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Original Article

Clinical Features and Laboratory Findings, Among Children with Covid-19 in Pak Emirates Military Hospital, Rawalpindi

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ABSTRACT

Objective: To study the clinical features among children admitted to Pak emirates Military Hospital with laboratory confirmed COVID-19 infection in Pakistan.
Study Design: Cross sectional study.
Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi Pakistan, from Aug 2020 to Mar 2021.
Methodology: All patients between 2 years to 12 years of age, either sex, who had presented with a confirmed diagnosis of COVID-19 in Pak Emirates Military Hospital Rawalpindi, during the study period, were included in this study.
Results: There were a total of 64 COVID-19 confirmed cases in our study. The mean age was 7.9±2.45 years. There were 37(57.8%) male patients and 27(42.2%) female patients. Among the symptomatic patients: fifty-four (84.4%) patients had fever, 29(45.3%) had cough, 17(26.65%) had sputum production, 18(28.12%) had dyspnea, 7(10.9%) had sore throat, 16(25%) had rhinorrhea, 11(17.2%) had diarrhoea, and 3(4.7%) had rash. Chest radiograph revealed consolidation in the lungs of 19(29.7%) out of 64 patients.
Conclusion: The spectrum of clinical features of COVID-19 among children varies from a mild to severe disease requiring critical care admission. Fever being the most common sign followed by cough, rhinorrhea and diarrhea. C-reactive protein, LDH, creatinine, total and direct bilirubin are raised during the infection in children. The children having severe disease had consolidation on chest X-ray, requiring oxygen support in critical setting.

Keywords: Children, COVID-19, Developing country, SARS-CoV-2.

How to Cite This Article: *Bashir J, Ahmed Z, Ghafoor M, Hussain M, Aziz A, Babar MW. Clinical Features and Laboratory Findings, Among Children with Covid-19 in Pak Emirates Military Hospital, Rawalpindi. Pak Armed Forces Med J 2025; 75(Suppl-6): S851-S855.*
DOI: https://doi.org/10.51253/pafmj.v75iSUPPL-6.7215

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is presently a world-wide catastrophe.[1] COVID-19, is an infection of respiratory tract which is produced by a novel coronavirus, the outbreak first started from Wuhan, in China, in the month of December of 2019. The World Health Organization (WHO) had affirmed, on 30th January, 2020, that the COVID-19 is an emergency that is of worldwide apprehension (PHEIC).[2] Emergent COVID-19 was discovered to be exceedingly infectious. It is transmitted quickly from individual to individual through respiratory droplets, sneezing, coughing, or by the contaminated hands of persons with the disease. Furthermore, the virus is able to spread by coming in contact with any surface with affected by the virus.[3] COVID-19 infection is caused by pathogenic SARS-CoV-2. It is illustrated by extreme immune damage, respiratory distress and pneumonia.[3] Literature shows that the incubation phase of COVID-19 virus varies from 2 to 14 days, and it might be infectious among the subjects who do not have any symptoms. It was noted by scientists that the basic reproductive number varied from R0 number 2.2 to R0 number 3.58. This had a 7.5 days average serial interval.[4] Owing to the rapid transmission of the Corona virus, absence of cure and dearth of unanimity which medication is effective, it is mandatory to study the disease in as many populations as possible. Children have proven to be extra susceptible as compared to grownups to certain infectious diseases, which might result in bad outcomes. Infants were discovered to be more likely to suffer from of severe disease caused by COVID-19.[5] Moreover, gastro-intestinal, respiratory symptoms, and atypical characteristics such as neurological symptoms, rash and inflammation that is multisystem have been sparsely described in literature.[5,6] In some studies, children who had COVID-19 exhibited a history of being in infected households.6 However, literature shows that there is insufficient evidence that newborns attained COVID-19 infection via vertical transmission.[7-9] The clinical profile of 2019-nCoV

