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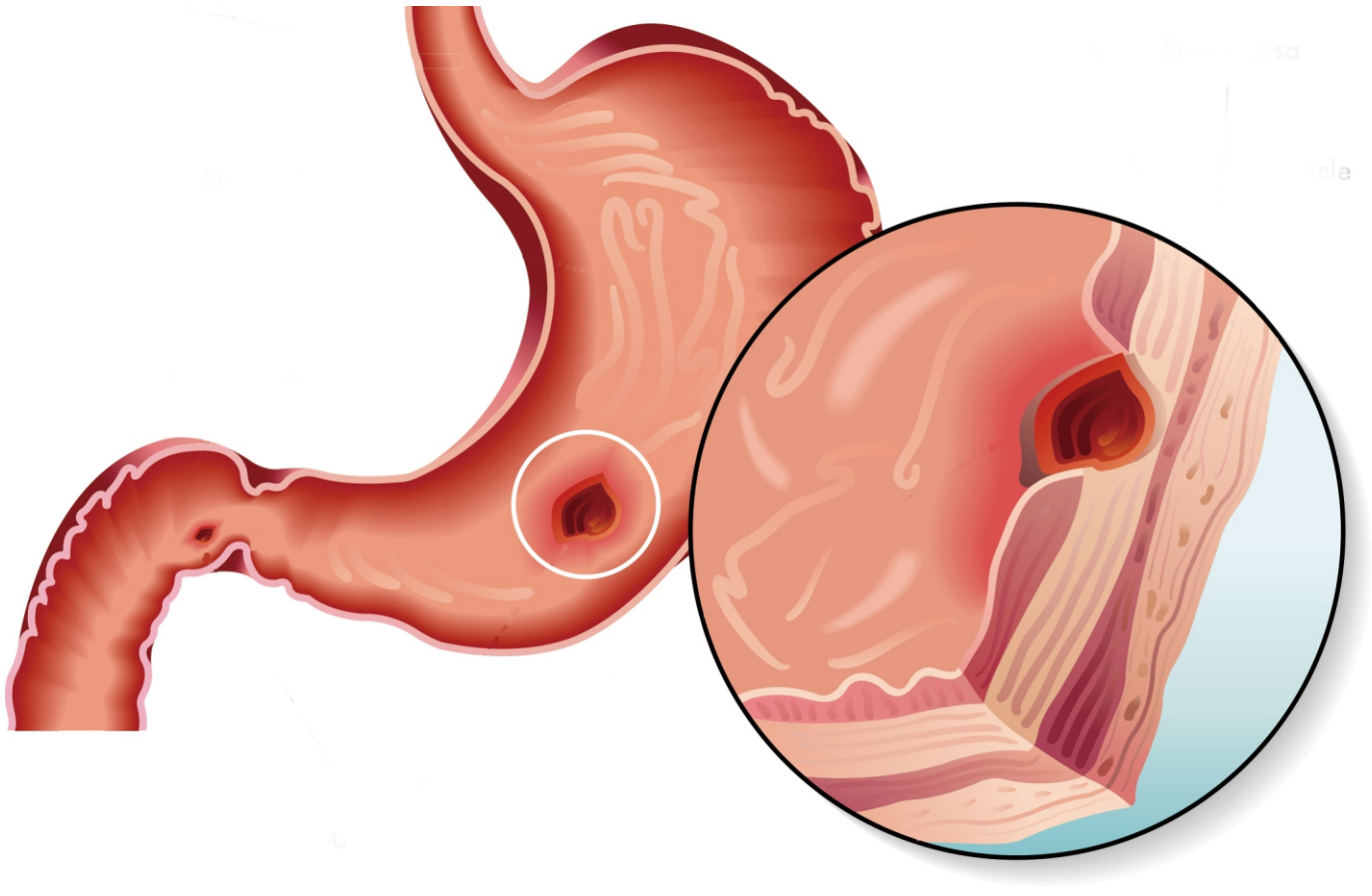

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Prevalence and Predictors of Viral Hepatitis D Co-Infection in Chronic HbsAg Carriers

Ali Mahamat Moussa[1], Tahir Mahamat Saleh[2], Mayanna Habkreo[1], Bessimbaye Nadlaou[3], Adama Ahmed Ngare[1], Doffou Adjeka Stanislas[2], Assi Constant[2]

[1]Service de Medecine Interne & Gastroentérologie, CHU La Référence Nationale, N'Djamena, Tchad
[2]Service de Medecine Interne, CHU La Renaissance, N'Djamena, Tchad
[3]Service de Laboratoire, CHU La Référence Nationale, N'Djamena, Tchad
Email: alimahamatmoussa@hotmail.com

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Abstract

The characteristics of viral hepatitis B and D co-infection are poorly documented in Chad. The aim of our study was to determine the prevalence of HBV/HDV co-infection and the characteristics of this co-infection. **Materials and Methods:** This was a retrospective study including all patients with chronic HBsAg carriers referred in our department from January 2014 to December 2018. Non-inclusion criteria were: absence of anti-HDV testing, presence of anti-viral hepatitis C or Human Immunodeficiency Virus antibodies or excessive alcohol consumption. The variables studied were age, sex, blood transaminase level, HBV DNA level, HDV RNA level, and liver fibrosis and activity score (Actitest Fibrotest). The prevalence of HDV and the characteristics of HDV/HBV co-infection were determined. **Results:** During the study period, 403 patients were seen in these two hospitals for chronic HBsAg carriage. Of these, 378 (75%) had performed the anti HDV assay. Anti-HDV antibodies were positive in 53 patients (14%). In multivariate analysis, HBV/HDV co-infected patients were less frequently HBeAg positive (5.4% *vs.* 28.1%; p = 0.0001), older (35 years *vs.* 32 years; p = 0.001), and more frequently had significant necrotic-inflammatory activity (3.9% vs. 3.2%; p = 0.031) compared with mono infected patients. Neither gender (76.9% male vs. 77.4% male; p = ns), nor viral load (median 530 IU/ml vs. 195 IU/ml; p = ns), nor significant liver fibrosis (35.1% vs. 47.1%; p = ns), nor transaminases (median 26 vs. 32 IU/ml) were different with mono infected patients. **Conclusion:** VHD is common in Chad. It is associated with increased hepatic necrotic-inflammatory activity.

Keywords

Viral Hepatitis D (Anti VHD Ac), Prevalence, Favouring Factors,

Necrotic-Inflammatory Activity, Chad

1. Introduction

Viral hepatitis B is endemic in Sub-Saharan Africa where it constitutes a public health problem [1] [2] [3] [4]. It is responsible for the majority of cirrhosis and primary liver cancers [1] [5] [6] [7]. It can be associated with co-infections including hepatitis delta virus (HDV). HDV is a defective virus whose replication cycle requires the presence of HBV [8]. This virus is also endemic in several regions of the world [7] [9] [10]. Its presence seems to increase the histological lesions of HBV [6]. The prevalence of this association and its characteristics are not well known in Africa [8] [11]. Testing for hepatitis D virus through its marker, anti-HDV antibodies (anti-HDV antibodies), is not common practice in Chad due to the lack of knowledge of many practitioners, the technical difficulties of measuring anti-HDV antibodies, and cost of this test. The aim of this study was to determine the prevalence of anti-HDV antibodies in chronic hepatitis B virus carriers and evaluate the biochemical, virological and histological characteristics of this co-infection.

2. Materials and Methods

This is a retrospective study including all outpatients from two hospitals of N'Djamena seen in gastroenterology consultation from January 2014 to December 2018. All chronic HBsAg carrier patients were included. The criteria for non-inclusion were: absence of anti-HBV antibody testing, presence of anti-viral hepatitis C or Human Immunodeficiency Virus antibodies or excessive alcohol consumption. The variables studied were age, sex, blood transaminase level, HBV DNA level, HDV RNA level, and liver fibrosis and activity score. Liver fibrosis was assessed by Actitest Fibrotest*. All serologies were performed with an ELISA test (Vidas), HBV viral loads (reverse transcriptase PCR linearity range 1000 to 10.000000) and HDV (Cobas 8800 Roche real-time PCR) quantification range 10 to 1.0000000). Biochemical activity was defined by an alanine amino transferase level higher than 40 IU/ml performed on a VIDAS machine. We determined the prevalence of anti-HDV antibodies in all included patients. Then, a comparison was made between HBV and HDV mono- and co-infected patients on demographic (age and sex) and biological (viral load, transaminases, HBeAg, fibrosis stage according to METAVIR) parameters in uni and multivariate analysis by logistic regression.

