care is experiencing an unprecedented challenge because of the COVID-19 pandemic on a worldwide scale. The WHO encouraged to take quick and appropriate public health initiatives to control the increased transmission rate and pandemic situation[10].

With a population of 167.14 million, Bangladesh positions as the eighth-most crowded country on the planet. The healthcare system of Bangladesh is mostly unregulated and consists of four cohorts including Government, private sector, non-Governmental organizations or NGOs, and international development organizations[10].

As the COVID-19 flare-up rapidly floods around the world, like many other countries, Bangladesh has taken some non-therapeutic preventive measures, such as travel bans, remote office activities, country lockdown, mandatory wearing masks, and most importantly, social distancing[11]. Besides, lack of sufficient information about COVID-19 makes people confused to reach health facilities for taking health care services.

Accessibility to healthcare facilities is impaired all over the world due to the COVID-19 pandemic as there is a lot of obstacles arise. The situation is not different in Bangladesh also. Like many other countries, there are some obstacles in accessing health facilities in Bangladesh, which are not revealed yet.

There is a lack of information about accessibility levels among rural people on accessing health care services in the upazila health complex during the COVID-19 pandemic.

The outcome of the study will help the policymakers in future planning to overcome the obstacles of accessing healthcare during the pandemic situation.

Methodology:

Study Design:

Descriptive type of cross-sectional study.

Study Period:

The duration of the study was one year starting from 1st January 2021 to 31st December 2021.

Study place:

The study place was upazila health complex, Sreenagar, Munshigonj, which was selected conveniently.

Study Population:

People who went to upazila health complexes to take services during the COVID-19 pandemic.

Sample size determination:

The sample size was fixed by using the following formula, n=z2pq/d2. Here, n=sample size, z=standard normal deviate, p=proportion of the desired outcome of the previous study, q=1-p, d=allowable error.

When n=Sample size

z=The reliability of coefficient at 95%confidence interval=1.96

p=39.3%=0.393 (Islam, Zaman, Farjana and Khanam, 2020)

q=1-p =1-0.393=0.607

d= Allowable error, degree of accuracy required, usually set as 5%=0.05

So, n=(1.96)2x0.393x0.607 / (0.05)2=366

As 10% no response of 366=366+(10% of 366)=402

Sample size=402

Sampling Technique:

Convenience sampling technique.

Data collection instrument:

A semi-structured questionnaire was used to collect data about the socio-demographic variables, information about the accessibility of the patients, and other relevant data. The questionnaire was developed in English first and then converted into a Bengali version. It took 15-20 minutes to collect data from each respondent.

Data collection technique:

Data were collected by face-to-face exit interviews. Data were collected from the waiting area of the OPD department and hospital premises. After taking informed written consent, each patient was interviewed.

Data Management:

- Initially data were checked for completeness and correctness to exclude missing or inconsistent data.
- Then data was entered into the computer using a statistical software (SPSS Software).

Data Analysis:

- Data was analyzed by using a statistical software.
- Descriptive data were analyzed by simple frequency distribution (mean, standard deviation, percentage).

Accessibility to UHC services during COVID-19 was assessed based on findings of ten questions which were related to accessibility, based on having the desired service, service provider's behavior, waiting time, availability of the medicine and laboratory test facilities, availability of transport, distance of UHC from their residence, etc. Each question had two options; "Yes" and "No"; "Yes" answer incurred "1" while and "No" answer incurred "0" score. The total score was ranged from 0 to 10. Finally, accessibility was labeled as follows:

Score	Level of Accessibility
8-10	Good
5-7	Average
<5	Poor

Ethics:

Ethical clearance was obtained from the Institutional Review Board (IRB) of NIPSOM followed by permission was taken from the UH&FPO for data collection. Informed written consent was taken from each participant informing purpose, procedure, risk and benefits of the study. Privacy of the participants and confidentiality of data were maintained strictly.

Result:

Females were predominant (65.4%), mean age of the participants was 41.22(±16.366) years, more than one-fourth (77.1%) were married, around one third (38.8%) had no education, most of the service seekers were housewives (54.0%), most (62.2%) were from nuclear family, average monthly family income was Tk. 21893.03 (±13489.481), and Average expenditure was Tk. 18407.96(±8646.723) (Table 1).

