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Presenting Clinico-laboratory Characteristics, Hospital Course and Outcomes of Admitted Children with COVID19 in a Tertiary Pediatric Hospital of Nepal

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ABSTRACT

Background: COVID-19 pandemic hit all age group with different presentations and outcome. This study aimed at exploring the clinical characteristics, investigational findings, hospital outcome along with 90 days follow up of COVID-19 infection in children.

Methods: This was longitudinal descriptive study among hospital admitted children with COVID-19 RT-PCR positive during first wave of Pandemic with 90 days telephonic follow up. Demographic and clinical characteristics, comorbidities, SPO2, investigations, need of oxygen , PICU admission, need of ventilator, outcome (improved and discharged, death) and duration of hospital stay were recorded and 90 days telephonic follow up was performed for any illness and hospital admission.

Results: Out of 65 children admitted, male 44 (67.7%) and female 21 (32.3%), median age was 23 months (IQR 6 days -14 years) with 52(80.0%) without any comorbid conditions.The common signs were Fever 40(61.5%) vomiting 15 (23.1%) and Cough 11(16.9%).Thirteen (20.0%) children has platelets count less than 150000 and 16(24.6%) had C - reactive protein Positive .Mean duration of hospital stay 8 days (Range 1 -44 days), 20(30.8%) needed oxygen , 20(30.8%) needed Pediatric intensive care unit (PICU)admission and 6 (9.2%), needed ventilator. Forty seven (72.3%) recovered and discharged with death of 6.2% (n=4). Fifty six children (75.4%) has not experienced any problem after COVID -19 and only 2 children needed hospital admission in 90 days telephone follow up.

Conclusions: In the first wave of the pandemic, Respiratory and Gastrointestinal symptoms were common presentation with few Severe and critical cases. Majority had good outcome. Majority has no other related illness till 90 days after discharge.

Keywords: Children, COVID-19, follow up; hospital outcome; sign symptoms

INTRODUCTION

The corona virus disease 19 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus-2 has spread from a local outbreak in China to become a global pandemic within months in 2019.[1]

Nepal reported the first case of COVID-19 in January 2020. Although the pandemic evolved slowly in Nepal, there has been surge to 27118 positive cases with 2029 death till end of 2020 with Children and adolescents under 20 years of age constituted 8% of all reported patients.[2] Surprisingly the disease was benign among children and newborns at the early part of pandemic.[3] The clinical presentation and outcomes of patients with COVID-19 have been variable in different countries.[4,5] There were several weeks lag between peak of COVID-19 and MIS-C.[6] The aim of our study was to find out the presenting clinic-laboratory characteristics, hospital course and outcomes in a cohort of 65 children admitted with COVID 19 infection in tertiary care pediatric hospital in Kathmandu, Nepal with 90 days follow up.

METHODS

We conducted longitudinal retrospective study in Kanti Children's Hospital Kathmandu Nepal among all admitted children and newborns between the 28 Jun 2020 to 24 Jan 2021. All Children from birth to 14 years who were admitted and tested COVID 19 positive by RT-PCR were included in the study. Approval from Institutional

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Ethics Committee was obtained (Regd. no 598/2020) and informed verbal consent from parents was taken during the 90 days telephonic follow up. The total RT-PCR tests performed during that period were 2188. Demographic features , initial presenting symptoms, examination findings on admission and investigations including renal function test (RFT), total leucocyte count, total platelets count, C-Reactive Protein(CRP) were collected. Data on oxygen used, Pediatric Intensive Care Unit (PICU) admission, need of ventilator, co-morbidities, short term outcome (improved, discharged, LAMA (leave without medical Advise) discharge on request (DOR) and death) and duration of hospital stay were recorded from hospital records and filled up in the predesigned proforma. Leukocytosis and leucopenia were defined as total leukocyte count more than 11,000/cumm^3 and less than 4,000/cumm^3 respectively. Thrombocytopenia was defined as platelet count less than 1,50,000/ cumm^3 . Hyponatremia was defined as serum sodium less than 135 mEq/L. Normal Limit of Urea was defined as Urea level 15-45 mg/dl.CRP was defined positive when increased than 6mg/dl. Ninety days telephonic follow up was taken by the researcher themselves and inquiry about the health problems in first, second and third months, need of hospital admission and incidence of adverse outcome (death, ICU admission, Symptoms related to MIS-C) was done. Statistical analysis was done using SSPS software version 20. Data were expressed in terms of frequency and percentage. Mean, median and interquartile range (IQR) was calculated for various parameters.

RESULTS

A total 65 children were admitted during the study with COVID-19 positive. The median age was 23 months with IQR (6 days -14 years) having unequal (males are infected double than female, 44 (67.7%) Vs 21 (32.3%) sex distribution. More than three fourth of the children (n=52, 80%) have not any comorbidity before infecting with Corona Virus. the commonest sign and symptoms were Fever 61.5% (n=40) ,vomiting 15 (23.1%) and Cough 16.9% (n=11).