Qualitative variables were expressed as percentages, quantitative variables as their mean with standard deviation. The viral load was also presented in logarithm with its mean and standard deviation. The chi-square test was used to compare percentages, the Student's t test for means. The 5% threshold was used to define the p significance level.

The study complied with the Declaration of Helsinki (ethical clearance to be requested).

3. Results

During the study period, 403 patients were seen in these two hospitals for chronic HBsAg carriage. Of these, 378 (75%) had an anti-HBV antibody test. Two had positive HIV serology and four had positive HCV antibody. Ninety-three patients did not have an HDV antibody test. These patients were significantly younger, had positive HBe antigen and higher necrotic-inflammatory activity. Of the 378 patients, 53 were anti-HDV antibody positive, a prevalence of 14%. Table 1 summarizes the characteristics of the study sample.

Table 1. Characteristics of the sample.

Variables	Overall sample
% male	233/303 (76.6%)
Mean age ± standard deviation	36.4 ± 11.6
Biochemical activity (n = 259)	71 (27.4%)
Mean ALT	43.3 ± 111
Mean GGT	43.4 ± 52.4
HBeAg positive (n = 278)	15 (5.4%)
HBV DNA <10 (n = 280)	12.9% (n = 36)
HBV DNA ≥2000 IU/ml	30.4% (n = 85)
Mean Log10 viral load B (IU/ml)	7.4 ± 3.7 (0 - 20)
Anti-HDV antibodies positive	14% = 53)
Mean Log10 viral load D	10.8 ± 5.4 (0 - 10)
Histological activity	
F ≥ 2	64 (43.8%)
A ≥ 2	21 (14.1%)
A or F ≥ 2	43.8% (n = 67)
METAVIR score	
Fibrosis stage	
0	52 (34%)
1	37 (24.2%)
2	30 (19.6%)
3	16 (10.5%)
4	18 (11.8%)
Activity stage	
0	72.5% (108)
1	13.4% (20)
2	6.7% (10)
3	7.4% (11)

In multivariate analysis (see Table 2), HBV/HDV co-infected patients were less often HBeAg positive (5.4% vs. 28.1% p = 0.0001), older (35 years vs. 32 years; p = 0.001) and more frequently had significant necrotizing-inflammatory activity (3.9% vs. 3.2%; p = 0.031). Neither gender (76.9% male vs. 77.4% male; p = ns), nor viral load (median 530 IU/ml vs. 195 IU/ml; p = ns), nor significant liver fibrosis (35.1% vs. 47.1%; p = ns), nor transaminases (median 26 vs. 32 IU/ml) differed from infected mono-infected patients (Table 3).

Table 2. Characteristics of co-infected versus mono-infected patients.

Variables	Anti-HDV antibodies		
	Positif (n = 53)	Négatif (n = 325)	p
% male	46 (86.8%)	244 (75.1%)	ns
Mean age ± standard deviation	41.1 ± 9.3	35.6 ± 11.7	ns
Biochemical activity (n = 259)	14 (41.2%)	57 (25.3%)	0.06
Mean ALT	46.5 ± 39	42.8 ± 118	0.06
Mean GGT	65 ± 71	40 ± 48	0.03
HBeAg positive (n = 278)	4 (12.9%)	11 (4.5%)	ns
Anti HBe positive (n = 371)	44 (91.7%)	310 (96%)	ns
HBV DNA < 0 (n = 280)	7	29	ns
HBV DNA ≥2000 IU/ml	13 28.3%	72 30.8%	ns
Mean Log HBV DNA	6.74 ± 3.3	7.58 ± 3.7	ns
Histological activity (n = 153)			
F ≥ 2	16	48	
A ≥ 2	7	14	
A or F ≥ 2	17 (65.4%)	50 (39.4%)	0.018
METAVIR score			
Fibrosis stage (n = 153)			0.024
0	7 (26.9%)	45 (35.4%)	
1	3 (11.5%)	34 (26.8%)	
2	4 (15.4%)	26 (20.5%)	
3	5 (19.2%)	11 (8.7%)	
4	7 (26.9%)	11 (8.7%)	
Activity stage			0.026
0	12 (48%)	96 (77.4%)	
1	6 (24%)	14 (11.3%)	
2	3 (12%)	7 (5.6%)	
3	4 (16%)	7 (5.6%)	

Table 3. Factors associated with hepatitis D antibody positivity.

Variable	p	Odds Ratio	IC Odds Ratio 95%	
			Lower	Superior
Age	ns	1.033	0.993	1.076
Sex (1)	ns	0.589	0.175	1.986
ALAT	ns	1.001	0.998	1.004
Log viral load HBV	0.013	0.676	0.496	0.920
Histological activity > 2	0.042	5.241	1.064	25.803

4. Discussion

The prevalence of anti-HDV antibodies in chronic HBV carriers was 14% in our study. Chen *et al.* in a meta-analysis and systematic review of the literature including 61 countries had noted a prevalence of 10.58% (95% CI 9.14 to 12.11) [8]. Another meta-analysis and systematic review carried out in sub-Saharan Africa showed a prevalence of 9.57%, 37.7%, in West Africa and Central Africa respectively [7]. In Cameroon, Chad's neighboring country, this prevalence varied from 6% to 17% depending on the population [12] [13] [14] [15] [16]. These figures confirm the endemic nature of this virus in this region of Africa [17] [18]. In West Africa, in Burkina Faso, Sanou *et al.* observed a prevalence of 3.4% among blood donors [11]. In the Maghreb, in Egypt, the prevalence of anti-HDV antibodies was 8% according to Fouad *et al.* [19]. In Tunisia and Libya respectively, Yacoubi and Elzouki noted a prevalence of 2% of HDV and HBV co-infection [20] [21]. In this North African region, a meta-analysis by Daw *et al.* showed a prevalence of 20% in hepatological settings and 5% in the general population [10]. Opaleye *et al.* reported a prevalence of 9% in Nigeria [9]. In America, this proportion was 8% in Brazil [22]. In Southern Europe, Odieres *et al.* reported a figure of 6% to 8% depending on the study period [23].

It is essential to search for these anti-HDV antibodies in all patients with HBV. However, this test is not feasible in Chad and is expensive. Our study shows that two factors are independently associated with this presence: a low B viral load contrasting with a high significant necrotic-inflammatory histological activity. More advanced histological lesions in case of co-infection with HDV have also been reported by other authors [7] [12] [21]; however, according to Fouad *et al.*, there was no difference [19]. Transaminases, reflecting necrotic-inflammatory activity, were higher in case of HDV co-infection in several other works [12] [21] [23] [24] [25]. In our study, transaminases were not an independent factor for the presence of HDV co-infection. The lower B viral load in case of HDV co-infection was also found by Fouad *et al.* [19]. Histological lesions were more advanced in cases of HBV-HDV co-infection [24] [26].

As the majority of patients are negative HbeAg, a low viral load could suggest an inactive carrier in the absence of liver fibrosis evaluation.

The proportion of patients who were tested for anti-HBV antibodies was 75%.

This proportion varied according to the studies. In Cameroon, Luma *et al.* reported a figure of 80% [12]. In our work, the high cost and the burden of uninsured or poor patients explain this lack of testing. The requests for HDV antibody testing were made by hepato-gastroenterologists from these two hospitals. In addition, of those who performed the assay, only 10% (n = 38) performed the VHD viral load; it was undetectable in 55.3% of them. The patients who did not perform the VHD viral load test had a different profile of HBeAg-positive chronic hepatitis than those who did perform the test or HBeAg was rarer [EASL].

5. Conclusion

HBV-HDV co-infection appears to be high in Chad. Co-infected patients have more advanced histological lesions and a low B viral load. In these patients, it is necessary to look for anti-HBV antibodies.