Table 1: Baseline characteristics of the participants (n=402)

Attributes	Findings
Gender	Male: 34.6%, Female: 65.4%
Age group in years	18-29: 29.6%, 30-39: 20.1%, 40-49: 14.4%, 50-59: 13.7%, 60-69: 15.9%; Mean age: 41.22(±16.366)
Marital status	Married: 77.1%, Unmarried: 12.4%, Widowed: 10.0%
Educational status	Illiterates: 38.8%, Primary level: 26.6%, Secondary level: 23.1%, Higher secondary level: 7.0%, Graduate-level: 3.2%, Masters-level: 1.2%
Occupational status	Student: 8.7%, Housewife: 54.0%, Service holder: 8.0%, Day labour: 4.5%, Business: 8.0%, Farmer: 5.7%, Unemployed: 11.2%
Types of family	Nuclear families: 62.2%, Joined families: 37.8%
Monthly income	Tk. 5000-20000:56.0%, Tk. 20000-30000:21.6%, Tk. 30000-40000:9.7%, Tk. 40000-50000:7.5%, Tk. 50000-60000: 2.5%, Tk. 60000-70000: 1.5%; Average income: Tk.21893.03(±13489.481)
Monthly expense	Tk. 5000-20000: 62.2%, Tk. 20000-30000: 22.9%, Tk. 30000-40000: 11.2%, Tk. 40000-50000: 3.7%; Average expenditure: Tk.18407.96(±8646.723)

To assess the level of accessibility to UHC services during COVID-19, ten questions were asked to the respondents related to the accessibility, based on having the desired service, service provider's behaviour, waiting time, availability of medicines and laboratory test facilities, availability of transport, distance of UHC from their residence, etc. Among 402 respondents, 60.2% of participants' accessibility was good, while 38.8% of the participants' accessibility was average (Table 2).

Table 2: The level of accessibility to the services of the upazila health complex. (n = 402)

Satisfaction level	Frequency	Percentage
Good	242	60.2
Average	156	38.8
Poor	4	1.0
Total	402	100

Regarding Accessibility factors related to service seekers during COVID-19, almost everyone (92.8%) found available transport, more than three-fifths (67.4%) resided near UHC, only one-fifths went UHC with COVID-19 symptoms, more than three-fourths (76.6%) had COVID vaccine and more than one-fifth (13.2%) were afraid of being infected with COVID-19 while visiting UHC (Table 3).

Table 3: Accessibility factors related to service seekers during COVID-19. (n=402)

Attribute	Yes (In Percentage)	No (In Percentage)
Availability of transports	92.8	7.2
Distance of residence	67.4	32.6
Going to the UHC with COVID-19 symptoms	19.2	80.8
COVID-19 vaccination status	76.6	23.4
Fear of being infected with COVID-19	13.2	86.8

Based on Accessibility factors related to health facilities during COVID-19, around one-fourth (28.1%) of service seekers thought appropriate physical distance was maintained, almost three-fifths (59.7%) had to wait long to get the service, just below four-fifths (79.9%) got the medicines prescribed and almost three-fourths (75.4%) got required test facilities. Almost everyone (92.8%) was satisfied with the availability of the health service providers(Table 4).

Table 4: Accessibility factors related to health facilities during COVID-19. (n = 402)

Attribute	Yes (In Percentage)	No (In Percentage)
Appropriate physical distance maintenance	28.1	71.9
Waiting time to get the service	59.7	40.3
Availability of the medicines prescribed	79.9	20.1
Availability of the required test facilities	75.4	24.6
Availability of the health service providers	92.8	7.2

By age and level of accessibility to UHC services, majority of the age group (74.8% of the 18-29 years age group, 61.7% of the 30-39 years age group and 58.6% of the 40-49 years age group, 49.1% of the 50-59 years age group, 65.0% of the 70-79 years age group and 80.0% of the 80-90 years age group) had good accessibility to UHC services. On the other hand, majority (57.8%) of the 60-69 years age group had average accessibility to UHC services. Only 1% from all age groups had poor accessibility to UHC services. This difference of accessibility by age was found statistically significant ($p<0.05$) (Table 5).

Table 5: Association between the level of accessibility and age of the participants. (n=402)

Age group in years	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
18-29	89 (74.8)	30 (25.2)	0 (0.0)	119 (100.0)
30-39	50 (61.7)	31 (38.3)	0 (0.0)	81 (100.0)
40-49	34 (58.6)	24 (41.4)	0 (0.0)	58 (100.0)
50-59	27 (49.1)	26 (47.3)	2 (3.6)	55 (100.0)
60-69	25 (39.1)	37 (57.8)	2 (3.1)	64 (100.0)
70-79	13 (65.0)	7 (35.0)	0 (0.0)	20 (100.0)
80-90	4 (80.0)	1 (20.0)	0 (0.0)	5 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Significance	Fisher's Exact Test =32.271, p = 0.000			

Regarding the association between the educational status of the participants and the level of accessibility to UHC services. Majority of them (49.4% of the illiterate, 61.7% with primary education, 72.0% with secondary education, 67.9% of the higher secondary, 69.2% of graduate and 80.0% of masters-level) had good accessibility to UHC services. On the contrary, 48.1% of illiterate, 38.3% of the primary level, 32.1% of higher secondary, 30.8% of graduate, 28.0% of secondary and 20.0% of the masters level had average accessibility to UHC services. This difference of accessibility by education was found statistically significant ($p<0.05$) (Table 6).

