

Research Article

EPIDEMIOLOGICAL CHARACTERISTICS, CLINICAL SPECTRUM AND OUTCOMES OF COVID-19 IN COHORT OF 50 PATIENTS OF PEDIATRIC AGE GROUP HOSPITALIZED IN A TERTIARY CARE HOSPITAL: A RETROSPECTIVE STUDY.

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ABSTRACT

Introduction: Covid-19 was first reported in China and rapidly spread across most parts of the world in short span of time. As the cases began to increase, data progressively emerged, giving new insights to this disease. The pediatric population is also at risk, however data suggests that covid-19 infection is less common in pediatric population. Despite this it can present with severe disease and fatal outcomes in children, particularly in infants under one year of age.

Objective: The aim of this study was to determine epidemiological characteristics, clinical presentations and outcomes in children hospitalized with Covid-19

Material and Methods: This study was conducted in the department of Pediatrics, Benazir Bhutto Hospital Rawalpindi which is affiliated with Rawalpindi Medical University. During the study period from March 1st 2020 to 30th Oct 2020, 50 patients were hospitalized with Covid-19 related illness. We obtained medical records including epidemiology, clinical presentation, diagnostic procedures and outcomes. Data was entered and analyzed through SPSS. The study was done after approval by the ethical committee of University.

Results: Thirty-one out of 50 patients (62%) were less than one year old with slight male preponderance 56 %. Positive contact with known Covid-19 patients was present in 32.7% of cases. 15(30%) patients had co-morbid conditions. PCR was positive in 47(94%) of patients. 3 (6%) patients were PCR negative and were diagnosed clinically, with the help of CT scan findings. Fever (83.7%) and cough (74 %) were most common symptoms. Loose motions were seen in 16% and poor intake/anorexia in 36%. 13(26%) patients died most of the deaths 8(61.5%) were under one year of age. The deaths were mainly due to complications like Acute respiratory distress syndrome (ARDS), respiratory failure and disseminated intra vascular coagulation (DIC), and septic shock.

Keywords: Covid 19, cough, fever, infants, pneumonia, poor intake, mortality

Conclusion: Children infected with Covid-19 who were below one year of age are at increased risk of serious disease and mortality.

INTRODUCTION

For Coronavirus disease 2019 (COVID-19) is caused by a corona virus which is a double stranded RNA virus belonging to family of Coronaviridae.^{1, 2, 3} The previous two epidemics related to this family of viruses were SARS AND MERS which emerged in 2003 and 2013 respectively. SARS was an airborne virus spread through respiratory droplets like influenza. It can also spread through surfaces which the infected person has touched.^{4, 3} It primarily affected adult and aged population 25-70 years with a case fatality rate of around 3%.⁴ The Covid-19 infections were first reported in Wuhan province of China in late 2019 and the initial cases were linked with Huanan seafood wholesale market. These patients presented with pneumonia of unknown origin.⁵ The disease spread rapidly after its initial reports in China and by April 2020, more than 210 countries around the world had seen the cases. WHO reported over one million confirmed cases and above 50 thousands death across the globe

in April 2020.⁶ The World Health Organization declared Covid-19 a public health emergency of international concern (PHEIC) with highest level of alarm, and declared it a global pandemic.⁷

The Covid-19 is relatively uncommon in the pediatric population. Data from China's Disease and Control Centre shows that there were 416 pediatric cases (i.e. 1%) under 10 years of age out of 72314 cases.⁸ An Italian survey shows pediatric patients to account for 1.8%.⁹ A U.K based study showed 18.1% cases below 1 year of age.¹⁰ In another study infants less than 3 months accounted for 18.8% of the cases.¹¹ Although the disease is not common in pediatric population the disease however is well reported in all pediatric age groups.¹² Overall severe disease and mortality in pediatrics is low.¹³ Severe disease has also been reported in infants under 1 year of age.¹⁴

Frequency of Covid-19 cases and hospitalization has been found to be high in infants compared with the rest of paediatric age group.¹⁵ Covid-19 cases have been reported from newborns to 14 years of age with 70% cases below 3 years of age.¹²

The clinical spectrum in children range from mild to severe disease. In children, many of the patients are asymptomatic and can carry out routine daily life activities without showing overt symptoms.⁸ Some patients also reported with fits.¹³ Gastrointestinal symptoms are also reported in children which include vomiting and diarrhea but this was reported in less than 10 percent of the pediatric cases.¹⁰

The aim of the study was to determine epidemiological characteristics, clinical spectrum and outcomes of Covid-19 in children presenting in Benazir Bhutto Hospital (BBH) Rawalpindi. The study is important as there is a wide variation of disease presentation and severity from region to region in the world. The study will give insight to the Covid-19 cases amongst children in Pakistan.