Most admitted children has laboratory finding with in normal limit. Thirteen (20.0%) children has platelets count less than 150000/ cumm^3 and 16(24.6%) were CRP Positive.

Table 1. Epidemiological and clinical profile of children with covid-19 (n=65).

	Variables	frequency	Percentage
Median age of child =23Months		Younger age = 6 days Elder age= 14 years old	
Gender	Male	44	67.7
	Female	21	32.3
Comorbid condition	No	52	80
	yes	13	20
Presenting symptoms	Fever	40	61.5
	Vomiting	15	23.1
	Pain abdomen	12	18.5
	Cough	11	16.9
	Shortness of breadth	9	13.8
	abnormal body movements	7	10.7
	Loose stool	6	9.2
	Jaundice	4	6.1
	Bleeding	2	3.1
	Not feeding well	4	6.1
	Excessive crying	4	6.1
	Headache	4	6.1
	Swelling of body	3	4.6
	Irritable	3	4.6
	Sore throat	2	3.1
	Burn	2	3.2
	SCR	1	1.5
Clinical presentation	Irritable	8	12.3
	Lethargy	2	3.0
	Hepatomegaly	8	12.3
	Tachypnea	1	1.5
	Tenderness in abdomen	5	7.6
	Edema	4	6.1
	splenomegaly	4	6.1
SPO2	Less than 92	20	30.8
	Equal and more than 92	29	44.6
	Not mentioned	16	24.6

Table 2. Laboratory investigation of children with COVID-19 infection.

	variables	Frequency (n)	Percentage (%)
Blood count	WBC less than 4000/cumm	5	7.7
	WBC 4000/ cumm to 11000/ cumm	21	32.3
	WBC greater than 11000/ cumm	28	43.1
	Not mentioned	11	16.9
Hemoglobin	Less than 10gm%	12	18.5
	Greater than 10 10gm%	39	60.0
	Not mentioned	14	21.5
Platelets	Less than 150000 cumm^3	13	20.0
	Greater & equal 150000 cumm^3	43	66.1
	Not mentioned	9	13.9
C reactive protein	Positive	16	24.6
	Negative	18	27.7
	Not mentioned	31	47.7
Renal function test			
Urea	Urea 15-45 mg/ dl	42	64.6
	Urea less than 15 mg/dl	2	3.1
	Urea greater than 45 mg/dl	7	10.8
	Not mentioned	11	16.9
Creatinine	Creatinine in range	51	78.5
	Creatinine out of range	3	4.6
	Not mentioned	11	16.9
Sodium	Sodium in 135-145mEq/L	35	53.8
	Sodium < 135mEq/L	6	9.3
	Sodium > 145mEq/L	10	15.4
	Not mentioned	14	21.5
Potassium	Potassium3.5-5.5mEq/L	40	61.5
	Potassium < 3.5mEq/L	5	7.7
	Potassium> 5.5mEq/L	6	9.2
	Not mentioned	14	21.6

The mean duration of hospital stay was 8 days with range of 1 to 44 days. Approximately one third 30.8% (n=20) needed oxygen and 30.8% (n=20) needed Paediatric Intensive care unit (PICU) management along with 9.2% (n=6) needed ventilator. Most of the children 72.3% (n=47) recovered and discharged while there was mortality of 6.2% (n=4).

Table 3. Management and outcome of children with COVID-19 (n=65).

Variables		Frequency (n)	Percentage (%)
oxygen	Needed	20	30.8
	Not needed	39	60
	Not mentioned	6	9.2
ICU	Needed	20	30.8
	Not needed	45	69.2
Ventilator	Needed	6	9.2
	Not needed	59	90.8
Average duration of stay		8 (Range1to44)days	
Outcome	Dead	4	6.2
	Recovered	47	72.3
	Referred out	3	4.6
	LAMA& DOR	11	16.9

We contacted the guardians of all the children who were discharged, leave against medical advice(LAMA) or transfer out after 90 days and inquired about the illness, need of hospital admission and major events within 90 days after leaving the hospital. Forty six children (75.4%) have not experienced any problem after COVID -19 while 15 (24.4%) children had some problems. Among those 15 children only 2 children needed hospital admission.

Table 4. Ninety days follow up of children with COVID-19 infection (n=61).

Post COVID follow up for 90 days			
	No problem	46	75.4
	Problem within 1 month	9	14.7
	Problem in second month	3	4.9
	Problem in third month	2	3.2
	Dead after discharge	1	1.8
Need of hospital admission (n=15)			
	Yes	2	13.3
	No	13	86.6

DISCUSSION

COVID-19 is a global health crisis. Although the pandemic evolved slowly in Nepal initially, it was surged during the period of July 2020 to Dec 2020. This study highlighted the clinical characteristics and outcome of 65 children admitted with COVID-19 in Kanti Children's Hospital along with 90 days follow up. As this study enrolled children who were admitted to the hospital, the data

likely represents individuals from the moderate to severe end of the disease spectrum. There is scarce of publication form hospital form Nepal about the data in relation to COVID-19 in the paediatric population. But there are few studies seen in India and other neighboring countries.[7-9] As it was the initial phase of the pandemic with extended lockdown and closure of schools and outdoor activities, the primary source of infection for children was supposed to be household contacts as described in the Indian study.[8]