Table-6: Association between the level of accessibility and educational status of the participants. (n=402)

Educational status	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Illiterate	77 (49.4)	75 (48.1)	4 (2.6)	156 (100.0)
Primary	66 (61.7)	41 (38.3)	0 (0.0)	107 (100.0)
Secondary	67 (72.0)	26 (28.0)	0 (0.0)	93 (100.0)
Higher secondary	19 (67.9)	9 (32.1)	0 (0.0)	28 (100.0)
Graduate	9 (69.2)	4 (30.8)	0 (0.0)	13 (100.0)
Masters	4 (80.0)	1 (20.0)	0 (0.0)	5 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Statistics	Fisher's Exact Test = 18.781, p = .027			

Based on the association between the marital status of the participants and the level of accessibility to UHC services, the majority of the married (59.7%) and unmarried (76%) had good access to health care services of the UHC. On the other hand, the majority of the widowed (52.5%) had average accessibility to UHC services. This difference of accessibility by marital status of the participants was found statistically significant (p<0.05)(Table 7).

Table-7: Association between the level of accessibility and marital status of the participants. (n= 402)

Marital status	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Married	185 (59.7)	122 (39.4)	3 (1.0)	310 (100.0)
Unmarried	38 (76.0)	12 (24.0)	0 (0.0)	50 (100.0)
Divorced	1 (50.0)	1 (50.0)	0 (0.0)	2 (100.0)
Widowed	18 (45.0)	21 (52.5)	1 (2.5)	40 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Statistics	Fisher's Exact Test = 12.534, p = 0.050			

By the monthly family expenses of the participants and the level of accessibility to UHC services, majority of them (52.8% with monthly family expenses of Tk.5000-20000, 70.7% of Tk. 20000-30000, 75.6% of Tk. 30000-40000 and 73.3% of Tk.40000-50000) had good accessibility to UHC services.

On the other hand, 45.6% of Tk.5000-20000 expense group, 29.3% of Tk. 20000-30000 expense group, 24.4% of Tk. 30000-40000 expense group and 26.7% of Tk. 40000-50000 expense group had average accessibility to UHC services. This difference of accessibility by monthly family expenses was found statistically significant (p<0.05) (Table 8).

Table 8: Association between the level of accessibility and monthly family expenses of the participants. (n=402)

Monthly family expenses	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
5000-20000 taka	132 (52.8)	114 (45.6)	4 (1.6)	250 (100)
20000-30000 taka	65 (70.7)	27 (29.3)	0 (0.0)	92 (100)
30000-40000 taka	34 (75.6)	11 (24.4)	0 (0.0)	45 (100)
40000-50000 taka	11 (73.3)	4 (26.7)	0 (0.0)	15 (100)
Total	242(60.2)	156(38.8)	4(1.0)	402(100.0)
Statistics	Fisher's Exact Test = 15.638, p = 0.009			

In respect of the association between the maintenance of appropriate physical distance and level of accessibility to UHC services, with the thought of maintaining appropriate physical distance, 88.5% had good and 11.5% had average accessibility to UHC services. On the contrary, 49.1% and 49.5% of respondents who thought the appropriate distance was not maintained, had good and average accessibility to UHC services, respectively. This difference of accessibility by the

maintenance of appropriate physical distance was found statistically significant ($p < 0.05$) (Table 9).

Table-9: Association between the level of accessibility and maintenance of appropriate physical distance. (n=402)

Maintenance of appropriate physical distance	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Yes	100 (88.5)	13 (11.5)	0 (0.0)	113(100.0)
No	142 (49.1)	143 (49.5)	4 (1.4)	289(100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402(100.0)
Statistics	Fisher's Exact Test = 57.511, p = 0.000			

Regarding the availability of the medicine prescribed and the level of accessibility to UHC services, 71.7% and 28.3% of the respondents who got the medicine prescribed had good and average accessibility to UHC services, respectively. On the other hand, 14.8% and 80.2% of the respondents who didn't get the medicine prescribed had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the medicine prescribed was found statistically significant ($p < 0.05$) (Table 10).