Limitations of the Study

Viral load, fibrosis study not performed and lack of technical facilities in Chad.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Liver Damage during Dengue Fever in Ouagadougou

Alice Nanelin Guingané[1*], Judith Ouango[2], Abdoulaye Sourabié[2], Christiane Couna Bere[2], Roger Sombié[2], Alain Bougouma[2], Abdel Karim Sermé[2], Aboubacar Coulibaly[2], Sosthène Somda[2]

[1]Department of Hepato-Gastroenterology, CHU, Bogodogo, Burkina Faso
[2]Hepato-Gastroenterology Department, CHU, Yalgado Ouédraogo, Burkina Faso
Email: *aliceguingane@yahoo.fr

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Abstract

Dengue fever is widespread in all tropical and subtropical areas of the world and is the main public health problem posed by arboviroses. In Burkina Faso, an outbreak of dengue serotype "DENV-2", which is responsible for severe forms of dengue, has been reported. In this study, we will discuss liver damage during this disease. The aim of this study was to describe the socio-odemographic, diagnostic, therapeutic and evolutionary aspects of dengue patients with hepatic cytolysis. **Patients and Methods:** This was a prospective cross-sectional study of dengue disease in 2 facilities in the city of Ouagadougou. The study was spread over a period of 3 months from August to November 2019. The study population consisted of all patients hospitalised for dengue with a positive AgNS1 and/or IgM rapid diagnostic test (RDT) and presenting signs of liver damage. **Results:** During our study period we recruited 134 patients with dengue fever of which 93 or 69.4% had at least one elevated transaminase. The sex ratio was 1.90 and the average age was 35 years. Symptoms of liver damage were rare with right hypochondrial pain in 4.30% of cases and jaundice in 1.07% of cases. Dengue haemorrhagic fever was found in 5 patients. IgG was negative in 77.42%. The majority of patients (44% or 47.31%) had at least one transaminase value elevated to the upper limit of normal (ULN); and a minority, 14 patients or 15.06%, had transaminases above 10 ULN. A small proportion of patients had hepatocellular failure 26.92% with a lowered prothrombin level. Ninety-four per cent (94.62%) of the patients received analgesics. Level 1 analgesic (paracetamol) was the most widely administered, particularly in 76 patients (86.36%). More than half of the patients (57.14%) had a length of stay of less than or equal to 3 days and the outcome was favourable in 91.40%. **Conclusion:** Dengue virus causes alterations in the liver parenchyma. The degree of liver damage is variable. As clinical symptoms are almost non-existent, the measurement of transaminas-

es remains important.

Keywords

Dengue Fever, Liver Damage, Cytolysis, Hemorrhagic Fever

1. Introduction

According to the WHO, 3.9 billion people in 128 countries are at risk of infection, representing 40% - 50% of the world's population, with 390 million cases of dengue per year, 96 million of which have clinical manifestations and 20,000 deaths per year [1].

In 2015, there was an increase in the number of reported cases from 2.2 million in 2010 to 3.2 million. Before 1970, only 9 countries had experienced severe dengue epidemics. The disease is now endemic in more than 100 countries in Africa, the Americas, the Eastern Mediterranean, South-East Asia and the Western Pacific; the latter two regions being the most affected [1].

Several studies around the world are interested in liver damage related to dengue and it is recognized as an important cause of acute hepatic failure in endemic counties [2] [3]. Dengue should be considered as a differential in the assessment of acute hepatic impairment and as an element promoting acute flare-ups in patients with chronic hepatic impairment. The spectrum of involvement includes asymptomatic elevation of hepatic transaminases to occurrence of severe manifestation in form of ALF. However, very few studies have been conducted in black Africans.

Since August 2016, suspected dengue cases and deaths have been reported in Ouagadougou, the capital of Burkina Faso. From 5 August to 12 November 2016, a total of 1061 probable cases (positive to the Dengue Rapid Diagnostic Test: RDT) out of 1266 suspected cases were notified with a cumulative total of 15 deaths (case fatality rate of 1.2%) [4]. In 2018, 1636 cases of Dengue fever were recorded in Burkina, including 26 deaths [5].

There are 4 serotypes of dengue recorded worldwide. In Burkina Faso an outbreak of dengue serotype DENV-2 [1] [6], which is responsible for severe forms of dengue, has been reported.

There are several forms of dengue: asymptomatic dengue, classical dengue and severe forms (severe dengue or dengue haemorrhagic fever and dengue with shock syndrome which can lead to death, especially in children). The main complication is dengue haemorrhagic fever, but mortality is mainly due to the occurrence of shock syndrome.

The most common complications are hepatic and neurological, which can lead to bone marrow failure. Studies have been carried out in Burkina Faso on dengue fever [7] [8] [9]. They have focused on the clinical and evolutionary aspects of the disease, particularly haemorrhagic aspects. In this study, we propose

to address the hepatic damage during this disease.

2. Patients and Methods

This was a prospective cross-sectional study of dengue disease at Yalgado Ouédraogo University Hospital (CHU-YO) and Philadelphie Center. The study was conducted over a period of 3 months from August to November 2019. The study population consisted of all hospitalized patients with a diagnosis of dengue disease during the study period who also presented with liver signs. We included in our study all patients in whom a rapid diagnostic test (RDT: AgNS1 and/or IgM positive) allowed us to retain the diagnosis of dengue disease associated with changes in the liver biology (transaminases, prothrombin level). Patients were followed for a fortnight from diagnosis until improvement of liver tests. The periodicity of the examinations depended on the severity of the dengue (daily for severe dengue and every 48 hours for non-severe dengue). The follow-up variables were mainly clinical and biological. On the clinical level: search for external bleeding, signs of shock. In terms of biology, we monitored: transaminases (ALT, ASAT), prothrombin rate, blood count (haemoglobin, platelets and leucocyte count). These patients were classified into 3 groups. In group A, at least one transaminase value (AST or ALT) was elevated up to 3 times the upper limit of normal; in group B, one of the two transaminases (AST or ALT) was between 3 and 10 times the upper limit of normal; in group C, one of the two enzymes was greater than 10 times the upper limit of normal.

The data collected on a paper collection sheet and then entered and analyzed with the Epi-Info version 7 software (French version). These were essentially descriptive analyses and cross-tabulations were performed to describe the results. Patients had given informed consent to conduct the study. Anonymity was respected.

3. Results

During our study period we enrolled 134 dengue patients of whom 93% or 69.4% had at least one elevated transaminase. Patients with cytolysis less than 3 ULN accounted for half (47.31%). **Figure 1** shows the distribution of patients according to the different cytolysis groups.

Our study population consisted of 61 men, *i.e.* two-thirds of the total number of patients. The sex-ratio was 1.90. The average age was 35.12 years. The youngest patient was 15 years old and the oldest 84 years old. Patients between the ages of 20 and 40 made up half of the total number of 48 patients. Young people between 20 and 40 years of age with cytolysis less than 3 ULN were the most represented in half (54.55%) of the cases.

Figure 2 shows the age distribution of patients according to the three cytolysis groups A (<3 LSN), B (3 - 10 LSN) and C (>10 LSN).

Civil servants and students were the most represented, with 37.63% and 27.95% of the population respectively. Regarding the patients' history, no patient

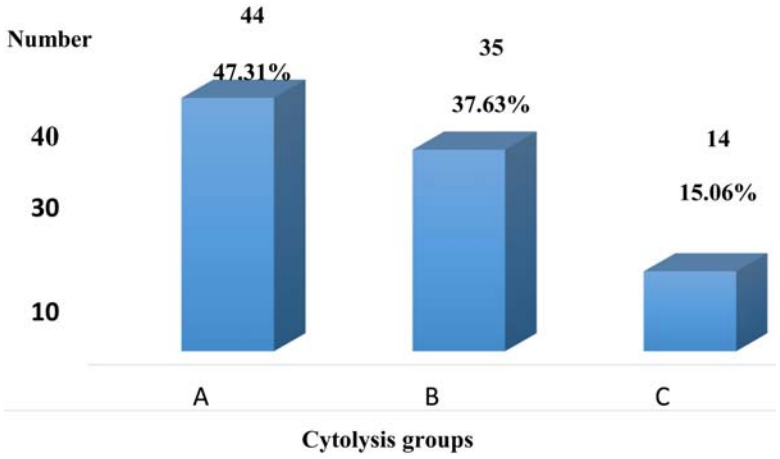

Figure 1. Distribution of patients according to cytolysis groups.

