

# Co-infections and COVID-19 in Children: An Observational Study

<sup>1</sup>. Uzzal Kumar Ghosh

Registrar, Dept. of Paediatrics,  
Dr. M R Khan Shishu Hospital & ICH, Mirpur-2, Dhaka.

<sup>2</sup>. Madhabi Baidya

Assistant Professor, Dept. of Paediatric Gastroenterology  
Hepatology and Nutrition, Dhaka Shishu (Children)  
Hospital.

<sup>4</sup>. Nobo Krishna Ghosh

Professor, Dept. of Paediatrics, Dr. M R Khan Shishu  
Hospital & ICH, Mirpur-2, Dhaka.

<sup>6</sup>. Joairya Yasmeen Bushra

Assistant Registrar, Dept. of Paediatrics, Dr. M R Khan  
Shishu Hospital & ICH, Mirpur-2, Dhaka.

<sup>3</sup>. Azmeri Sultana

Associate Professor, Dept. of Paediatrics, Dr. M R Khan  
Shishu Hospital & ICH,  
Mirpur-2, Dhaka.

<sup>5</sup>. M. F. Abiduzzaman

Registrar, Dept. of Paediatrics, Dr. M R Khan Shishu  
Hospital & ICH, Mirpur-2, Dhaka.

<sup>7</sup>. Md. Maniruzzaman Nayan

Trainee, IbnSina Medical College & Hospital,  
Kallaynpur, Dhaka.

## Abstract:-

### ➤ Background:

Acute illness caused by bacteria, viruses, and parasites. Co-infection is the simultaneous infection of a host by multiple pathogens resulting in a delay in diagnosis and bad prognosis. Currently, coronavirus infection is a pandemic and global health concern. Coronavirus infection in children with concomitant other infections is rarely reported in our country. This study was performed to find out the coronavirus infection associated with recent illnesses to minimize morbidity and mortality.

### ➤ Methodology:

The study was done at Dr. M R Khan Shishu Hospital & ICH from April 2020 to June 2020. Patients with fever, rash, vomiting, diarrhea, cough, respiratory distress, dysuria, convulsion, jaundice, and other symptoms; admitted in the hospital were taken for this study. The diagnosis was made by clinical symptoms plus investigations accordingly and appropriate treatment was given for recent illnesses. During follow up these cases; there was the persistence of symptoms and some other new features appeared. These arouse our suspicion that there might be associated with coronavirus infection in this pandemic.

### ➤ Results:

Thirty cases were taken co-infection with COVID-19. Age was found 4 months to 8 years. The male-female ratio was 1.5:1. Typhoid fever with COVID-19 12(40%), Bacterial meningitis with COVID-19 6(20%), UTI with COVID-19 3(10%), Paratyphoid fever with COVID-19 2(6.7%), Typhus/ Rickettsial fever with COVID-19 2(6.7%), HAV infection with COVID-19 2(6.7%), HEV infection with COVID-19 1 (3.3%), Septic arthritis

with COVID-19 (3.3%), bacterial pneumonia with COVID-19 (3.3%) were found. RT-PCR was positive for COVID-19 30(100%), blood culture was positive for Salmonella Typhi 4(13.3%), Widal test was reactive (high rising titer) 8(26.7%), Latex agglutination test was positive for bacterial meningitis 6(20%), urine culture was positive for E. coli 3(10%), blood culture was positive for Salmonella Para typhi A 2(6.7%), Weil-Felix reaction was found (high rising titer) 2(6.7%), Anti HAV IgM was positive 2(6.7%), Anti HEV IgM was positive 1(3.3%), Blood culture was positive (staph. aureus) for septic arthritis 1(3.3%), blood culture was positive (strep. pneumoniae) for bacterial pneumonia 1(3.3%).

### ➤ Conclusion:

This study showed that COVID-19 in Bangladeshi children was found associated with co-infections. So, co-infection with COVID-19 patients should be closely monitored and managed accordingly.