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Received: 10 Aug 2021; revision received: 09 Feb 2022; accepted: 15 Feb 2022

infection among children still needs to be studied in the developing countries. Not withstanding the international spread of this disease and broad research being performed in several countries, there are limited local data emerging in paediatric population.[10]

This study was conducted with an aim to find the disease pattern of COVID-19 in paediatric age group which is poorly understood at this stage. Our study's objective was to report the frequency of signs and symptoms and data regarding clinical and laboratory features of COVID-19 among children admitted to Pak Emirates Military Hospital with laboratory confirmed diagnosis of COVID-19 infection in Pakistan. We hope that our study's findings help other developing countries in identifying possible key clinical features that eventually assist healthcare professionals in developing treatment and prevention strategies targeted towards paediatric population.

METHODOLOGY

This cross sectional study was conducted in Pak Emirates Military Hospital Rawalpindi from August 2020 to March 2021. Permission from the institutional ethics review committee (ERC) was taken prior to conducting the study. Non probability consecutive sampling technique was employed for data collection. Informed consent was taken from the parents of patients, following complete disclosure about risk and benefits of the study. Data were collected on a predesigned questionnaire and a unique identifier was assigned to each patient. Strict confidentiality was maintained throughout the study. Strict ICH good clinical practice guidelines were followed. This study was HIPAA complaint.

WHO sample size was used to calculate the sample size at 95% confidence interval with 5% margin of error taking prevalence of disease at 8%. The prevalence of disease was assessed by the statistics of average positivity rate of COVID-19 by national command and control centre (NCOC) – a central body of government of Pakistan for strategic control of the COVID-19 epidemic. A total of sixty-four patients were included in this study.

Inclusion Criteria: All patients between 2 years to 12 years of age, either sex, who had a confirmed diagnosis of COVID-19 in Pak Emirates Military Hospital Rawalpindi from August 2020 to March 2021 were included in this research.

Exclusion Criteria: Children with asthma, type 1 diabetes, malnutrition, congenital heart anomalies, pulmonary tuberculosis, immunosuppression, and history of premature birth were excluded from this study. Samples from pharyngeal swab of all the patients in this research were amassed, and reverse transcription polymerase chain reaction (RT-PCR) was used to test the COVID-19 RNA. Patients' history and demographic information about the child was acquired from the parents. Patients were examined and clinical features were observed and noted. Blood samples were drawn and sent to the hospital's laboratory for the measurement of: complete blood count (CBC), liver function tests (LFTs), C-reactive protein (CRP), lactate dehydrogenase (LDH) and serum creatinine. A plain chest X ray was done for all patients and consolidation was noted. During the length of hospital stay all the COVID-19 positive children were admitted in COVID-19 ward for worsening of symptoms Paediatric Intensive Care Units (PICU) admission was observed.

The continuous variables in the descriptive statistics were given as Mean±SD. Categorical data was given as numbers and percentages. Data were analysed using SPSS version 16.

RESULTS

There were 64 COVID-19 confirmed patients in our study. Mean age was 7.9±2.45 years. There were 37(57.8%) male patients and 27(42.2%) female patients. Among our patients, 54(84.4%) were symptomatic and 10(15.6%) asymptomatic. Among the symptomatic patients: fifty-four (84.4%) patients had fever, 29(45.3%) had cough, 17(26.65%) had sputum production, 18(28.12%) had dyspnea, 7(10.9%) had sore throat, and 16(25%) had rhinorrhea, 11(17.2%) had diarrhoea, and 3(4.7%) had rash. Fever was reported to be resolved about 24 to 72 hours after its onset with the peak of fever was reported to be varying from 37.6°C to 39.3°C in our data set. Chest radiograph revealed consolidation in the lungs of 19(29.7%) out of 64 patients.