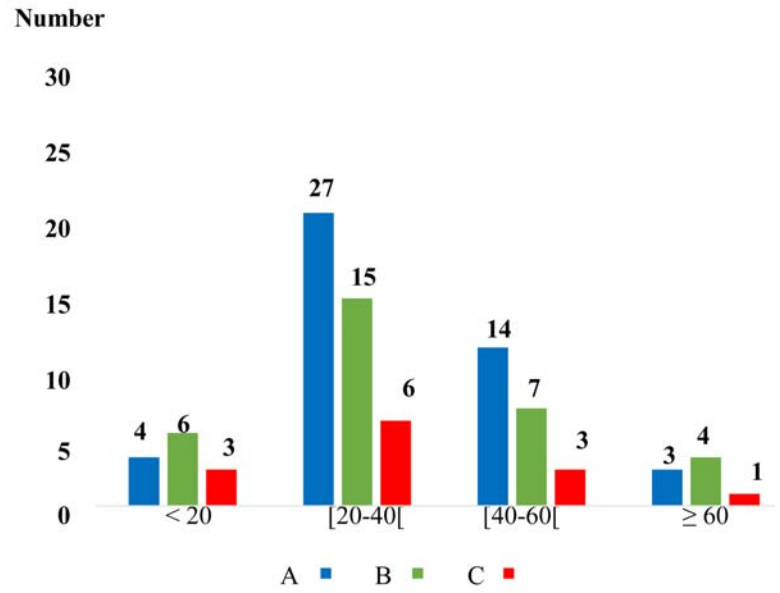

Figure 2. Age distribution of patients according to the three cytolysis groups.

was known to have chronic liver disease. There was no evidence of non-steroidal anti-inflammatory drug (NSAID) use. A few rare cases of traditional treatment (5.37%) and treatment with hepatotoxic potential (paracetamol in 3.22%) were reported and are presented in Table 1.

Clinically, fever and headache were the most frequently reported symptoms in four-fifths of the cases respectively. Symptoms related to liver damage were rare, such as right hypochondrial pain (4.30%), pruritus (3.2%) and jaundice (1.07%) and are presented in Table 2.

Anemia was found in one tenth (9.67%) of cases. The general condition was altered in two thirds (63.44%) of cases. On physical examination, two patients (2.15%) had hepatomegaly and five patients (5.37%) had haemorrhage. Classic dengue accounted for more than nine-tenths (94.62%) of the cases. Severe dengue haemorrhagic fever was reported in 5.38% of cases.

Table 1. Distribution of patients by history and lifestyle.

History and lifestyle	Number	Percentage (%)
Hepatopathy	0	0
HTA	6	6.45
Diabetes	2	2.15
Lifestyle		
Alcohol	4	4.30
Tobacco	6	6.45
Previous treatment		
NSAIDs	0	0
Paracetamol	3	3.22
Traditional treatment	5	5.37

Table 2. Distribution of patients according to functional signs.

Functional signs	Number	Percentage (%)
Fever	77	82.79
Headaches	74	79.56
Nausea or vomiting	54	58.06
Joint pain	37	39.78
Muscle pain	36	38.70
Retro-orbital pain	11	11.82
Pain in the right hypochondrium	4	4.30
Bleeding	14	15.05
Dark urine	3	3.22
Pruritus	3	3.22
Icterus	1	1.07
Discoloured stools	1	1.07

A positive Ag NS1 serological diagnosis associated with a negative immunoglobulin test was present in more than half of the cases (56%). Figure 3 shows the distribution according to the serological diagnosis of the patients.

Indeed, 91.39% of patients had elevated AST versus 82.79% who had elevated ALT. The average AST, 248.66 IU/ml was higher than the average ALT which was 166.66 IU/ml. Twenty six patients (27.96%) measured their prothrombin level and among these 7 patients either 26.92% of them had a lower rate in Table 3.

Thrombocytopenia was found in 68 patients (73.12%), leukopenia in 41 patients (44.09%) and anaemia in 13 patients (13.98%) on the blood count. Seventy-eight patients (83.87%) had a plasma creatinine measurement and five patients or 6.41% had acute renal failure. Twelve patients (11.94%) had an ultra-

sound scan. Homogeneous hepatomegaly was present in 4 of them (33.33%). Nine tenths (94.62%) of the patients received analgesics. Level 1 analgesic (paracetamol) was the most widely administered, particularly in 76 patients (86.36%) in Table 4.

Sixty-one patients, *i.e.* two thirds (65.59%), received parenteral rehydration with crystalloids. In addition, two patients were transfused with packed red blood cells and six with platelet concentrates.

The length of stay varied from 1 to 19 days with an average of 3.54 days. About two thirds (60.22%) of the patients had a short stay of between 1 and 3 days show in Table 5.

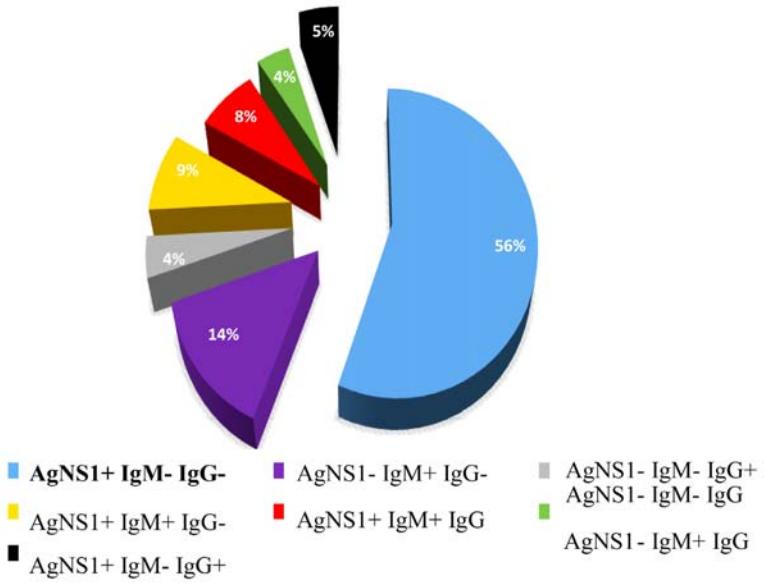

Figure 3. Distribution of patients by serological diagnosis.

Table 3. Distribution of patients by prothrombin level.

TP (%)	Number	Percentage (%)
≥70	19	73.08
]70 - 50]	6	23.08
<50	1	3.84
Total	**26**	**100**

Table 4. Distribution of patients according to analgesic treatment.

Analgesics	Number	Percentage (%)
Level 1	76	86.36
Level 2	11	12.50
Level 3	1	1.13
Total	88	100

Table 5. Distribution of patients by length of stay.

Duration of hospital stay (days)	Number	Percentage (%)
[1 - 3]	56	60.22
[4 - 7]	35	37.63
≥8	2	2.15
Total	**93**	**100**

The outcome was favourable for 85 patients (91.4%) and four patients (4.30%) were lost to follow-up. Four other patients (4.30%) died as a result of upper gastrointestinal haemorrhage.

4. Discussion

Our study took place over a 4-month period when there is often an upsurge of dengue, 93 patients were collected, an average of 24 patients per month. The dengue virus has a tropism for the liver, nervous system and muscles where it is likely to create cellular alterations. Data from the literature suggest that 65% - 96% of dengue patients have elevated transaminases with persistence up to 60 days after the onset of symptoms [10]. This is consistent with the results of our study. Dengue fever with cytolysis can occur in all age groups. Hepatic manifestations are either a result of direct viral toxicity or dysregulated immunologic injury in response to the virus [11] [12].

Our study found right hypochondrial pain, hepatomegaly and jaundice in 4.30%, 2.15% and 1.07% of cases respectively. These results are weaker than those of other studies conducted in Asia, where almost 40% tenderness to palpation of the right hypochondrium was reported [10], 24% - 100% hepatomegaly [13] [14] [15], 29% jaundice [16] [17]. In a 2013 meta-analysis, hepatomegaly was preferentially associated with severe dengue [18].

A positive Ag NS1 serological diagnosis associated with a negative immunoglobulin test was present in more than half the cases (56%). The qualitative immunoglobulin G assay was negative in 77.42% of cases in our study. Souza in his study found an almost similar result of 65.5% [19]. This high frequency of negative IgG could mean that the patients in the study were received relatively early in the course of the disease. The generally noisy symptoms of dengue fever may lead to early consultation. However, it should be remembered that in our study the diagnosis of dengue was made by RDT with the risk of false positives for patients without AgNS1 and false negatives due to the lack of IgG titration.

In contrast to hepatitis B and C virus infections (HBV and HBC), AST levels in dengue patients are often found to be higher than ALT levels. The involvement of cardiac and skeletal muscle in flavivirus infections may explain this observation [20]. Kuo *et al.* reported elevated AST and ALT levels in 90% and 80% of patients respectively [21]. The results of our study were in agreement with the literature. The prevalences of HBV (9.1%) and HCV (3.6%) infection are high in

our context. The contribution of these viruses in the genesis of cytolysis could not be evaluated in our work.

In endemic countries such as Burkina Faso, *Plasmodium falciparum*, hepatitis viruses (A, B, C, D, E) and human immunodeficiency virus, *Mycobacterium tuberculosis* are responsible for the majority of infectious deaths [22]. Co-infections with dengue virus and these pathogens may contribute to the worsening of both cytolysis and prognosis during dengue disease. This highlights the importance of studying the epidemiology and pathophysiology of these co-infections. These studies could help to improve the management of patients.