**Keywords:** -Co-infections, COVID-19.

## I. INTRODUCTION

Coronaviruses (CoVs) are enveloped, single-stranded, zoonotic, RNA viruses of a large family. The novel CoV severe acute respiratory syndrome coronavirus (SARS-CoV) emerged in 2002. The 2019 novel coronavirus (SARS-CoV-2) is currently causing a severe outbreak of disease (called COVID-19) in China and multiple other countries including Bangladesh. Now it is a pandemic and global health concern. In humans, CoVs mostly cause respiratory and gastrointestinal symptoms. Clinical manifestations range from a common cold to severe diseases such as bronchiolitis, pneumonia, ARDS, inflammatory syndrome, multi-organ failure, and even death. SARS-CoV and SARS-CoV-2 less commonly affect children and less severe

disease compared with adults and are associated with lower fatality. Evidence suggests children are as likely as adults to become infected with SARS-CoV-2 but are less likely to be symptomatic. The majority of children infected by novel CoVs have documented household contact. In contrast, adults more often have nosocomial exposure.<sup>1</sup>

According to National Guidelines on Clinical Management of Coronavirus Disease 2019 (COVID-19) in Bangladesh shows corona symptoms are Mild illness (Influenza-like illness-ILI), Pneumonia, Severe pneumonia, Acute respiratory distress syndrome, Sepsis, Septic shock.<sup>2</sup>

Common symptoms of COVID-19 in children are cough and fever. It is important to note that these symptoms may not always be present; thus, a high index of suspicion for SARS-CoV-2 infection is required in children.<sup>3</sup>

China and the United States reported only about 2.4% coronavirus infection among children where age was under 19 years.<sup>4, 5</sup> Most cases in children are mild, and treatment consists of supportive care. No drugs or biologics have been approved by the US Food and Drug Administration (FDA) for the prevention or treatment of COVID-19, and no vaccine is currently available.<sup>6</sup>

UK study says the majority of patients under 18 years old experienced a mild disease and less than 1% of them died.<sup>7</sup>

A study of European children with COVID-19 suggests deaths are extremely rare. Four of the 582 children studied died, two of whom had known underlying health conditions. Children's symptoms were generally mild. Some who tested positive had no symptoms, but about one in 10 in the study needed intensive care.<sup>8</sup>

Nearly one-half of the infected children had co-infection with other common respiratory pathogens.<sup>9</sup> Fourty patients (83%) had significant preexisting comorbidities.<sup>10</sup>

Acute illness is caused by bacteria, viruses, and parasites. Co-infection is the simultaneous infection of a host by multiple pathogens. COVID-19 in children with other infections is rarely reported in our country. In this pandemic situation, children with recent illnesses may be associated with coronavirus infection. Recent illness is non-responding to conventional & appropriate treatment or deteriorating or atypically present; when they are might be associated with coronavirus infection. COVID-19 symptoms may mimic with various other diseases. The febrile phase of dengue fever, typhoid fever, paratyphoid fever, typhus or rickettsial fever, malaria, and many other diseases may overlap with the coronavirus infection that leads to substantial misdiagnosis.

In this view, a high index of suspicion, careful attention to the clinical course, and RT-PCR are necessary to identify the coronavirus infection with recent illnesses. Delay in diagnosis of associated COVID-19 results bad

prognosis. This study was performed to find out the coronavirus infection associated with recent illnesses.

## II. METHODOLOGY

An observational study was done at Dr. M R Khan Shishu Hospital & ICH, Mirpur-2, Dhaka from April 2020 to June 2020. Patients with fever, rash, cough, respiratory distress, vomiting, diarrhea, dysuria, convulsion, jaundice, and other symptoms; admitted in the hospital were taken for this study. The diagnosis was made by clinical symptoms criteria plus investigations accordingly and appropriate treatment was given. During follow up these cases; we observed that those patients had persistence of high-grade non-remitting fever, rash, vomiting, burking/dry cough, deepening of jaundice, uncontrolled convulsion & some other new features appeared. These features could not be correlated with the specific disease symptoms despite getting appropriate treatment. These arouse our suspicion that there might be some associated with coronavirus infection in this pandemic. Then nasopharyngeal and oropharyngeal swab was taken and sent for RT-PCR for COVID-19. Typhoid and paratyphoid fever were diagnosed by either blood culture or very high titer of Widal test where T: O/A: Omore than 1:320 and rising titer subsequently. Typhus fever was identified by Weil-Felix reaction OX titer of 1:320 or an increase in OX titer in the follow-up. Bacterial meningitis was diagnosed by CSF study with a bacterial Antigen test (Latex agglutination test). Hepatitis A virus infection was diagnosed by a rapid very high rise of SGPT, prolonged PT, rising of serum bilirubin, and Anti HAV IgM positive. Hepatitis E virus infection was identified by abnormal liver function tests with Anti-HEV IgM positive. Pneumonia causing organisms isolated by blood culture. Septic arthritis was diagnosed by blood culture and X-ray of the affected joint. Urinary tract infection by urine routine microscopic examination & urine culture positive for an organism with significant colony count. Co-infection with COVID-19 was our case experience (N).