The laboratory findings showed (mean): haemoglobin 10.75±2.61 (g/dL), TLC 8.89±4.43 (109/L), platelets 243±65.14(109/L), creatinine 1.43±1.03 (mg/dL), C-reactive protein 51.45±4.16 (mg/dL), LDH 515.78±110.68 (U/L), total bilirubin was noted as 0.47±0.28 (mg/dl) , direct bilirubin was observed to be 0.28±0.11 (mg/dl), indirect bilirubin

was recorded was 0.26±0.18 (mg/dl), ALT 37.71±21.48 (IU/L), AST 32.56±18.19 (IU/L).

Table-I: Distribution of Clinical Characteristics of Paediatric Patients Confirmed with Corona Virus Infection

Characteristics	Values	n(%)
Age, years (Mean±SD)	7.98±2.45	
Sex	Total	64(100)
	Male	37(57.8)
	Female	27(42.2)
Sign and symptoms		
Fever	Yes	54(84.4)
	No	10(15.6)
Cough	Yes	29(45.3)
	No	35(54.6)
Sputum production	Yes	17(26.6)
	No	47(73.4)
Rhinorrhea	Yes	16(25)
	No	48(75)
Sore throat	Yes	7(10.9)
	No	57(89.1)
Dyspnea	Yes	18(28.1)
	No	46(71.8)
Headache	Yes	3(4.7)
	No	61(95.3)
Diarrhoea	Yes	11(17.2)
	No	53(82.8)
Vomiting	Yes	6(9.4)
	No	58(90.6)
Rash	Yes	3(4.7)
	No	61(95.3)
Conjunctivitis	Yes	1(1.6)
	No	63(98.4)
Swelling of extremities	Yes	2(3.1)
	No	62(96.9)
Asymptomatic	Yes	10(15.6)
	No	54(84.4)

Table-II: Distribution of Laboratory, Imaging Findings and Paediatric Intensive Care Unit (PICU) Admission, Paediatric Patients Confirmed with Corona Virus Infection

Characteristics		(Mean±SD)
Laboratory Findings:		
Haemoglobin (g/dl)		10.75±2.61
TLC (109/L)		8.8±4.43
Platelets (109/L)		243±65.14
Creatinine (mg/dl)		1.43±1.03
CRP (mg/dl)		51.45±4.16
LDH (U/L)		515.78±110.68
Total Bilirubin (mg/dl)		0.47±0.28
Direct Bilirubin (mg/dl)		0.28±0.11
Indirect Bilirubin (mg/dl)		0.26±0.18
ALT (IU/L)		37.71±21.48
AST (IU/L)		32.56±18.19
Imaging Findings		**n(%)**
Chest X ray Consolidation	Yes	19(29.7)
	No	45(70.3)
Clinical Outcome		**n(%)**
Admission to Paediatric Intensive Care Unit (PICU)	Yes	3(4.7)
	No	61(95.3)

Frequency (%) of patients presenting with fever and rhinorrhea decreased with increasing age. Interesting, frequency (%) of vomiting and nausea, sore, and throat headache displayed a mounting tendency with increase in age. Three out of sixty four (3/64) of children were admitted to Paediatric Intensive Care Unit (PICU). Among those children admitted to the Paediatric Intensive Care Unit (PICU), two out of three patients were those children who were admitted to our hospital beyond 5 days prior to the start of COVID-19 symptoms.

Each symptomatic patient was provided treatment for the relief of their symptoms. Few patients who were diagnosed with pneumonia were given the antibiotic therapy to alleviate their condition. All patients in this study were discharged once they had fully recovered and when their samples tested negative for 2019-nCoV RNA.

