

CLINICO-DEMOGRAPHIC CHARACTERISTICS AND OUTCOMES OF SUSPECTED AND CONFIRMED COVID-19 CASES ADMITTED IN DEPARTMENT OF PEDIATRICS, CHITTAGONG MEDICAL COLLEGE HOSPITAL

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Abstract

Background: Coronavirus Disease 2019 (COVID-19) affects mainly adult with serious devastating effect in some cases. Most reported COVID-19 in children is asymptomatic or mild. Less is known about severe COVID-19 in children requiring hospitalization, especially from Bangladesh. This study was aimed to describe the clinical presentations, diagnostic findings and outcome of suspected and confirmed pediatric COVID-19 patients admitted at a tertiary care facility in Chattogram district of Bangladesh, by analyzing the hospital records.

Materials and methods: This retrospective study was conducted in Chittagong Medical College Hospital. Medical records of consecutive 48 admitted patients in the Isolation Unit of Department of Pediatrics till October 15, 2020 were reviewed. Both suspected and confirmed cases were included. Data regarding age, sex, symptoms, signs, laboratory results, in hospital mortality, duration of hospital stay, need for ICU supports were noted.

Results: Of the 48 children, 64.6% were male. Overall median (IQR) age was 2.25 years (11 months-8.97 years) and 58.3% were in the age group of upto 5 years. 12.5% had comorbidity in the form of immuno suppressed state (10.4%), congenital heart disease (6.3%) and chronic kidney diseases (4.2%). Most common clinical features were fever (83.3%) cough (79.2%) breathing difficulty (56.3%) abdominal pain (18.8) vomiting (8.3%) and diarrhoea (6.3%). Chest X-ray findings were patchy opacity (20.8%) unilateral or bilateral consolidation (50.0%). RT-PCR could be done for 33 (68.8%) cases and among them the

test was positive in only 5 (15.2%). Overall 7 (14.7%) cases expired and among them 5(71.4%) children of minor age group upto 5 years of age and 2 (2/5, 40%) of them were confirmed cases of COVID-19.

Conclusions : In this small series of retrospective study revealed high mortality rate of children hospitalized with COVID-19. So they are at risk for severe COVID-19 which was underestimated in general.

Key words: COVID-19; Children; Chattogram.

Introduction

Coronavirus Disease-19 (COVID-19) is an acute respiratory viral infection related to Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2).¹ The first reports of novel COVID-19 noted the infrequency of disease in children with one of the earliest studies including only 9 children under 14 years of age among 1011 total patients (0.89%).^{2,3} Since then, multiple reports have described children affected by COVID-19 with varying degrees of severity.⁴⁻⁶

At this time, it appears that children are infected equally like adults, but less likely to develop severe disease.^{7,8} American academy of pediatrics has documented 7.6% of affected COVID-19 patients are children. Out of which 0.7 to 2% are hospitalized and mortality is only 0 to 0.2%.⁹ Studies indicate children have higher viral load and can be a prime source in transmission of disease among the households.¹⁰ American academy of pediatrics data suggest children with severe COVID-19 usually have underlying medical condition which is a similar pattern in adults. Most common comorbidities seen are obesity, diabetes and neurological conditions.⁸ Rarely children may present with a severe illness due to COVID-19 Multisystem inflammatory syndrome in children.¹¹ Overall it is considered that children with COVID-19 disease have excellent prognosis.¹²

Recently meta analyses has been published focusing the epidemiological and clinical aspects of pediatric COVID-19.^{13,14} It is to be noted that, these

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analyses did not include any cases series from Bangladesh, highlighting the paucity of published data from Bangladesh. Facing this unknown and emerging pathogen, we have set out to describe the clinical presentation, diagnostic findings and outcome of a cohort of pediatric patients with suspected COVID-19 disease admitted in Chittagong Medical College Hospital (CMCH) a tertiary care facility in Chattogram district, Bangladesh. Updated local evidence will be expected to help the clinician in their decision making process during the management of COVID-19 pediatric cases and help to make a revised guideline for policy makers for children.

Materials and methods

This was a retrospective review of patients age 12 years and below admitted at the isolation unit of Department of Pediatrics, CMCH between April 15 and October 15, 2020 with suspected and laboratory confirmed COVID-19. The patients with any one of the criteria in the epidemiological history and any two of the criteria in clinical manifestations were defined as suspected case. Clinical manifestations are i) Fever, fatigue, dry cough ii) Chest imaging findings iii) Decreased lymphocyte count iv) No other pathogens are detected which can fully explain in the clinical manifestations. Positive cases where nasal and throat swab samples tested positive for SARS-CoV-2 nucleic acid using RT-PCR were labeled as positive cases. Cases left hospital against medical advice were excluded from the review. Case definition and severity categorization was done in accordance with the Management Guideline for Pediatric COVID-19, Bangladesh Pediatric Association (BPA).¹⁵ Data were collected through semi structured case record form and check list. We collected demographic data (Age, sex), clinical data (Symptoms on admission, comorbidities, and some laboratory parameters) and outcome (Improved and discharged or died during hospital stay).