Many clinical studies have established the degree of severity of liver damage according to the level of transaminases detected in the blood. Thus, when the transaminase level reaches at least 10 times the upper limit of normal (group C), then the liver damage is the most severe. This is the case in almost 4% of patients [23] [24] compared to 15.05% in our study. This could be due to hteabuse of self-medication. Indeed, the use of paracetamol, NSAIDs and traditional treatment was reported in 3.22%, 0%, 5.37% and 6.9% of patients respectively.

This is a common practice as NSAIDs and paracetamol are commonly self-medicated. This is a frequent practice because NSAIDs and paracetamol are commonly used in self-medication. In addition to being available without prescription in pharmacies and also illegally sold in the street, they also seem to be frequently prescribed more in nursing practice (prescription of drugs delegated to nurses) than in medical practice in cases of infectious syndrome, with or without pain. The hepatotoxic risk of phytotherapies, whose exact composition is often unknown, must also be taken into account in our context.

It was lowered in 26.92% in our study. Similar frequencies ranging from 34% to 42% have been found in other studies [25] [26]. Although bleeding (5.38% in our study) may be observed with elevated transaminases [21] [27], studies have shown a weak correlation between prothrombin levels and transaminases. Therefore, the hepatic function of coagulation factor synthesis would generally be well compensated. The factors associated with the occurrence of severe forms of dengue have been researched in Burkina Faso. In this study, risk factors for severe dengue included age, male sex, primary dengue, haemoglobin S, diabetes and hypertension. Adults were at greater risk of severe dengue compared with children (age ≤ 15 years) [7].

In addition to the liver, dengue fever can affect various organs including the kidney [25]. The kidney is affected in a variety of ways and may involve one or more of its structures. Among the renal complications, acute renal failure (ARF) is the most frequent; it is found in at least 48.4% of dengue cases [28]. The majority of studies on renal involvement in dengue are from Asian countries and South America. These studies show that ARF is often associated with severe dengue [28]. Coulibaly in Burkina Faso found that 73.8% of patients with ARF due to dengue had liver cytolysis. In our study, 80% of patients with ARF had cytolysis greater than 10 LSN. This finding may suggest a link between the fail-

ures of the two viscera.

The treatment of dengue is symptomatic by combating dehydration (oral and parenteral rehydration), fever (paracetamol) and the algic syndrome. The onset of cytolysis raises concerns that the use of paracetamol or any other potentially hepatotoxic drug may accentuate liver damage. Strict adherence to dosage regimens is essential [29].

Ninety-one percent (91.40) of patients had a favourable outcome and four percent (4.30%) died. Deaths accounted for 80% of haemorrhagic dengues. These data are consistent with the literature. Severe forms of dengue fever have the highest case fatality rate [29] [30].

This study has some limitations: the sites were chosen in relation to the availability of RDTs, which may lead to selection bias. The tests (transaminases, RDTs, haemograms, creatininemia) were paid for by the patients and were not always performed.

5. Conclusion

Dengue virus causes damage to the liver parenchyma and other organs. The degree of liver damage is variable. The measurement of transaminases is of great importance, on the one hand to assess the severity of liver damage and on the other hand to facilitate better follow-up. Liver damage, although frequent, can be multifactorial and should be considered in our context.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Clinical Characteristics of COVID-19 Patients with Digestive Symptoms in a Tertiary Level Hospital

Dilip Kumar Ghosh[1*], Akhlak Ahmed[2], Hafez Mohammad Nazmul Ahsan[2], Parash Ullah[1], Mukta Nath[3], Syed Alamgir Safwath[4]

[1]Department of Gastroenterology, Shaheed Suhrawardy Medical College Hospital, Sher-e-Bangla Nagar, Dhaka, Bangladesh
[2]Department of Medicine, Shaheed Suhrawardy Medical College Hospital, Sher-e-Bangla Nagar, Dhaka, Bangladesh
[3]Sir Salimullah Medical College, Dhaka, Bangladesh
[4]Department of Gastroenterology, Jalalabad Ragib-Rabeya Medical College, Sylhet, Bangladesh
Email: *dkghoshmukta@gmail.com, akhlakm22@gmail.com, babubluesky@yahoo.com, drparashullah@gmail.com, nathmukta1979@gmail.com, alamgirsafawath@yahoo.com

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Abstract

Background: The pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has greatly challenged public health worldwide. A growing number of studies have reported gastrointestinal (GI) symptoms. The study aimed to estimate the various digestive symptoms frequently reported in Covid-19 patients among the adult population of Bangladesh. **Methods:** In this descriptive, cross-sectional study, we enrolled confirmed patients with COVID-19 who were admitted to the COVID unit of Shaheed Suhrawardy Medical college hospital, Dhaka from July 2020 to December 2020. All patients were COVID confirmed by real-time polymerase chain reaction (RT-PCR) and were analyzed for clinical characteristics, laboratory findings and imaging study. **Results:** The study population consisted of 121 COVID-19-positive patients, among them, 57.85% were male and 42.15% female. The majority (43%) of the study population were in the age group of 31 - 40 years. The male to female ratio was 1.4:1. Nearly 94.2% of the sample population were married, among them 92.9% were male and 96.1% were female. Out of 121 Covid-19 patients, 30.65% had a contact history, 17.4% had a history of traveling or residing in an area reporting COVID-19 and 11.6% of family members were affected by Covid-19. Most of the patients had a fever (95%), cough (88.4%) and dyspnoea (43.8%), pneumonia (37.4%) and severe pneumonia (36.4%). In this study, 40% patients reported a digestive symptom including diarrhea 47.9%, vomiting 55.5%, loss of appetite 16.5%, abdominal pain 29.8%, abdominal bloating 24.8%, reflux 0%, jaundice 3.3%. Regarding co-morbidities, the majority had bronchial

asthma (50%) followed by hypertension 46%, diabetes 38%, obesity 23%, and CKD 14% and heart disease 3%. Among 121 COVID-19 patients, 98% had recovered from the disease and 2% of patients expired. **Conclusion:** Gastrointestinal symptoms are common among patients with COVID-19 and this group of patients had a long time of hospital stay from onset to admission, and higher liver enzyme levels. During the management of COVID-19 patients, clinicians need to be alert regarding suspicion of the GI features among COVID-19, so that they can diagnose early and treat effectively and immediately.

Keywords

COVID-19, Gastrointestinal Symptoms, Diarrhoea, Prognosis, Fecal-Oral-Transmission

1. Introduction

COVID-19 is a severe acute respiratory infection caused by corona virus 2 (SARS-CoV-2) and declared a pandemic by World Health Organization (WHO) on 11th March 2020 [1]. The most common clinical manifestation is respiratory infection ranging from mild influenza-like illness to severe pneumonia leading to acute respiratory distress syndrome (ARDS) [2]. Although SARS-COV-2 is known primarily target to the lung, it has also tropism to the gastrointestinal mucosa [3]. Covid-19 virus enters and replicates into cells by binding to its angiotensin-converting enzyme 2 (ACE2) receptor. In lung, ACE2 receptor is expressed in type 2 alveolar cells, but in the gastrointestinal tract, ACE2 has been found in epithelial cells throughout the gastrointestinal tract GI tract and cholangiocytes. Thus, SARS-CoV-2 may cause digestive symptoms either by direct viral invasion in target cells and/or immune-mediated tissue and end-organ injury [4]. Different studies from several countries in the world have reported different gastrointestinal manifestations, such as anorexia, nausea, abdominal pain, and diarrhea. Covid-19 infected patients with GI symptoms have a poor prognosis. Patients with covid-19 positive with truly GI symptoms have delayed diagnosis [5] [6] [7]. For this reason, GI symptoms have special significance in the corona virus patients.

So, the study prospectively estimated clinical characteristics and outcomes of COVID-19 patients with digestive symptoms admitted to the COVID ward of a tertiary level hospital, Dhaka, Bangladesh.