Table 10: Association between the level of accessibility and availability of the medicine prescribed. (n=402

Availability of the medicine prescribed	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Yes	230 (71.7)	91 (28.3)	0 (0.0)	321 (100.0)
No	12 (14.8)	65 (80.2)	4 (4.9)	81 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Statistics	Fisher's Exact Test = 94.384, p = 0.000			

Regarding the association between the availability of the required test facilities and the level of accessibility to UHC services. Among them, 73.3% and 26.7% of the respondents who found required test facilities available had good and average accessibility to UHC services, respectively. On the other hand, 20.2% and 75.8% of the respondents who didn't find required test facilities available had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the required test facilities was found statistically significant ($p < 0.05$) Table 11.

Table 11: Association between the level of accessibility and availability of the required test facilities. (n=402)

Availability of the required test facilities	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Yes	222(73.3)	81(26.7)	0(0.0)	303(100.0)
No	20(20.2)	75(75.8)	4(4.0)	99(100.0)
Total	242(60.2)	156(38.8)	4(1.0)	402(100.0)
Statistics	Fisher's Exact Test = 92.603, p = 0.000			

Based on the availability of the health service providers to run the healthcare service properly at the time of COVID-19 and the level of accessibility to UHC services, 64.1% and 35.1% of the respondents who thought sufficient health service providers were available had good and average accessibility to UHC services, respectively. On the other hand, 10.3% and 86.2% of the respondents thought sufficient health service providers were not available had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the required test facilities was found statistically significant ($p < 0.05$) (Table 12).

Table 3: Accessibility factors related to service seekers during COVID-19. (n=402)

Attribute	Yes (In Percentage)	No (In Percentage)
Availability of transports	92.8	7.2
Distance of residence	67.4	32.6
Going to the UHC with COVID-19 symptoms	19.2	80.8
COVID-19 vaccination status	76.6	23.4
Fear of being infected with COVID-19	13.2	86.8

Based on Accessibility factors related to health facilities during COVID-19, around one-fourth (28.1%) of service seekers thought appropriate physical distance was maintained, almost three-fifths (59.7%) had to wait long to get the service, just below four-fifths (79.9%) got the medicines prescribed and almost three-fourths (75.4%) got required test facilities. Almost everyone (92.8%) was satisfied with the availability of the health service providers(Table 4).

Table 4: Accessibility factors related to health facilities during COVID-19. (n = 402)

Attribute	Yes (In Percentage)	No (In Percentage)
Appropriate physical distance maintenance	28.1	71.9
Waiting time to get the service	59.7	40.3
Availability of the medicines prescribed	79.9	20.1
Availability of the required test facilities	75.4	24.6
Availability of the health service providers	92.8	7.2

By age and level of accessibility to UHC services, majority of the age group (74.8% of the 18-29 years age group, 61.7% of the 30-39 years age group and 58.6% of the 40-49 years age group, 49.1% of the 50-59 years age group, 65.0% of the 70-79 years age group and 80.0% of the 80-90 years age group) had good accessibility to UHC services. On the other hand, majority (57.8%) of the 60-69 years age group had average accessibility to UHC services. Only 1% from all age groups had poor accessibility to UHC services. This difference of accessibility by age was found statistically significant ($p<0.05$) (Table 5).

Table 5: Association between the level of accessibility and age of the participants. (n=402)

Age group in years	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
18-29	89 (74.8)	30 (25.2)	0 (0.0)	119 (100.0)
30-39	50 (61.7)	31 (38.3)	0 (0.0)	81 (100.0)
40-49	34 (58.6)	24 (41.4)	0 (0.0)	58 (100.0)
50-59	27 (49.1)	26 (47.3)	2 (3.6)	55 (100.0)
60-69	25 (39.1)	37 (57.8)	2 (3.1)	64 (100.0)
70-79	13 (65.0)	7 (35.0)	0 (0.0)	20 (100.0)
80-90	4 (80.0)	1 (20.0)	0 (0.0)	5 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Significance	Fisher's Exact Test =32.271, p = 0.000			

Regarding the association between the educational status of the participants and the level of accessibility to UHC services. Majority of them (49.4% of the illiterate, 61.7% with primary education, 72.0% with secondary education, 67.9% of the higher secondary, 69.2% of graduate and 80.0% of masters-level) had good accessibility to UHC services. On the contrary, 48.1% of illiterate, 38.3% of the primary level, 32.1% of higher secondary, 30.8% of graduate, 28.0% of secondary and 20.0% of the masters level had average accessibility to UHC services. This difference of accessibility by education was found statistically significant ($p<0.05$) (Table 6).