## III. RESULTS

Thirty cases were taken co-infection with COVID-19. Here sample size N=30

Age was found 4 months to 8 years.

Among the patients of co-infection with COVID-19; the male was 18 (60%) and the female was 12 (40%). The male-female ratio was 1.5: 1 (Table I)

Gender	Number (n)	Percentage (%)
Male	18	60
Female	12	40

Table I showing the gender distribution of the study sample (N= 30)

Among the patients of different infections with COVID-19; Typhoid fever with COVID-19 was 12(40%), Bacterial meningitis with COVID-19 was 6(20%), UTI with

COVID-19 was 3 (10%), Paratyphoid fever with COVID-19 was 2 (6.7%), Typhus/Rickettsial fever with COVID-19 was 2 (6.7%), Acute viral hepatitis (HAV infection) with COVID-19 was 2 (6.7%), Acute viral hepatitis (HEV

infection) with COVID-19 was 1 (3.3%), Septic arthritis with COVID-19 was 1 (3.3%), Bacterial pneumonia with COVID-19 was 1 (3.3%). (Table II)

Diagnosis	Number (n)	Percentage (%)
Typhoid fever with COVID-19	12	40
Bacterial meningitis with COVID-19	6	20
UTI with COVID-19	3	10
Paratyphoid fever with COVID-19	2	6.7
Typhus/Rickettsial fever with COVID-19	2	6.7
Acute viral hepatitis (HAV infection) with COVID-19	2	6.7
Acute viral hepatitis (HEV infection) with COVID-19	1	3.3
Septic arthritis with COVID-19	1	3.3
Bacterial pneumonia with COVID-19	1	3.3

Table II: - showing different disease pattern with COVID-19 (N= 30)

RT-PCR was positive for COVID-19 30 (100%), blood culture was positive for Salmonella Typhi 4 (13.3%), Widal test was reactive (high rising titer) 8 (26.7%), Latex agglutination test was positive for Bacterial meningitis 6 (20%), urine culture was positive for E.coli 3 (10%), blood culture was positive for Salmonella Paratyphi A 2 (6.7%), Weil-Felix reaction (high rising titer) was 2 (6.7%),

Anti HAV IgM was positive (hepatitis A virus infection) 2 (6.7%), Anti HEV IgM was positive (hepatitis E virus infection) 1 (3.3%), Blood culture was positive (Staphylococcus aureus) for Septic arthritis 1 (3.3%), blood culture was positive (Streptococcus Pneumoniae) for bacterial pneumonia 1 (3.3%) (Table III)

Attributes	Number (n)	Percentage (%)
COVID-19 RT-PCR positive	30	100
Enteric fever		
Blood C/S positive for S. typhi	4	13.3
Widal test reactive	8	26.7
Bacterial Meningitis		
Latex agglutination test positive	6	20
Urinary tract infection		
Urine C/S positive for E. coli (more than 10 <sup>5</sup> )	3	10
Blood C/S positive for S. paratyphi A	2	6.7
Typhus fever		
Weil-Felix reaction	2	6.7
Acute viral hepatitis		
Anti HAV IgM positive	2	6.7
Anti HEV IgM positive	1	3.3
Septic Arthritis		
Blood C/S positive for Staphylococcus aureus	1	3.3
Bacterial pneumonia		
Blood C/S positive for Streptococcus Pneumoniae	1	3.3

Table III showing the pattern of investigation findings for the diagnosis of different disease with COVID-19 (N=30)

#### IV. DISCUSSION

In this study, 30 cases of co-infection with COVID-19 were taken. Age was found 4 months to 8 years. Among the patients of co-infection with COVID-19; the male was 18 and the female was 12.