2. Materials and Methods

This study was a descriptive cross-sectional study. It was held in collaboration with the Department of Gastroenterology at the Covid Department of Shaheed Suhrawardy Medical College Hospital in Dhaka, Bangladesh from July to December 2020. All participants were enrolled based on inclusion and exclusion criteria. Inclusion criteria were patients with Covid-19 positive (RT-PCR Posi-

tive) with age more than or equal to 18 years irrespective of sex and who were willing to participate in the study. The prevalence of COVID-19 in the general population in Bangladesh from April to October 2020 was 6.4% [8]. Considering the prevalence, the author calculated the sample size by Guilford and frucher equation and the calculated sample was 92. But, 121 patients were enrolled in this study due to the availability of the admitted patients in the COVID ward. An objective questionnaire based on National Covid Guideline (Version-7) and WHO Guideline was designed in English for this study (**Appendix-I**). The English version of the questionnaire was translated into the native language of Bengali by the expert. Some major items such as socio-demographic characteristics, general symptoms, history of traveling, diagnosis, vital signs, risk factors of co-morbidity, investigation, imaging and treatment information were included in the questionnaire section as per our National Covid Guideline. The purposive sampling technique was used for data collection. Data were collected by trained personnel and medical officers who were appropriately trained prior to data collection and supervised by the authors. After self-introduction with the patient, the author explained the purpose of their visit and ensured informed consent before collecting the data. The authors randomly rechecked the data to verify the quality of the data. Finally, the data were analysed using Statistical Packages for Social Sciences (SPSS-17) (SPSS Inc., Chicago, IL, USA). The results were presented in tables, figures, and diagrams.

3. Results

One hundred twenty-one covid-19 patients were enrolled in this study. The socio-demographic findings are stated in Table 1. Among the study population, 57.85% were male and 42.15% were female. The majority (43%) of the respondent belonged to the age group of 31-40 years. The male to female ratio was 1.4:1. Regarding the occupation of the respondents, the majority were government employees (43%) followed by 16.5% Businessmen, 14% non-government employees and the rest 26% constituted other occupations. With respect to the educational background, about 17.4% university education completed, 21.5% college completed, 28.9% secondary education completed, about 18.2% primary education completed and 14% of the respondents were illiterate. Most of the study populations are Muslims (85.1%) and the rest are Hindu (13.2%) and Christian (1.7%). Regarding income, 24.8% of the respondents reported earning a monthly income of below Tk. 10,000.

Out of 121 COVID-19 patients, 11 (9.2%) were smoker, 30 (25.2%) were Ex-smoker, 73 (60.3%) were betel nut chewer, 8 (6.6%) were alcohol consumer etc. From the dietary habit of the respondents, it is found that 96.7% were non-vegetarian and 3.3% vegetarian. All the respondents were used to the sanitary latrine (Table 2).

Out of 121 COVID-19 patients, 37 (30.6%) had a contact history of the Covid patient, 21 (17.4%) had a history of traveling or residing in an area reporting

Table 1. Socio-Demographic detail of the respondents (n = 121).

	Male (n = 70)	Female (n = 51)	Total
Age			
21 - 30	7 (10.0)	7 (13.7)	14 (11.6)
31 - 40	25 (35.7)	27 (52.9)	52 (43.0)
41 - 50	19 (27.1)	7 (13.7)	26 (21.5)
51 - 60	12 (17.1)	6 (11.8)	18 (14.9)
>60	7 (10.0)	4 (7.8)	11 (9.1)
Marital status			
Married	65 (92.9)	49 (96.1)	114 (94.2)
Unmarried	5 (7.1)	2 (3.9)	7 (5.8)
Education			
Illiterate	11 (15.7)	6 (11.8)	17 (14.0)
Primary school	12 (17.1)	10 (19.6)	22 (18.2)
High School	20 (28.6)	15 (29.4)	35 (28.9)
College	14 (20.0)	12 (23.5)	26 (21.5)
University	13 (18.6)	8 (15.7)	21 (17.4)
Occupation			
Government employee	25 (35.7)	27 (52.9)	52 (43.0)
Non-government employee	11 (15.7)	6 (11.8)	17 (14.0)
Student	1 (1.4)	0 (0.0)	1 (0.8)
Business	19 (27.1)	1 (2.0)	20 (16.5)
Agriculture worker	3 (4.3)	0 (0.0)	3 (2.5)
Industrial worker	4 (5.7)	1 (2.0)	5 (4.1)
Driver	1 (1.4)	0 (0.0)	1 (0.8)
Daily laborer	2 (2.9)	2 (3.9)	4 (3.3)
Homemaker	0 (0.0)	12 (23.5)	12 (9.9)
Others	4 (5.7)	2 (3.9)	6 (5.0)
Religion			
Muslim	60 (85.7)	43 (84.3)	103 (85.1)
Hindu	10 (14.3)	6 (11.8)	16 (13.2)
Christian	0 (0.0)	2 (3.9)	2 (1.7)
Monthly family income			
<10,000	14 (20.0)	16 (31.4)	30 (24.8)
>10,000	56 (80.0)	35 (68.6)	91 (75.2)

Table 2. Personal habit of the patients.

Personal habit	Male (n = 70)	Female (n = 51)	Total
Betel nut chewer	43 (61.4)	30 (58.8)	73 (60.3)
Alcohol consumer	6 (8.6)	2 (3.9)	8 (6.6)
Tobacco user	3 (4.3)	0 (0.0)	3 (2.5)
Smoker	11 (15.9)	0 (0.0)	11 (9.2)
Ex-Smoker	30 (43.5)	0 (0.0)	30 (25.2)
Vegetarian	2 (2.9)	2 (3.9)	4 (3.3)
Non-vegetarian	68 (97.1)	49 (96.1)	117 (96.7)
Use of sanitary latrine	70 (100.0)	51 (100.0)	121 (100.0)

COVID-19 and 14 (11.6%) family members were affected by Covid-19 (Table 3).

Regarding severity, among 121 patients, most (57.8%) of the patients were clinically moderate, 29.8% mild, 9.9% severe and 2.5% critical (Table 4).

COVID-19 patients had a wide range of symptoms-ranging from mild symptoms to severe illness. Regarding symptoms of one hundred twenty-one admitted patients to the COVID unit of Shaheed Suhrawardy Medical college hospital, most of the patients had a fever (95%) and cough (88.4%) and 43.8% of patients had shortness of breath (dyspnoea), 34.7% had pneumonia and 36.4% had severe pneumonia, 43% had chest pain, 32.2% had confusion, 74.4% had a headache, 38% had fatigue and 47.1% had altered sense of smell (Table 5).

Regarding gastrointestinal symptoms, we found that 40% reported a digestive symptom (Figure 1), including diarrhea (58 [47.9%]), anorexia (20 [16.5%]), nausea (38 [31.4%]), vomiting (55 [45.5%]), abdominal pain (36 [29.8%]), abdominal bloating (30 [24.8%]), reflux (0%), jaundice (4 [3.3%]), altered sense of taste (54 [44.6%]) and sore throat (82 [67.8%]) (Table 6).

Among 121 patients, most (50%) of the patients had bronchial asthma followed by hypertension 46%, diabetes 38%, heart disease 3%, obesity 23%, and CKD 14%. Twenty male COVID patients are a smoker (28%) (Table 7).

Among 121 COVID-19 patients, 98% had recovered from the disease and 2% of patients expired (Table 8).

4. Discussion

In Bangladesh, the first COVID-19 case was declared in Dhaka City on 8 March, 2020 [9]. According to the latest findings of a Chinese expert group, the Covid-19 virus could be transmitted through the digestive system [10]. So, the study was conducted to find out the clinical characteristics and outcome of COVID-19 patients with digestive symptoms admitted to the Covid ward of a tertiary level hospital, Dhaka.

In this study, 57.85% were male and 42.15% were female. The majority (43%)

Table 3. Contact history of the respondent.

Personal habit	Male (n = 70)	Female (n = 51)	Total
Any contact of COVID-19 patient in last 14 days	17 (24.3)	20 (39.2)	37 (30.6)
Any history of travelling of residing in an area reporting COVID-19	11 (15.7)	10 (19.6)	21 (17.4)
Family member affected	7 (10.0)	7 (13.7)	14 (11.6)

Table 4. Severity of COVID-19.

Severity	Male (n = 70)	Female (n = 51)	Total
Mild	18 (25.7)	18 (35.3)	36 (29.8)
Moderate	39 (55.7)	31 (60.8)	70 (57.8)
Severe	10 (14.3)	2 (3.9)	12 (9.9)
Critical	3 (4.3)	0 (0.0)	3 (2.5)

Table 5. Manifestation of COVID-19 patients.