The median age of hospitalized paediatric population was 54 months with a range of 6 days to 14 years. This is close to the value of 6 years (median age) in a study conducted in Pune Maharashtra India (N=50) by Sarangi et al [7] and 7 years (median age) in an another study by Dong et al conducted in China.[4] Other study show the median age of 3 year.[9] This difference might be due to the difference in inclusion criteria and the number of children studies.. Our study showed male outnumbered the female (67%Vs 32%) which is contradictory to the other study of neighboring countries which found almost equal male, female distribution.[4,7,9,10]

The average duration of hospital admission was noted as eight days with a range of 1 to 44 days. In an Indian study the median length of hospital stay was 15 (11-20) days.[11] During that period initially admitted children were discharged after RT PCR test comes negative but latter hospital changed the policy of discharging the children after getting medically better irrespective of the RT PCR result.

The commonest symptoms observed were respiratory (Fever 61.5%, cough 16.9%, shortness of breath 13.1%), followed by gastrointestinal (vomiting 23.1%, pain abdomen 18.5% , loose stool 9.2%). Similar findings were observed by Karthi Nallasamy et.al in India[9], observational study across the world have reported similar frequencies of symptoms.[7,10] Sore throat, bleeding, abnormal body movements, not feeding well and irritability were other features. A systematic review of 27 studies showed fever to be present in half (41%–58%) followed by cough (39%–51%) and rapid breathing (6%–17%). Gastrointestinal symptoms, particularly diarrhea were noted in 6%–13% children.[11]

Oxygen saturation (SPo2) is one of the important parameters which is widely used in COVID-19 disease course. Twenty (40.8%) childrenhas oxygensaturation less than 90%while coming to hospital.

We observed 20 % of admitted COVID -19 children were with comorbidities. The common comorbidities in our admitted children were heart disease(n=2), Acute lymphatic leukemia(ALL)(n=2), Tetralogy of fallot(TOF), Acute Encephalitis Syndrome(AES), Juvenile Idiopathic Arthritis (JIA), Rheumatic Heart Disease(RHD), Atrio-ventricular mal formation and Down's syndrome. This finding was different from the study reported by Bose SS etal in India[4] which showed that malignancy was the commonest followed by renal, Congenital Healt Disease (CHD) and Central Nervous System (CNS) related comorbidities. Harman et al found that 8 (41%) COVID-19 positive children admitted were with comorbidities in King's College Hospital, London, UK, between February 25, 2020 and April 28, 2020 and they were mostly Cerebral Palsy, and Prematurity with single case of Wilson's disease and dilated cardiomyopathy.[12] In another multi-centric study at North America by Shekerdemian et al found that 50% of the admitted COVID 19 positive children at several PICUs of city had comorbidities.[13]

We observed only around 80% of the admitted COVID-19 children had undergone investigations and they were not uniform for baseline investigation. This shows that investigations were performed as per indications. Most asymptomatic cases had not undergone investigations. Similar type of strategy were taken by other centers in India during this first wave of pandemic.[11]Only five out of 55 had leukopenia, 13 out of 46 had thrombocytopenia. Qualitative C reactive protein was positive in 16 out of 34.There was no significant Renal function derangement seen.

Regarding the management, supplemental oxygen was needed for 30% of admitted cases and 30.8% child were managed in the PICU but only 9.2% children required ventilator support. The percentages of PICU admission varied from places to places like 20% in northern india (karthi) 13% in puneindia[3]

The pediatric outcome of COVID-19 is generally good. This study showed that 70.7% children recovered with out any problems and 6.2% died whereas 20% left without medical advice from Kanti Hospital . But they were traced out during the telephone follow up

Global knowledge of COVID-19 epidemiology, clinical characteristics and management has continued to evolve since the onset of the pandemic. Children have been noted to have relatively lower rates of severe illness and low mortality; however, they have been impacted by MIS-C.[14] We performed the telephone follow up after 90 days ofdischarge. Almost three fourth of children reported having no problem after recovering from COVID-19. Only one of seven children had some problem in the first month, similarly three in second month and

two in third month. Out of 15 children who had some problem within three month after COVID-19 only two needed hospital admission. One was admitted for two days for fever and another was admitted for Acute gastro intestinal symptoms but both improved. There was one death reported within 90 days follow up. The death was on home and the cause was unknown.

This study had some limitations. It was conducted in only one center and the admission and discharge criteria were not well established during that pandemic period. This was retrospective chart review with telephone follow up. Some essential points might have been missed.

CONCLUSIONS

In the first wave of the pandemic, most of the children presented asymptomatically.Out of the symptoms presented, Respiratory and Gastrointestinal symptoms were more common. Severe and critical illness were few. Majority had good outcome. Majority has no other problems attributable to COVID 19 till 90 days follow up.

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