Table 12: Association between the level of accessibility and availability of the health service providers to run the healthcare service properly at the time of COVID-19. (n=402)

Availability of the health service providers	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Yes	239 (64.1)	131 (35.1)	3 (0.8)	373 (100.0)
No	3 (10.3)	25 (86.2)	1 (3.4)	29 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Statistics	Fisher's Exact Test = 34.496, p = 0.000			

Regarding the association between availability of transport while coming to the upazila health complex during the COVID-19 pandemic and level of accessibility to UHC services, 63.8% and 35.9% of the respondents who found transports available had good and average accessibility to UHC services, respectively. On the other hand, 13.8% and 75.9% of the respondents who didn't find transport available had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the required test facilities was found statistically significant ($p<0.05$) (Table 13).

Table 13: Association between the level of accessibility and availability of transport while coming to the upazila health complex during the COVID-19 pandemic. (n=402)

Availability of transport	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Yes	238 (63.8)	134 (35.9)	1 (0.3)	373 (100.0)
No	4 (13.8)	22 (75.9)	3 (10.3)	29 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Statistics	Fisher's Exact Test = 36.593, p = 0.000			

By the short distance of residence from the upazilla health complex and the level of accessibility to UHC services, 74.5% and 25.5% of the respondents whose residences were nearby had good and average accessibility to UHC services, respectively. On the other hand, 30.5% and 66.4% of the respondents whose residences were far away had good and average accessibility to UHC services, respectively. This difference of accessibility by a short distance of residence from the upazilla health complex was found statistically significant ($p<0.05$) (Table 14).

Table 14: Association between the level of accessibility and a short distance of residence from the upazilla health complex. (n= 402)

A short distance of residence from the upazilla health complex.	Accessibility category			Total
	Good f (%)	Average f (%)	Poor f (%)	
Yes	202 (74.5)	69 (25.5)	0 (0.0)	271 (100.0)
No	40 (30.5)	87 (66.4)	4 (3.1)	131 (100.0)
Total	242 (60.2)	156 (38.8)	4 (1.0)	402 (100.0)
Statistics	Fisher's Exact Test = 74.270, p = 0.000			

Discussion:

The cross-sectional study was conducted among 402 rural adults from 1st January to 31st December 2021 to assess the accessibility to the health care services of the UHC during COVID-19. Though relevant research is very scarce in Bangladesh, very few studies have touched upon the quality of health services and access to health services of primary-level health facilities like UHC. This study revealed findings related to the socio-demographic characteristics of the participants, level of accessibility to the services of UHC along associated factors. These findings were compared with different subgroups of participants within the study and with the findings of other relevant studies.

With the mean age (±SD) of 41.22(±16.366) years, participants from the age group 18-29 were 29.6%, from the age group 30-39 were 20.1%, from the age group 40-49 were 14.4%, from the age group 50-59 were 13.7, from the age group 60-69 were 15.9%, from the age group 70-79were 5.0% and from the age group, 80-90 were 1.2%, who went to UHC to take health care services. A Study conducted by Islam, M. et al., showed, among the participants, the age group from 20-29 were 35.3%, from 30-39 years were 23.3%, from 30-49 years were 22.7%, and from 50-60 years were 18.7%7. A study conducted by Adhikary et al. found, 18-29 years of age group were 30.0%, 30-39 years were 18.0%, 40-49 years were 13.9%, 50-59 years were 9.8% and ≥60 years were 10.3%; who took health care from primary level public health facilities[12].

The majority of the respondents were female (65.4%), and the rest were male (34.6%) was the outcome of this study. A Study conducted by Islam, M. et al., showed, out of the 300 respondents, 48.7% were female and 51.3% were male receiving health service from UHC7. Similar findings found male participants were 55.40% and females were 44.60% in another study by Islam, Chowdhury and Farjana, 197010. A study conducted by Adhikary et al., 2018, revealed that 60.9% were female and 39.1% were male received health care services from health facilities[12].

The current study shows, 77.1% of the respondents were married, 12.4% were unmarried and 9.95% were widowed. A similar study before the COVID-19 pandemic was conducted by Islam, M. et al., found married were 77.3%; unmarried were 16.0%; widowed were 6.7%7. Besides, a study by Adhikary et al., 2018 found unmarried were 13.3%, and married were 84.5%, who received health care services from health facilities[12]. Another finding from a study by Islam, Chowdhury and Farjana, 1970 found married were 73.80%, unmarried were 22%, widows were 4.30%, who took health care from primary level public health facilities[13].