General symptoms	Male (n = 70)	Female (n = 51)	Total
Fever	67 (95.7)	48 (94.1)	115 (95.0)
Cough	63 (90.0)	44 (86.3)	107 (88.4)
Dyspnoea	33 (47.1)	20 (39.2)	53 (43.8)
Altered sense of smell	35 (50.0)	22 (43.1)	57 (47.1)
Fatigue	29 (41.4)	17 (33.3)	46 (38.0)
Headache	52 (74.3)	38 (74.5)	90 (74.4)
Confusion	25 (35.7)	14 (27.5)	39 (32.2)
Nasal Congestion	7 (10.0)	3 (5.9)	10 (8.3)
Conjunctivitis	14 (20.0)	15 (29.4)	29 (24.0)
Dizziness	14 (20.0)	14 (27.5)	28 (23.1)
Chest pain	30 (42.9)	22 (43.1)	52 (43.0)
Pneumonia	28 (40.0)	14 (27.5)	42 (34.7)
Severe pneumonia	27 (38.6)	17 (33.3)	44 (36.4)
Sepsis	0	0	0
Septic Shock	0	0	0
Multi-organ failure	0	0	0

Table 6. Gastrointestinal manifestation of COVID-19 patients.

General symptoms	Male (n = 70)	Female (n = 51)	Total
Diarrhoea	36 (51.4)	22 (43.1)	58 (47.9)
Nausea	21 (30.0)	17 (33.3)	38 (31.4)
Vomiting	31 (44.3)	24 (47.1)	55 (45.5)
Anorexia	9 (12.9)	11 (21.6)	20 (16.5)
Abdominal pain	21 (30.0)	15 (29.4)	36 (29.8)
Abdominal bloating	19 (27.1)	11 (21.6)	30 (24.8)
Reflux (GERD)	0	0	0
Jaundice	2 (2.9)	2 (3.9)	4 (3.3)
Altered sense of taste	32 (45.7)	22 (43.1)	54 (44.6)
Sore throat	49 (70.0)	33 (64.7)	82 (67.8)

Table 7. Co-morbidity of COVID-19 patients.

Co-morbidity	Male (n = 70)	Female (n = 51)	Total
DM	29 (41.4)	17 (33.3)	46 (38.0)
HTN	35 (50.0)	21 (41.2)	56 (46.3)
Bronchial asthma	38 (55.1)	22 (44.0)	60 (50.4)
Chronic heart disease	2 (2.9)	2 (3.9)	4 (3.3)
CVD	0	1 (2.0)	1 (0.8)
COPD	0	0	0
CKD	10 (14.3)	7 (13.7)	17 (14.0)
CLD	0	0	0
Smoking	20 (28.6)	0 (0.0)	20 (28.6)
Obesity	13 (18.6)	15 (29.4)	28 (23.1)
Chemotherapy/surgery	0	0	0
HIV	0	0	0
TB	0	0	0
Malnutrition	9 (12.9)	6 (12.0)	15 (12.5)
Dengue	0	0	0

Table 8. Outcome of the COVID-19 patients.

	Male (n = 70)	Female (n = 51)	Total
Recovered	68 (97.1)	51 (100.0)	119 (98.3)
Death	2 (2.9)	0	2 (1.7)

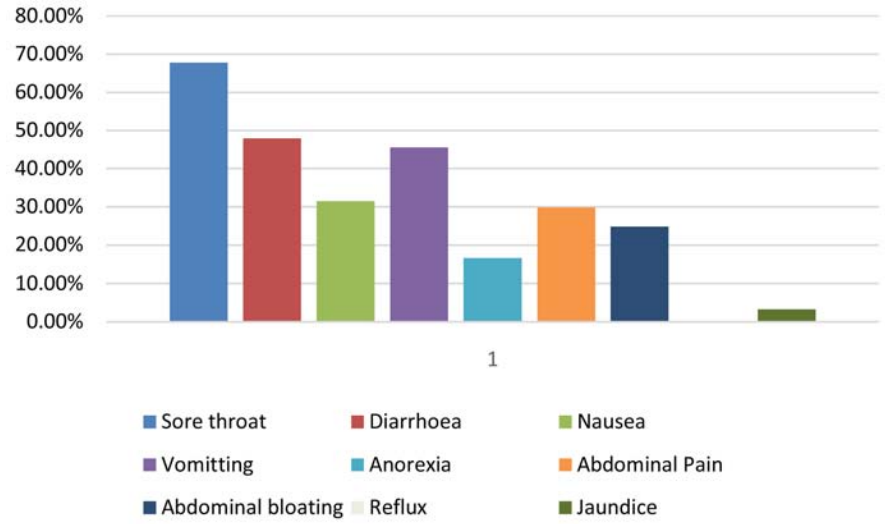

Figure 1. Digestive signs of the participants.

of the study population belonged to the age group of 31-40 years. The male to female ratio was 1.4:1. Hossain I, *et al.* from Bangladesh published an article where they also found 43% of respondents in the age range of 21 to 40 years, a female: male ratio of 1:2.33 [11]. In China, Guan WJ *et al.* reported median age: 47 years and 41.9% female [12]. Gupta N *et al.* from India also found a mean age of 40.3 years, 66.7% male [13]. However, in America, Richardson S *et al.* reported median age of 63 years and in Europe, Colaneri M *et al.* reported median age of 67.5 years but the same male preponderance [14] [15]. So, the findings of this study are consistent with the other Asian studies.

Out of 121 Covid-19 patients, 30.65% had a contact history, 17.4% had a history of traveling or residing in an area reporting COVID-19 and 11.6% of family members were affected by Covid-19. In India, Gupta N *et al.* reported that 52.4% of patients had a history of contact with a lab-confirmed COVID-19 patient and more than half (61.9%) of the patients had a travel history outside India. so, it was found that a large group of the population had positive contact history, that's why isolation and quarantine are needed for reduction of covid transmission.

COVID-19 infected patients had a wide range of symptoms-ranging from mild symptoms to severe illness. The earliest reports from China by Guan WJ *et al.* described, fever, dry cough, breathing difficulties (dyspnoea), headache and pneumonia as the typical clinical symptoms of COVID-19. Regarding symptoms of one hundred twenty-one admitted patients to the COVID unit of Shaheed Suhrawardy Medical college hospital, most of the patients had a fever (95%) and cough (88.4%) and 43.8% of patients had shortness of breath, 34.7% had pneumonia and 36.4% had severe pneumonia, 43% had chest pain, 32.2% had confusion, 74.4% had a headache, 38% had fatigue and 47.1% had altered sense of smell. SGM Mowla *et al.* from Bangladesh also reported fever (69%), cough (54%), breathlessness (41%) and fatigue (40%) [16]. So, the findings of this study

are consistent with the other studies.

Gastrointestinal (GI) manifestations are being increasingly reported as common symptoms in COVID-19 patients [17] [18] [19] [20]. Gastrointestinal symptoms include loss of appetite, nausea, vomiting, diarrhea, abdominal pain, and deranged liver function tests [21]. In this study, 40% of covid-19 patients reported digestive symptoms, including diarrhea 47.9%, vomiting 45.5%, altered sense of taste 44.6%, sore throat 67.8%, anorexia 16.5%, nausea 31.4%, abdominal pain 29.8%, abdominal bloating 24.8% and jaundice 3.3%,. Tian Y, et reported the globally gastrointestinal symptoms of COVID-19 included anorexia 39.9% - 50.2%, diarrhoea 2% - 49.5%, vomiting 3.6% - 66.7%, nausea 1% - 29.4%, abdominal pain 2.2% - 6.0% and gastrointestinal bleeding 4% - 13.7%.

Amin MT *et al*. conducted an online self-reported retrospective study in Bangladesh, on the recovered patients from the COVID-19 infection and they found that fever, exhaustion, cough, loss of taste, sore throat, body ache, and hair loss were prevalent among more than 50% of the participants [22]. Muhammad Aziz *et al*. reported a systemic review and they found the prevalence of ageusia/dysgeusia was 49.8% across these 5 studies [23]. So, the clinical characteristics and digestive symptoms of this study are compatible with the other studies from home and abroad.

Ghimire, S. *et al*. conducted a Systemic Review and Meta-analysis on Diarrhea with Increased Severity of Disease in COVID-19. They reported that 15.47% of patients had at least one GI symptom, nausea/vomiting was 7.53% and diarrhea was 11.52%. Ina meta-analysis, they reported that patients with diarrhea as one of the presenting symptoms were more likely to have severe disease. They concluded that GI symptoms are common in COVID-19 and the presence of diarrhea as a presenting symptom is associated with increased disease severity and likely worse prognosis. So, early recognition of patients is needed for prompt management of this at-risk population [24].