Statistical analyses were performed with Statistical Package for the Social Sciences version 23.0 for Windows. Patients were categorized according to their age in three groups. Categorical variables were summarized as frequencies and percentages. Continuous data were expressed as median and Interquartile Range (IQR). Fisher's exact test was used to compare categorical variables and Mann

Whitney U tests were used to compare the median values between survived and deceased cases. $p < 0.05$ was considered as statistical significance.

The study was approved by the Ethical Review Committee of Chittagong Medical College (Memo No: CMC/PG/2020/119 Date: 03/11/2020). The written informed consent was waived as the researchers analyzed the data anonymously and no potential risk to the patients was anticipated. The anonymity of patients and confidentiality of the secondary data was ensured by the researchers and institutions involved in the study. In addition, in this study no individual data is being presented.

Results

Of 48 admitted cases in the isolation ward overall median (IQR) age was 2.25 years (11 months-8.97 years). Majority of the cases were in the age group of 6-12 years (41.7%) followed by 31.2% in the age group of 1-5 years and 27.1% under one year. Most of the admitted cases were male (64.6%) and came from rural are (70.8%) (Table I).

Table I: Demographics characteristics of the patients stratified by age group.

Characteristics	Total (n=48)	<1 years (n=13)	1-5 years (n=15)	6-12 years (n=20)
Percentage of total (%)	100.0	27.1	31.2	41.7
Median age (IQR)	2.25 years (11 months to 8.97 years)			
Sex				
Male	31 (64.6)	12 (92.3)	10 (66.7)	9 (45.0)
Female	17 (36.4)	1 (7.7)	5 (33.3)	11 (55.0)
Residence				
Rural	34 (70.8)	10 (76.9)	13 (86.7)	11 (55.0)
Urban	14 (29.2)	3 (23.1)	2 (13.3)	9 (45.0)

Data expressed in number (Percentages) if not otherwise mentioned.

In this study, 5 (10.4%) cases had immunosuppressed state (On steroid/ is due to NS) 3 (6.3%) had congenital heart diseases and 2 (4.2%) had chronic kidney diseases. Most common presenting complain was fever (87.5%) followed by cough (79.2%) breathing difficulty (56.3%). Diarrhea, vomiting and abdominal pain were noticed less frequently. It is to be noted that fever, cough and breathing difficulty were most prevalent among children aged <1 year. Along with fever and cough, gastrointestinal symptoms including vomiting, abdominal pain, and diarrhea were reported by older children (Table II).

Table 11: Clinical characteristics of the patients stratified by age group.

Characteristics	Total (n=48)	<1 years (n=13)	1-5 years (n=15)	6-12 years (n=20)
Comorbidities				
Immunosuppressed	5 (10.4)	0 (0)	2 (13.3)	3 (15.0)
CHD*	3 (6.3)	1 (7.7)	1 (6.7)	1 (5.0)
CKD*	2 (4.2)	0 (0)	0 (0)	2 (10.0)
Symptoms and signs				
Fever	42 (87.5)	11 (84.6)	13 (86.7)	18 (90.0)
Cough	38 (79.2)	10 (76.9)	12 (80.0)	16 (85.0)
Breathing difficulty	27 (56.3)	8 (61.5)	7 (46.7)	12 (60.0)
Diarrhea	3 (6.3)	0 (0)	1 (6.7)	2 (10.0)
Vomiting	4 (8.3)	1 (7.7)	1 (6.7)	2 (10.0)
Abdominal pain	9 (18.8)	0 (0)	4 (26.7)	5 (25.0)

Data expressed in number (Percentages). *CHD: Congenital Heart Disease, CKD: Chronic Kidney Disease.

Out of 48 included cases, RT-PCR test results were available in 32 (66.7%) cases, and the test was positive in 5 (10.4%) cases. Chest X-ray findings revealed bilateral consolidation in 27.1% and unilateral consolidation in 22.9% cases. Age wise distribution of the laboratory results are shown in Table III.

Table III: Laboratory results of the patients stratified by age group.