Based on education, the findings of the study show, illiterates were 38.8%, the primary level was 26.6%, the secondary level was 23.1%, the higher secondary level was 7%, who went for UHC services. Findings from a study by Islam, Chowdhury and Farjana, 1970, Illiterate were 16.10%, the primary level was 21.0%, and the secondary level was 32.10% who went to health facilities13. The study findings of Adhikary et al., 2018, illiterates were 19.8%, the primary education was 26.0%, and the secondary education was 35.0% of respondents, who came to take health care services[12]. A study by Islam, Zaman, Farjana and Khanam, 2020 shows, illiterate were 28.7%, the primary level was 31.3%, the secondary level was 7.3%; the higher secondary was 20.7%, graduates were 7.3%, and masters were 4.7% among the participants[7].

Regarding occupation, the study found, the majority were housewives (54.0%), students were 8.7%, service holders were 8.0 %, day laborers were 4.5%, businessmen were 8.0%, farmers were 5.7% and unemployed were 11.2%.

A study by Islam, Chowdhury and Farjana, 1970 shows, among the participants who went for primary level public health facilities, housewives were 35.40%, service holders were 20.30% and businessmen were 19.70%[13]. Among participants, who went to different levels of health facilities, unemployed were 17.1%, homemakers were 57.1%, semi-skilled/ skilled laborers were 11.3%, and businessmen were 12.4%; was another finding of the study of Adhikary et al.[12]

A similar study conducted by Islam, Zaman, Farjana and Khanam, 2020 states, Students were 13.3%, housewives were 33.3%, farmers were 6.8%, businessmen were 11.3%, and service holders were 21.3% who went for health care[7]. The dissimilarities of the study are may be due to different sample size.

The study states, 62.2% of respondents were from nuclear families and 37.8% were from joint families. The findings from the study conducted by Islam, M. et al., shows, participants from Joint family were 84.0%, and from nuclear family were 16.0%[7].

In respect of the monthly income of the participants, the majority (56.0%) of respondents earned in the 5000-20000 taka range, 21.6% of respondents earned in the 20000-30000 taka range, 9.7% earned in the 30000-40000 taka range, 7.5% earned in the 40000-50000 taka range, 2.5% earned in the 50000-60000 taka range, 1.5% earned in the range of taka 60000-70000, 0.5% earned in the range of taka 70000-80000, and the rest 0.7% of respondents earned in the 80000-90000 taka range. Their average income was 21893.03(±13489.481).

Findings from the study conducted by Islam, M. et al., were, 53.3% of participants earned in Tk. 5000-10,000 range, 31.3% of participants earn in Tk. 10001-20000 range, 8.7% of participants earn in Tk. 20001-30000 range and 6.7% of participants earn in Tk. 30001-50,000 range[7].

Average monthly family income (±SD) Tk. 13920.00 (±10290.75) A study by Islam, Chowdhury and Farjana, 1970 shows average income (±SD) was 7805.57(±6442.24) taka[10], and the study findings of Adhikary et al., 2018, say, the average income (±SD) was 16,953 (±28,541) taka[9]. The dissimilarities of the study are may be due to different sample size.

The study revealed that, among the respondents, the majority (62.2%) had family expenses of 5000-20000 taka, 22.9% had family expenses of 20000-30000 taka, 11.2% had family expenses of 30000-40000 taka and 3.7% of the respondents had family expenses of 40000-50000 taka. The average expense (±SD) was 18407.96(±8646.723) taka.

The study stated, out of all the participants, 60.2% had good accessibility and 38.8% had average accessibility to UHC services during COVID-19. In respect of maintenance of appropriate physical distance, 28.1% of respondents thought that the appropriate physical distance was maintained in the upazila health complex during service provided. On the contrary, 71.9% of respondents thought that the appropriate distance was not maintained.

Based on waiting time to get the health care services, 59.7% of participants thought that they had to wait long to get the service, and 40.3% thought they didn't have to wait long. A study conducted by Adhikary et al. shows, more than half of the patients (55.7%) had to wait less than half an hour before getting treatment from the provider[12]. A study by Islam, Chowdhury and Farjana, 1970, says, about one-third (28.2%) of all users were not satisfied with the time they waited to receive care[13]. The majority (67.0%) of the participants addressed long waiting time, was a finding of a study conducted by Islam, Zaman, Farjana and Khanam, 2020[7].