DISCUSSION

In this study, the age of patients who were infected by coronavirus disease (COVID-19) varied from 2-12 years, and had a Mean±SD of 7.98±2.45 years, and the results of laboratory findings and clinical features overlap with outcomes of various studies (Table-I).[11-15] The clinical spectrum of COVID-19 patients in our study had varied from severely ill to asymptomatic cases. Three out of sixty four (4.68%) children were admitted to critical care unit. In a recent study conducted in 2020 by Ludvigsson et al,13 the most common symptoms among children with COVID-19 infection were noted as: fever (47.5%), nasal symptoms (11.2%), cough (41.5%), nausea/vomiting (7.1%), and diarrhoea (8.1%). The frequencies of cough, diarrhoea and rhinorrhea were comparable to the results from our study. In our research a higher proportion of patients, that is, 84.4% had presented with fever. There was a similar proportion of patients with cough (45.3%), sputum production (26.65%), sore throat (10.9%), rhinorrhea (25%), diarrhoea (17.2%), rash (4.7%), and dyspnea (28.12%). Literature shows that cough and fever are the very usual manifestations among the symptomatic paediatric patient,[15] this supports our research findings. The worldwide data indicated the percentage of children in the entire number of COVID-19 infected patients was little and many children progressed only as far as to develop mild disease.[5] One research from China had described that children who were less than ten years had the comparable vulnerability as grown-ups to be affected by COVID-19 infection, but not tending to have severe

illness.[16] Additional research originating from China by Zhang *et al.*,[17] bolsters a notion that infants are not as susceptible to COVID-19 in comparison to adults. It further discusses that when the infected persons contact were tracked and checked for the COVID-19, it was found that for each child who was affected was below 15 years of age. This raises the concern that if COVID-19 is being documented in children, it may be indicative of much rising rates of infection among adults.[17] A recent research from India by Gupta *et al.*,[18] has described the epidemiological characteristics and clinical features of twenty-one subjects in India. Those patients had suffered from milder form of disease but one patient (1/21) who suffered from consolidation of lungs and had needed oxygen support. Results were comparable to our research, as we noted that there were three out of sixty four (4.68%) children who were admitted to Paediatric Intensive Care Unit (PICU).

Literature shows that lab readings found in the most patients suffering from COVID-19 were noted to be: lymphocytopenia (82.3%), leukopenia (33.7%), thrombocytopenia (36.2%), many patients have high levels of C-reactive protein (CRP), among few patients increased levels of aspartate aminotransferase (AST) and alanine transaminase (ALT)[12,19,20] were observed. These values are comparable to the results from our study (Table-II). Studies have also shown that computed tomography scans in a several subjects is indicative of ill-defined margins (81%), thickening of neighbouring pleura (32%), smooth or air bronchogram (47%), and ground- glass opacity (65%).[21] However, in our study, we did not look at CT scans for all our patients. This was a limitation of our study. It would be interesting to note the CT can finding in future studies. The rest of the laboratory findings are comparable to results that we had obtained in our study. A study in UK by Swann *et al.*,[12] showed that children that were hospitalized beyond 5 days prior to the start of symptoms were found to be more frequently admitted to Paediatric Intensive Care Units (PICU). Such a finding was comparable to the results from our study.

There is a dearth of data for paediatric population suffering from COVID-19. Which brings to light a pressing necessity to describe the clinical features of the illness, particularly among patients in developing countries where there is scarcity of paediatric patient data. COVID-19 in children offers challenges that are distinctive from adult population. While the proportion of infected children are anticipated to be small, healthcare professionals need to have data in order to be prepared to face the burden of disease in paediatric population. Now, it is rather ambiguous how long the pandemic may last. Nevertheless, wide-ranging effects on not only adults but also on children are possible. We hope that our study's findings help other developing countries in identifying possible key clinical features that eventually assist healthcare professionals in developing treatment and prevention strategies targeted towards paediatric populace.

CONCLUSION

The spectrum of clinical features of COVID-19 among children varies from a mild to severe disease requiring critical care admission. Fever being the most common sign followed by cough, rhinorrhea and diarrhea. C-reactive protein, LDH, creatinine, total and direct bilirubin are raised during the infection in children. The children having severe disease had consolidation on chest X-ray, requiring oxygen support in critical setting.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

JB & ZA: Data acquisition, data analysis, critical review, approval of the final version to be published.

MG & MH: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AA & MWB: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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