Characteristics	Total (n=48)	<1 years (n=13)	1-5 years (n=15)	6-12 years (n=20)
RT-PCR test				
Negative	27 (56.3)	5 (38.5)	8 (53.3)	14 (70.0)
Positive	5 (10.4)	3 (23.1)	0 (0)	2 (10.0)
Not done	16 (33.3)	5 (38.5)	7 (46.7)	4 (20.0)
Laboratory test				
Hemoglobin (g/dL)	9.8 (8.3-11.6)	9.3 (8.0-9.9)	11.0 (9.8-12.1)	9.2 (8.0-12.6)
WBC (k/uL)	13.8 (7.9-22.7)	12.4 (7.8-25.1)	13.1 (9.4-21.3)	13.8 (10.0-23.0)
Neutrophil (%)	76 (52-80)	56 (51-66)	61 (45-85)	78 (76-84)
Lymphocyte (%)	20 (12-36)	35 (51-65)	26 (10-43)	17 (10-19)
NLR	3.9 (1.5-6.9)	1.8 (1.4-2.4)	2.3 (1.1-8.1)	4.7 (4.0-8.1)
Platelets (k/uL)	310 (228-425)	303 (225-482)	340 (252-407)	340 (154-440)
ESR, mm 1 st hr	27 (16-52)	17 (7-43)	21 (11-30)	51 (25-71)
CRP (mg/dL)	15.4 (6.0-90.5)	13.3 (3.1-80.2)	12.8 (7.4-50.3)	76.8 (6.0-159.0)
D-dimer (µg/ml)*	10.1 (2.2-11.9)	NA	1.4 (0.6-1.5)	6.4 (1.7-10.7)
Ferritin (ng/ml)**	304 (151-2454)	NA	75 (38-80)	523 (210-4183)
Chest X-ray				
No consolidation	14 (29.2)	1 (7.7)	5 (33.3)	8 (40.0)
Patchy opacity	10 (20.8)	1 (7.7)	2 (13.3)	7 (35.0)
Unilateral consolidation	11 (22.9)	4 (30.8)	5 (33.3)	2 (10.0)
Bilateral consolidation	13 (27.1)	7 (53.8)	3 (20.0)	3 (15.0)

Data expressed in number (Percentages) or median (IQR), *Data were available for 10 patients, **Data were available for 13 patients, NA: Not Available.

All of the included patients received supportive treatment with parenteral antibiotic. Oxygen was given in 66.7% of cases through nasal cannula. IV steroid was given mostly with patients with associated bronchial asthma. No patient got antiviral treatment. Median hospital stay was 7 days (IQR: 5-8 days). 7 (14.6%) patients expired and 2 (4.2%) cases were transferred to red zone of hospital for supportive care like hemodialysis (Table IV).

Table IV: Intervention and outcome of the patients stratified by age group.

Characteristics	Total (n=48)	<1 years (n=13)	1-5 years (n=15)	6-12 years (n=20)
Interventions				
IV steroid	7 (14.6)	1 (7.7)	0 (0)	6 (30.0)
Oxygen	32 (66.7)	9 (69.2)	12 (80.0)	11 (55.0)
Antibiotic	48 (100)	13 (100)	15 (100)	20 (100)
Outcome				
Hospital stay, days	7 (5-8)	7 (5-12)	7 (6-7)	7 (5-10)
Referred to red zone	2(4.2)	0 (0)	1(6.7)	1 (5.0)
Discharge with advice	39 (81.3)	10 (76.9)	12 (80)	17 (85)
Death in hospital	7 (14.6)	3 (23.1)	2 (13.3)	2 (10.0)

Data expressed in number (Percentages) or median (IQR).

Table V shows that, in hospital deceased cases were comparatively younger than the survived cases without any statistical significance ($p=0.456$). Similar non significant higher trend of mortality were observed among male, patients with comorbidity, having positive RT-PCR test, bilateral consolidation on chest X-ray and higher NLR ratio compared to their counterparts.

Table V: Comparison of demographic and clinical characteristics in survived and deceased patients

Variables	Survived (n=41)	Deceased (n=7)	p value
Age, years	3.0 (1.0-9.0)	1.3 (0.6-10.0)	0.456*
Sex			
Male	25 (61.0)	6 (85.7)	0.396 [†]
Any comorbidity			
Present	8 (19.5)	2 (28.6)	0.196 [†]
RT-PCR			
Positive	3 (7.3)	2 (28.6)	0.143 [†]
Negative	23 (56.1)	4 (57.1)	0.879 [†]
Not done	15 (36.6)	1 (14.29)	<0.001 [†]
Chest X-ray			
No consolidation	13 (31.7)	1 (14.3)	0.657 [†]
Patchy opacity	9 (22.0)	1 (14.3)	0.712 [†]
Unilateral consolidation	10 (24.4)	1 (14.3)	0.814 [†]
Bilateral consolidation	9 (22.0)	4 (57.1)	0.075 [†]
Blood investigations			
Neutrophil (%)	72 (51-81)	80 (65-87)	0.403*
Lymphocyte (%)	22 (12-41)	17 (10-29)	0.256*
NLR	3.32 (1.13-6.62)	4.71 (2.24-8.71)	0.324*

Data expressed in number (Percentages) or median (IQR). *p values were obtained from Mann Whitney U test, †p values were obtained from Fisher's exact test. NLR: Neutrophil to Lymphocyte Ratio.