METHODS

During the epidemic, BBH Rawalpindi which is affiliated with Rawalpindi Medical University Rawalpindi played an important role in care of Covid-19 patients. The pediatric patients presenting with Covid-19 infection were managed with special arrangements made within the paediatric unit, with establishment of isolation wards, ICU and HDU. During the epidemic, patients with ages from new born to 12 years were admitted. These patients were managed as per protocols defined. Medical records of these patients were retrieved for this research. The criteria for selection of cases were patient with strong clinical suspicion of Covid-19. Only three patients turned out to be negative on PCR but were managed as Covid-19 as clinical assessment, laboratory and radiological findings were strongly suggestive of Covid-19. Patients with incomplete record were excluded from the analysis. A total of 50 patients who were hospitalized were included in the study. Ethical clearance was sought including permission from the Medical Superintendent for obtaining data. Data was collected on age, gender, clinical presentation, complications and outcomes of the disease.

RESULTS

The study included 50 patients of the pediatric age group. Majority of the hospitalized patients 31 (62%) were less than 1 year of age. Male patients were slightly more 28 (56%) while female patients were 22 (44%).

Table 1. Age and gender of the subjects

		Frequency	Percentage
Age	One year or less	31	62
	Above one year to 5 years	8	16
	Above five years	11	22
Gender	Male	28	56
	Female	22	44

Shapiro comorbid conditions were present in 15(30%) of the patients. Among comorbid conditions, 7 patients had congenital heart disease, 2 patients had measles, 2 patients had asthma, 2 patients had acute lymphoblastic lymphoma and one patient had meningitis.

None of the patients in our study has history of travel to the affected areas and countries. Contact history was seen in 16(32.7%) of the subjects. Implying community spread of the disease.

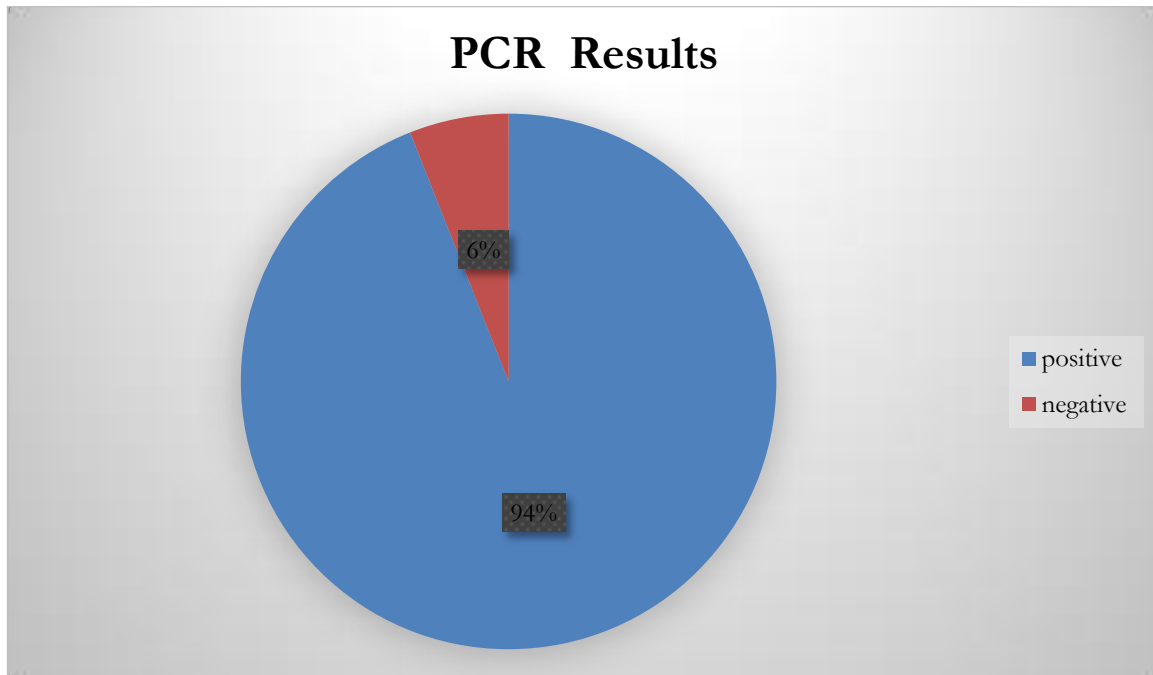
In our study majority of the children 41(83.7%) presented with fever, cough 37(74%) and shortness of breath 31(93.9%). Amongst intestinal symptoms loose motions were present in 8(16%) of the patients and poor oral intake/ anorexia was present in 18(36%) of the patients.

Table 2. Clinical symptoms observed in patients.