Co-morbidities are the major risk factors for covid infection. Symptomatic patients in the risk group (like DM, HTN, IHD, Prior Asthma/COPD/ILD patients, known CKD, CLD, known Malignancy, Obesity (BMI > 25) should be admitted to the covid ward. In this study, most of the patients had bronchial asthma (50%) followed by hypertension 46%, diabetes 38%, obesity 23%, CKD 14%, and heart disease 3%. Yang J, *et al*. reported the most prevalent co-morbidities, hypertension (21.1%) and diabetes (9.7%), followed by cardiovascular disease (8.4%) and respiratory system disease (1.5%) [25]. As the study was conducted in a covid unit, we got more co-morbidities compared to others studies.

In this study, among 121 COVID-19 patients, 98% had recovered from the disease and 2% of patients expired. During the study period, from July to December 2020, WHO reported the Case Fatality Rate in Bangladesh, which is 1.36% on 2 June, 2020 [26]. So, the finding of this study is consistent with the report.

The study has some limitations. The study is limited to small sample size.

Sometimes, proper history taking with physical examinations was not done meticulously due to the pandemic situation (social distance was one of the major concerns). A further large-scale study with a large sample size is needed to explore the outcome of the COVID-19 patient with digestive symptoms.

5. Conclusion

This study depicted the initial data regarding the clinical characteristics of covid-19 patients with digestive symptoms in a tertiary level hospital in Bangladesh. Gastrointestinal symptoms are common among patients with COVID-19 and this group of patients has a long time of hospital stay from onset to admission, and higher liver enzyme levels. During the management of COVID-19 patients, clinicians need to be alert regarding the GI features amongst COVID-19 patients, so that they can treat them effectively and immediately. However, further large-scale studies are needed to confirm these findings.

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Conflicts of Interest

There is no conflict of interest.

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Appendix I

English version of the questionnaire:

BANGLADESH MEDICAL RESEARCH COUNCIL

MOHAKHALI, DHAKA - 1212, Bangladesh

Tel: 871395, Fax: 880-2-888820

Project Proforma (PP) - 02

Health, Population and Nutrition Sector Development Programme (HPNSDP)

"Clinical Characteristics of COVID-19 Patients with Digestive Symptoms in a tertiary level hospital".

Principal Investigator: **Dr. Dilip Kumar Ghosh**

DATA COLLECTION SHEET

SECTION-1: BASELINE INFORMATION

ID No……

Date:……..

1) Name:……..……

2) Father's Name:.....

3) National ID No. …….

4) Age (in complete year): …….

5) Date of Birth:

6) Address with Contact No.:

Village/ward:……..Upazilla/Thana:……..

District:…… Mobile no:……..

7) Sex: 1 = Male 2 = Female

8) Marital Status: 1 = Married 2 = Unmarried

3 = Divorced 4 = Widower 5 = Others, if any……

9) Occupation

a) Government employee

b) Non-government employee

c) Student

d) Business

e) Agriculture worker

f) Industrial worker

g) Rickshaw puller

h) Driver

i) Daily laborer

j) Homemaker/housewife

k) Retired

l) Others (Specify)……

10) Religion:

a) Islam

b) Hindu

c) Christian

d) Buddhist

e) Others

11) Height (Cm):……

12) Weight (Kg):……

13) BMI……

14) Waist-to-hip ratio : …….

15) Betel nut chewer i. Yes ii. No

16) Alcohol Taker i. Yes ii. No

17) Tobacco User i. Yes ii. No

18) Dietary Habit i. Vegetarian ii. Non-vegetarian

19) Smoking Status:

a) Smoker

b) Ex-Smoker

c) Non-Smoker

20) Level of Education:

a) Illiterate

b) Primary school

c) High School

d) College

e) University

21) Monthly Family income (on an average)……

a) <10,000 ☐

b) 10,000> ☐

22) Total Family members:……

23) Use of Sanitary Latrine:

a) Yes

b) No

24) Date of Symptom onset ----------/----------/2020

25) Date of Sample Collection ---------/----------/2020

26) Date of admission ----------/----------/2020

27) Any contact of COVID-19 patient in last 14 days i) Yes ii) No

28) Any history of travelling or residing in an area reporting COVID-19 i) Yes ii) No

29) Family members affected: i) Yes ii) No if Yes , number ----------

30) Diagnosis (clinical syndrome) :

a) Asymptomatic i) Yes ii) No

b) Mild i) Yes ii) No

c) Moderate i) Yes ii) No

d) Severe i) Yes ii) No

e) Critical i) Yes ii) No

31) Signs

a) Cyanosis i) Yes ii) No

b) Crackles i) Yes ii) No

c) Wheeze i) Yes ii) No

d) Bronchial breath sound i) Yes ii) No
i) spO_2…… %
ii) GCS …….. %
32) Vital Signs during admission:
a) Temperature (axillary)…….. ˚F
b) Heart rate ……../ min
c) BP ……/…….. mmHg
d) Resp. rate ……/min
33) RT-PCR Test i) Positive ii) Negative
34) General Symptoms

Fever	1.	Present	2.	Absent
Cough	1.	Present	2.	Absent
Dyspnoea	1.	Present	2.	Absent
Altered sense of smell	1.	Present	2.	Absent
Altered sense of taste	1.	Present	2.	Absent
Fatigue	1.	Present	2.	Absent
Sore throat	1.	Present	2.	Absent
Diarrhoea	1.	Present	2.	Absent
Nausea	1.	Present	2.	Absent
Vomitting	1.	Present	2.	Absent
Anorexia	1.	Present	2.	Absent
Abdominal Pain	1.	Present	2.	Absent
Abdominal Bloating	1.	Present	2.	Absent
Reflux (GERD)	1.	Present	2.	Absent
Jaundice	1.	Present	2.	Absent
Headache	1.	Present	2.	Absent
Confusion	1.	Present	2.	Absent
Nasal Congestion	1.	Present	2.	Absent
Conjunctivities	1.	Present	2.	Absent
Dizziness	1.	Present	2.	Absent
Chest Pain	1.	Present	2.	Absent
Others:				
Pneumonia	1.	Present	2.	Absent
Severe Pneumonia	1.	Present	2.	Absent
Sepsis	1.	Present	2.	Absent
Septic Shock	1.	Present	2.	Absent
Muliorgan failure	1.	Present	2.	Absent

35) Risk factors of Co-Morbidities

DM	1.	Present	2.	Absent
HTN	1.	Present	2.	Absent
Bronchial Asthma	1.	Present	2.	Absent
Chronic Heart Disease	1.	Present	2.	Absent
CVD	1.	Present	2.	Absent
COPD	1.	Present	2.	Absent
CKD	1.	Present	2.	Absent
CLD	1.	Present	2.	Absent
Smoking	1.	Present	2.	Absent
Obesity	1.	Present	2.	Absent
Chemotherapy Surgery	1.	Present	2.	Absent
HIV	1.	Present	2.	Absent
TB	1.	Present	2.	Absent
Malnutrition	1.	Present	2.	Absent
Dengue	1.	Present	2.	Absent

36) Investigation

CBC	1st Day	2nd Day	3rd Day	4th Day	5th Day	6th Day	7th Day
1) Hb %							
2) TC.WBC							
3) Neu %							
4) Lymph %							
5) Platelet							

37) Others

1) RBS

2) HbA1c

3) Serum Billirubin

4) ALT

5) AST

6) CRP titre

7) D-dimer

8) Procalcitonin

9) Serum Creatinine

10) Serum Electrolyte:

Na^+ ----------

K^+ ---------

Cl^- ----------

HCO_3^- -------

38) Imaging

a) Chest X-Ray PA View (Pneumonitis) i) Present ii) Absent

b) CT Chest: Yes/No. Report: …… i) Yes ii) No

39) Treatment

A) Drug

a) Paracetamol i) Yes ii) No

b) HCQ i) Yes ii) No

c) Azithromycin i) Yes ii) No

d) Enoxaparin i) Yes ii) No

B) 1) Oxygen therapy i) Yes ii) No

2) IV fluid i) Yes ii) No

3) Bl pressure support required i) Yes ii) No

4) Mechanical ventilation required i) Yes ii) No

5) Dialysis required i) Yes ii) No

6) Steroid i) Yes ii) No

O_2 therapy duration: --------- hrs/days

Mechanical vent duration ---------- hrs/days

40) Repeat PCR: i)Yes ii) No

1st Date ……../……./2020	Result:
2nd Date ……../……/2020	Result:

41) Date of discharge ----------/----------/2020

42) Date of end of isolation -------/--------/2020

43) Outcome:

a) Recovered

b) Referred to higher centre

c) Left by own

d) Death

44) Contact tracing (to be done by local health authority) informed: i) Yes ii) No

Signature of data collector

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