Discussion

In this study, we have analyzed 48 pediatric suspected COVID-19 cases hospitalized in isolation ward in Department of Pediatrics of CMCH, a tertiary care hospital of Chattogram. During this short period of review the cumulative COVID-19 associated hospitalization rate among children is low compared with that among adults in this hospital which is similar to the COVID related admission profile of other centers.^{6,7} Though number of admission was low our findings indicate that, children can develop severe COVID-19 illness and fatality rate is quite high as 2 out of 5 confirmed cases (40%) and 5 out of 43 clinically suspected COVID-19 cases (11.6%) found expired in this series.

Out of 48 admitted cases overall median (IQR) age was 2.25 years (11 months-8.97 years). Majority of the cases are of upto 5 years age group (58.3%). Kim et al from USA reported that, the cumulative COVID-19 associated hospitalization rate was highest among children aged <2 years and rates were substantially lower in children aged 2-4 years and 5-17 years.¹⁹ In our study most of the admitted cases were male (64.6%) and came from rural area (70.8%). So it indicates COVID is no more an urban havoc only spreads to the rural area as well.

This study suggests that the presence of underlying comorbidities place children at higher risk for COVID-19 associated hospitalization. Because more than one fifth of children in this analysis had one or more underlying medical conditions in the form of immuno-suppression from renal conditions, CKD or congenital heart diseases. Western countries reported obesity was the most prevalent medical condition which was associated with increased need for hospitalization and adverse outcome in children.^{8,12}

Similar to other reports present study demonstrated that, reported signs and symptoms upon hospital admission differed by age: fever, cough and breathing difficulty were most prevalent among children aged <1 year. Along with fever and cough,

gastrointestinal symptoms including vomiting, abdominal pain or diarrhea were reported by older children.^{14,16,18}

As an outcome 7 (14.6%) out of 48 children died in hospital. Three were infants having severe pneumonia at admission with pre-existing respiratory compromise, two were aged between 9-12 years also had associated comorbidities. The hospital deceased cases were comparatively younger than the survived cases. Similar higher trend of mortality was observed among male children, patients with comorbidity, having positive RT-PCR test, bilateral consolidation on chest X-ray and higher NLR ratio compared to their counterparts. The mortality rate was comparatively higher from other report from around our country and western countries. Kim et al reported that, among 208 children with a discharge disposition only one child (0.5%) with multiple underlying conditions died during hospitalization.¹⁹ Rexlin et al from India reported that of the 137 hospitalized children with COVID-19 the entire group improved and discharge.²⁰ Similarly, preliminary clinical data from Italy also demonstrated no mortality in pediatric COVID-19 positive hospitalized cases. The data presented in this study is an initiative to defined the clinical spectrum of disease in children and the contributions of demographic and clinical parameters to hospitalizations and outcomes correlated with these parameters, as well as to organize the hospital management system for suspected and confirmed COVID-19 pediatric cases. So, the higher case fatality in our center needs to be evaluated in further studies.

Limitations

The main limitation of the study was its retrospective design. Moreover, the study included limited number of children from a single tertiary care public hospital which might limit its ability to generalize the results. Furthermore, detail clinical and laboratory parameters for entire group was not available.

Conclusions

The study demonstrated that, children with COVID-19 can have severe illness and mortality is much higher in confirmed COVID patients and not less in suspected cases as well. Fatality rate is more in under 5 children with similar

to adult population it is higher in patients with comorbidities. Similar to the general population, children should be encouraged to wash their hands often and continue social distancing and children aged ≥ 2 years should wear a mask when around persons outside of their families to reduce the risk for COVID-19 and transmission to others. Ongoing monitoring of hospitalization rates, clinical characteristics, ICU admission, and outcomes in the pediatric population is important to further characterize the morbidity and mortality of COVID-19 in children.

Recommendations

Continued study is necessary for further characterization of the demographics, clinical features, in-hospital interventions and overall correlation with outcomes of COVID-19 among children. So the study recommends extended studies in detail are needed for thorough comprehensive conclusions regarding pediatric COVID-19 disease in Bangladeshi children.

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Contribution of authors

AKD: Conception, designing, data analysis, drafting & final approval.

FUA: Conception, designing, data analysis, drafting & final approval.

MR: Data analysis, drafting & final approval.

ZC: Data collection, critical revision & final approval.

MD: Data collection, drafting & final approval.

GMTA: Data analysis, drafting & final approval.

MKD: Data analysis, interpretation of data, critical revision & final approval.

RS: Design, critical revision & final approval.

Disclosure

All the authors declared no competing interest.

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