		Frequency	Percentage
Fever	Yes	41	83.7
	No	8	16.3
Runny nose(rhino rhea)	Yes	5	10.2
	No	44	89.8
Sore throat	Yes	5	10
	No	45	90
Cough	Yes	37	74
	No	13	26
Shortness breath	Yes	31	93.9
	No	19	6.1
Body ache	Yes	13	26
	No	37	74
Loose motion	Yes	8	16
	No	42	84
Poor intake/ anorexia	Yes	18	36
	No	32	64

In our study PCR was positive in 47(94%) of the patients. 3(6%) were PCR negative and were diagnosed clinically and with the help of CT scan findings.

Table 2. Clinical PCR Results.



X-RAY changes were present in 44(88%) of the patients. 34(68%) of the patients had bilateral infiltrates. Lobar consolidation was seen in 5(10%) of the patients. X-rays of 6(12%) of patients were normal.

Table 3. X-ray findings in study subjects

XRAY		Frequency	Percentage
Normal or no findings		06	12%
Diffuse infiltrates	Bilateral	34	68%
	Right middle	2	4%
	Right upper	1	2%
Consolidation		5	10%
Blunting of apices of lung fields		1	2%
Non-specific		1	2%

Complications developed in patients include congestive cardiac failure (CCF) 5(10%), Acute respiratory distress syndrome (ARDS) 5(10%), multi organ failure (MOF) 6(12.2%), septicaemia 15(30%), septic shock 10(20%), disseminated intravascular coagulation (DIC) 5(10%), respiratory failure 12(24%).

In our study 37(74%) patients showed complete recovery, while 13(26%) patients succumbed to their illness. Most of the mortality occurred in infants less than one year of age, accounting for 8 of the 13 deaths (61.5%). Four deaths were reported in children 1-5 years of age, while one 10 year old child died. All patients who died had developed complications including CCF, respiratory failure, septic shock, etc.

Table 4. Details of patients who died of Covid-19 complications in the study

Serial number	Age	Gender		Complication	Ventilatory support	Duration of treatment
1	2 days	Male		Septicemia/setic shock, DIC	yes	3 days
2	1 month	Female		Renal failure(RF)	yes	
3	3 month	Female		CCF, septicemia/setic shock reanal failure(RF)	yes	5 days
3	3 month	Male		ARDS, MOF, septicemia /septic shock, RF	yes	8 days
5	3 month	Male	CHD	CCF RF		7 days
6	4 months	Male	CHD, TGA	CCF, ARDS septicemia/setic shock,RF		1 day
7	5 months	Male		ARDS, septicemia/septic shock, DIC, RF	yes	3 days
8	5months	Female		RF	yes	9 days
9	1 year	Female		MOF, septicemia/setic shock, RF	no	One day
10	2 year	Male	measles	RF	yes	8 days
11	2.5 years	Female		ARDS, MOF, Septicemia/septic shock, RF	yes	12 days
12	3.5 years	Male		ARDS, MOF, DIC, RF	yes	13 days
13	10 years	Female		MOF, DIC, RF	no	3 days

DISCUSSION

Covid-19 in pediatric population has been under intense discussion as the disease became pandemic and spread across large parts of the world. It was thought that the children were less likely to get Covid-19 infections compared to adult. One reason was that children are less exposed to outside world. However new data suggests that the pediatric population is also vulnerable to Covid-19 just like the adult population and serious disease has been reported.^{14, 15} Although it is found that more than 90 percent of the infections in children are mild or asymptomatic, severe disease is not uncommon in children and infants with those less than 1 year of age being particularly at risk.^{16 16}

In our study 31(66%) of the patients were age less than one year. A study done on Covid-19 hospitalized patients showed that children less than 3 months accounted for 18.8 % patients with 27% of the children being less than 12 months.¹¹ A study in china showed that critically severe patients to be 10 % in children less than one year of age and this was highest in any age category of the pediatric population.¹⁶ This consistent with our findings that infants are at a particularly high risk of Covid-19 infections and complications.

In our study none of the patients had travel history to the affected area, while contact history was present in 16(32.7%) of the patients. In a study from China, 65 % of child cases had contact history in a close family member.¹²

In our study 56% of the patients were male and 44% were female. This is similar to other studies where boys were marginally more than girls (56.6% vs. 43.4%) 16 in affected pediatric cases.