Regarding the availability of the medicines prescribed, 79.9% of participants got the medicines they prescribed, and 20.1% didn't get all the medicines prescribed. A study by Adhikary et al says the rates of providing prescriptions and drugs were less than 50% in health facilities other than community clinics. Most of the respondents (62.0%) complained about insufficient drug supply was a finding of a study conducted by Islam, Zaman, Farjana and Khanam, 20207. The dissimilarities of the study are may be due to different sample size.

Based on the availability of the required test facilities, the majority (75.4%) of participants found the test facilities available, while 24.6% found them unavailable. Finding from a study by Islam, M. et al., was 40% of the respondents complained about limited laboratory facilities before the pandemic.

In respect of the availability of the health service providers to run the healthcare service properly at the time of COVID-19, most of the respondents (92.8%) thought that there were enough health service providers to run the healthcare service properly. On the other hand, 7.2% thought that health service providers to run the healthcare service properly were not enough.

The study reveals the majority (92.8%) of the participants state positively about the availability of transport while coming to the upazila health complex during the COVID-19 pandemic. On the contrary, 7.2% said, transports were not available. 18.4% of respondents stated about poor communication before the pandemic in a study conducted by Islam, Zaman, Farjana and Khanam, 20207. The dissimilarities of the study are may be due to different sample size. Regarding distance of residence from the upazilla health complex, most of the (67.4%) participants residents were near to the upazila health complex. On the other hand, 32.6% said, their residents were far away.

The study revealed, 19.2% of participants went to the upazilla health complex with COVID-19 symptoms. On the contrary, 80.8% went without COVID-19 symptoms. Based on the COVID-19 vaccination status of the respondents, 76.6% of the participants were vaccinated with the COVID-19 vaccine, and the rest 23.4% were not.

The study reveals that 13.2% of participants were afraid of being infected with COVID-19 when came to getting the healthcare service. On the other hand, 86.8% were not afraid of being infected.

In the study findings, the age group from 18-29 years had 74.8%, from the age group 30-39 had 61.7%, from the age group 40-49 had 58.6%, from the age group 50-59 had 49.1%, from the age group 60-69 had 39.1%, from the age group 70-79 had 65.0% and from the age group 80-90

had 80.0% of good accessibility. Whereas, the age group from 18-29 years had 25.2%, from the age group 30-39 had 38.3%, from the age group 40-49 had 41.4%, from the age group 50-59 had 47.3%, from the age group 60-69 had 57.8%, from the age group 70-79 had 35.0%, and from the age group, 80-90 had 20.0% of average accessibility. This difference of accessibility by age was found statistically significant ($p<0.05$).

A study conducted by Islam, M. et al., showed the age group from 20-29 years had 32.1%; from 30-39 years had 20.0%; from 40-49 years had 20.6% good accessibility. Whereas, the age group from 20-29 years had 22.6%, from 30-39 years had 20.0%; from 40-49 years had 44.1%, from 50-60 years had 46.4% had average accessibility. age group from 20-29 years had 45.3%, from 30-39 years had 60.0%; from 40-49 years had 35.3%, from 50-60 years had 50.0% had poor accessibility[7]. The dissimilarities of the study are may be due to different sample size and the scale used to measure the accessibility was not well validated.

The study says, among the respondents, accessibility to UHC services was better in males Mean($\pm$SD)=7.78$\pm$1.214. Findings from the study of Islam, M. et al., were 23.3% and 19.5% of males and females had good accessibility, respectively. 25.6% of males and 27.3% of females had average accessibility was another outcome of that study[7].

The study revealed that 59.7% of married, 76.0% of unmarried, 50.0% of divorced, and 45.0% of widowed had good accessibility. On the other hand, 122(39.4% of married, 24.0% of unmarried, 50.0% of divorced, and 52.5% of widowed had average accessibility. This difference of accessibility by marital status of the participants was found statistically significant ($p<0.05$).

The majority (48.1%) of the illiterate, 38.3% with primary education and 32.1% with higher secondary education, 30.8% of graduate and 28.0% of secondary education had average accessibility to health care services of the UHC during COVID-19. On the contrary, 49.4% of the illiterate, 61.7% with primary education and 67.9% with higher secondary education, 69.2% of graduate, 72.0% of secondary education, and the majority (80.0%) had good access to health care services. This difference in accessibility by education was found statistically significant ($p<0.05$). A study before the COVID-19 pandemic was conducted by Islam, M. et al., stated Majority (58.1%) of the illiterate, 46.8% with primary education, and 54.5% with secondary education had poor access to health care services of the UHC. On the other side, the majority of the masters 42.9% and 36.4% graduates had good accessibility while 45.5% of graduates had “average” accessibility to services of UHC[7]. The dissimilarities of the study are may be due to different sample size and the scale used to measure the accessibility was not well validated.