Among the 30 patients of different infections with COVID-19; Typhoid fever with COVID-19 was 12 cases, Bacterial meningitis with COVID-19 was 6 cases, UTI with COVID-19 was 3 cases, Paratyphoid fever with COVID-19

was 2 cases, Typhus/Rickettsial fever with COVID-19 was 2 cases, Acute viral hepatitis (HAV infection) with COVID-19 was 2 cases, Acute viral hepatitis (HEV infection) with COVID-19 was one case, Septic arthritis with COVID-19 was one case, bacterial pneumonia with COVID-19 was one case.

All cases were RT-PCR positive for COVID-19. Blood culture was positive for Salmonella Typhi 4 cases, Widal test was reactive (high rising titer) 8 cases, Latex agglutination test was positive for Bacterial meningitis 6

cases, urine culture was positive for E.coli 3 cases, blood culture was positive for Salmonella Paratyphi A 2 cases, Weil-Felix reaction (high rising titer) was 2 cases, Anti HAV IgM was positive (hepatitis A virus infection) 2 cases, Anti HEV IgM was positive (hepatitis E virus infection) one case, blood culture was positive for Septic arthritis one case, blood culture was positive for streptococcusPneumoniae one case.

In this study, Bangladeshi children were found typhoid fever with COVID-19 as a co-infection predominantly.COVID-19 and Salmonella Typhi co-epidemics in Pakistan. Those articles have pointed out the impact of co-epidemics/co-infections of COVID-19 and other infectious diseases on an all ready overburdened. Pakistan is entirely occupied with the COVID-19 catastrophe; simultaneously around 20000 typhoid cases within 10 days of June 2020 have also been reported along with COVID-19.<sup>11</sup>

Dengue and COVID-19 co-infection is a deadly combination. Still in Bangladesh dengue is a major public health problem. Every year many people including children die due to dengue fever with its complication.Although it was an important concern in our study no case was identified of dengue fever with COVID-19. A case has been reported, co-infection of dengue and COVID-19; share common clinical and laboratory features.<sup>12</sup>

Our study showed bacterial meningitis with COVID-19 as a co-infection.A case report of nosocomial infection with SARS CoV-2 in a one-year-old Meningoencephalitis patient in a tertiary hospital of Bangladesh.<sup>13</sup>

We found acute hepatitis with COVID-19 as a co-infection with the hepatitis A or hepatitis E virus.A study was found where COVID-19 presenting as Acute Hepatitis.<sup>14</sup>

Pediatric patients with COVID-19 presented with distinct epidemiological, clinical, and radiologic characteristics from adult patients. Nearly one-half of the infected children had co-infection with other common respiratory pathogens.<sup>15</sup>

One case reported in our study was streptococcuspneumoniae with coronavirus infection as a co-infection. In children, the co-infection rate was seen for adenovirus C and influenza B virus at 68.4%, 10.7% respectively. Significantly lower co-infection rates were seen for influenza viruses and human metapneumovirus compared with other viral strains. Rhinovirus was identified associated with the most co-infections overall and co-infection rate in children at 33.3%, where adults were only 5%.<sup>16</sup>

A case reported a 4-month-old boy with a muscular ventricular septal defect and atopic dermatitis presented with gastroenteritis and respiratory tract infection with a documented history of home exposure to COVID-19. The initial respiratory pathogen was positive for adenovirus. But

inthe following day, the COVID-19 PCR was also positive.<sup>17</sup>

Bangladesh is a small developing country.The population is gradually increasing and theylive in overcrowded places. Sanitation system, water supply system, disinfection system is still developing. So communicable diseases, infectious diseases, waterborne diseases, mosquito-borne diseases are common.But successful EPI vaccination program in Bangladesh reduces communicable and infectious diseasesassociated with morbidity and mortality.

## V. LIMITATION

Severity and outcome of co-infections with COVID-19 could not have mentioned in our study. Virus isolation could not be possible in our settings. So, co-infection by other viruses along with coronavirus missed identifying.

## VI. CONCLUSION

This study showed thatCOVID-19 inBangladeshi children were found associated with co-infections. So, co-infection with COVID-19patients should be closely monitored and managed accordingly. Here, we have to mention that childhood disease pattern depends on different epidemiological and geographical location. So, the co-infection pattern with COVID-19 can vary. But our study concluded that co-infection is not very uncommon with COVID-19.

## RECOMMENDATION

Co-morbidities are a great concern with COVID-19. So, co-infection with COVID-19 might be a concern also. Epidemiological and geographical basis study is recommended.

### ➤ Conflict of interest

No conflict of interest.

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