In our study 15 (30%) of the patients had underlying health conditions ,similar to a study from United States which showed that 42.3% patients had one or more related health disorder. However, underlying the health conditions found in that study were different from those in our study. In our study congenital heart diseases was most common, seen in 7 patients. In the study from United States obesity (37.8%), chronic lung disease (18.0%),

and prematurity (gestational age <37 weeks at birth), (15.4%) were the predominant co morbid conditions reported.¹¹

44(88%) of the patients had radiological changes in X-ray chest. The major finding noted in chest radiographs where bilateral infiltrates seen in 34(68%). The chest radiographs were normal in 6(12%) of cases. In our study chest radiographs were ordered in all patients. Our study also described the similar findings of bilateral infiltrates, being the main radiological findings, seen in 24(48%) of the patients.¹¹

In our study, the most common presenting symptoms were fever (83.7%) and cough (74%).Sore throat was less frequent as a presenting feature. An Italian study in the pediatric population showed that 82.1% of patients had fever and 48.8% had cough.¹⁵ A China based study showed that 60% patients had fever and cough was present in 65%¹².

Gastrointestinal symptoms in our study were diarrhea 16%, anorexia / poor oral intake 36%.A study in china showed that 8.8% of the patients had loose motions.¹² A Mexican study showed that 24%of their patients had gastrointestinal symptoms.¹⁰

In our study mortality was seen in 13(26%) of the population. Mortality observed in our study is relatively high. Severe disease with hospitalization is reported in pediatric patients in different studies but the mortality was reportedly low.^{11, 17} American CDC data suggested that from January to October 2020, among 207,836 deaths reported, 87 deaths were reported in 5-18 years of age, while 40 deaths were reported in 0-4 years of age.¹⁸ In our study, most of the deaths were below one year of age. All children who died developed complications like respiratory failure, septic shock, and multi organ failure.

As seen in our study there are varied clinical presentations and complications. Our study will therefore help in assessment, early suspicion, diagnosis and management of Covid-19 infection

REFERENCES

1. Gorbalenya AE, Enjuanes L, Ziebuhr J, et al: evolving the largest RNA virus genome. *Virus research*. 2006 Apr 1;117(1):17-37.
2. Milek J, Blicharz DK. Coronaviruses in avian species. Review with focus on epidemiology and diagnosis in wild birds. *J Vet Res*. 2018;62(3):249–255.
3. Lu R, Zhao X, Li J, et al.: Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*. 2020, 395:565-574. 10.1016/S0140-6736(20)30251-8
4. WHO, severe acute respiratory syndrome .Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200404-sitrep-75-covid-19.pdf?sfvrsn=99251b2b_4
5. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*. 2020;382(13):1199–1207
6. World Health organization situation report 75 Who.int. 2020 [cited 13 October 2020]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200404-sitrep-75-covid-19.pdf?sfvrsn=99251b2b_4
7. World Health organization 2020 ;WHO Director-General's statement on IHR Emergency Committee on Novel Coronavirus (2019-nCoV) Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline#!>
8. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *Jama*. 2020 Apr 7;323(13):1239-42.
9. Bellino S, Punzo O, Rota MC et al.COVID-19 disease severity risk factors for pediatric patients in Italy. *Pediatrics*. 2020 Oct 1;146(4).
10. Bustos-Cordova E, Castillo-García D, Cerón-Rodríguez M,et al. Clinical Spectrum of COVID-19 in a Pediatric Mexican Population
11. Kim L, Whitaker M, O'Halloran A,et al. Hospitalization rates and characteristics of children aged< 18 years hospitalized with laboratory-confirmed COVID-19—COVID-NET, 14 states, March 1–July 25, 2020. *Morbidity and Mortality Weekly Report*. 2020 Aug 14;69(32):1081.
12. Xia W, Shao J, Guo Y,et al. Clinical and CT features in pediatric patients with COVID-19 infection: Different points from adults. *Pediatric pulmonology*. 2020 May;55(5):1169-74
13. Götzinger F, Santiago-García B, Noguera-Julián A,et al. COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. *The Lancet Child & Adolescent Health*. 2020 Sep 1;4(9):653-61
14. Wei M, Yuan J, Liu Y,et al. Novel coronavirus infection in hospitalized infants under 1 year of age in China. *Jama*. 2020 Apr

- 7;323(13):1313-4.
15. Garazzino S, Montagnani C, Donà D, et al. Multicentre Italian study of SARS-CoV-2 infection in children and adolescents, preliminary data as at 10 April 2020. *Eurosurveillance*. 2020 May 7;25(18):2000600.
 16. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in China. *Pediatrics*. 2020 Jun 1;145(6).
 17. Lu X, Zhang L, Du H, et al. SARS-CoV-2 Infection in Children. *N Engl J Med*. 2020;382(17):1663-5. <https://doi.org/10.1056/NEJMc2005073> PMID: 32187458
 18. CDC Provisional COVID-19 Deaths: Focus on Ages 0-18 Years available at <https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-Focus-on-Ages-0-18-Yea/nr4s-juj3/data>, accessed on 21-10-2020.