In respect of occupation of the participants and accessibility to UHC health care service during COVID-19, 77.1% of students, 59.9% of housewives, 59.4% of service holders, 50% of day laborers, 62.5% of businessmen, 52.2% of farmers, and 55.6% of unemployed had good accessibility to UHC services. On the other hand, 22.9% of students, 38.7% of housewives, 40.6%

of service holders, 50% of day laborers, 37.5% of businessmen, 47.8% of farmers, and 42.2% of unemployed had average accessibility to UHC services. The findings from the study conducted by Islam, Zaman, Farjana and Khanam, 2020 was, the majority (66.7%) of the farmers, housewives (56.0%), students (55.0%), businessmen (52.9%) and day laborer (45.5%) had poor accessibility to UHC services. On the contrary, the majority (53.1%) of the service holders had average accessibility while 30.0% of students, 27.3% of day laborers, and 25.0% of service holders had good accessibility to UHC services[7]. The dissimilarities of the study are may be due to different sample size.

The study revealed, 52.8% with monthly family expenses of Tk. 5000-20000, 70.7% of Tk. 20000-30000, 75.6% of Tk. 30000-40000 and 73.3% of Tk. 40000-50000 had good accessibility to UHC services. On the other hand, 45.6% of Tk. 5000-20000 expense group, 29.3% of Tk. 20000-30000 expense group, 24.4% of Tk. 30000-40000 and 26.7% of Tk. 35000-50000 expense group had average accessibility to UHC services. This difference of accessibility by monthly family expenses was found statistically significant ($p<0.05$). With the thought of accessibility to UHC services, 49.1% and 49.5% of respondents who thought that the appropriate distance was not maintained, had good and average accessibility to UHC services, respectively. And those who thought that the appropriate distance was maintained properly, 88.5% and 11.5% had good and average accessibility to UHC services, respectively. This difference of accessibility by the maintenance of appropriate physical distance was found statistically significant ($p<0.05$).

The study states based on the availability of prescribed medications, 71.7% and 28.3% of the respondents who got the medicine prescribed had good and average accessibility to UHC services, respectively. On the other hand, 14.8% and 80.2% of the respondents who didn't get the medicine prescribed had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the medicine prescribed was found statistically significant ($p<0.05$).

The study finding of required test facilities, 73.3% and 26.7% of the respondents who found required test facilities available had good and average accessibility to UHC services, respectively. On the other hand, 20.2% and 75.8% of the respondents who didn't find required test facilities available had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the required test facilities was found statistically significant ($p<0.05$).

The study revealed, 64.1% and 35.1% of the respondents who thought sufficient health service providers were available had good and average accessibility to UHC services, respectively. On the other hand, 10.3% and 86.2% of the respondents thought sufficient health service providers were not available had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the required test facilities was found statistically significant ($p<0.05$).

The study findings of the availability of transport, 63.8% and 35.9% of the respondents who found transports available had good and average accessibility to UHC services,

respectively. On the other hand, 13.8% and 75.9% of the respondents who didn't find transport available had good and average accessibility to UHC services, respectively. This difference of accessibility by the availability of the required test facilities was found statistically significant ($p < 0.05$). Regarding the distance of residence from the UHC, 74.5% and 25.5% of the respondents whose residences were nearby had good and average accessibility to UHC services, respectively. On the other hand, 30.5% and 66.4% of the respondents whose residences were far away had good and average accessibility to UHC services, respectively. This difference of accessibility by a short distance of residence from the upazilla health complex was found statistically significant ($p < 0.05$).

The study states, 54.5% with COVID-19 symptoms and 61.5% without COVID-19 symptoms had good accessibility to UHC services. On the contrary, 45.5% with COVID-19 symptoms and 37.2% without COVID-19 symptoms had average accessibility.

Conclusion:

The study on accessibility to upazila health complex services during the COVID-19 pandemic found that the level of accessibility was good among 60% of the respondents. The remaining 40% were either average or poor. During the pandemic, UHC services were less accessible to older aged people. The level of accessibility was not good for about half of the illiterate people. About two-thirds of the respondents observed that the physical distance was not maintained while providing the health care services. The majority had to wait long for receiving the health care services. One-fifths of the respondents who had COVID-19 symptoms went for seeking health care services. Most of the respondents were satisfied with the services they received, the service provider's behavior, availability of the medicines, and test facilities.

Recommendations:

Following recommendations are made based on the findings of the current study:

1. Physical distance should be maintained as it was not in place in the upazila health complex.
2. Further study involving respondents from more UHCs should be conducted.

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