

An Overview of the Signs and Symptoms of Pediatric Patients Hospitalized with COVID-19

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Abstract

Introduction: Clinical symptoms and laboratory findings of Covid-19 in children are more diverse than in adults. The aim of this study is to determine the clinical and laboratory findings of covid-19 in hospitalized children.

Materials and methods

This cross-sectional descriptive study was conducted on 57 children aged 1 month to 12 years who were admitted with Covid-19, and their diagnosis were confirmed by PCR method from March 2020 to November 2021 in Mousavi Hospital of Zanjan, Iran. Demographic data, clinical and laboratory findings of patients were recorded, and relevant information was analyzed.

Results

In this study, 57 children with Covid-19, PCR positive, including 26 boys (45.6%) and 31 girls (54.4%) were evaluated. The most common clinical findings were fever, cough, respiratory distress, vomiting, diarrhea and seizures with fever in 45 (78.9%), 30 (52.6%), 24 (42.1%), 21 (36.8%), 18 (31.5%) and 6 (10.5%) patients respectively. The most common laboratory findings were increased AST and ALT in 50 (87.7%) and 24 (42.1%) patients. Increased CRP and ESR were found in 21 (36.8%) and 15 (26.3%) patients, respectively. Lymphopenia and thrombocytopenia were reported in 14 (24.5%) and 4 (7.07%) patients, respectively.

Conclusion

The most common clinical manifestations of covid-19 in children were fever and cough. The increase of liver enzymes, especially AST, was significant in hospitalized children, while lymphopenia and thrombocytopenia were not common in affected children.

Keywords: Covid-19, children, clinical manifestations, laboratory findings

Introduction

Covid-19 is a viral disease caused by the SarsCov-2 virus from the coronavirus family [1, 2]. This disease was detected in Wuhan, China, in December 2019 and was declared a pandemic by WHO in March 2020 [3-5]. Covid-19 mainly affects the respiratory system, and its most common reported symptoms include fever, dry cough, body pain, fatigue, and to a lesser degree, shortness of breath, nausea and vomiting, and headache [1, 6]. This disease behaves like a common cold in mild stages and rarely causes serious complications. However, in the more

severe stages of the disease, it progresses to pneumonia with symptoms of shortness of breath, tachypnea, cough, and a decrease in blood oxygen level and the need for oxygen therapy [2]. The final phase of the disease is known as the immunological phase, which manifests with more severe symptoms such as respiratory distress syndrome (RDS), shock, and cytokine storm, and the highest mortality of the disease is related to this phase [2,5,7]. Studies show differences in Covid involvement between adults and children [8-12]. The symptoms in children are generally milder than adults, and sometimes they manifest with gas-

gastrointestinal symptoms, which are not common in adults [8, 9]. Also, the presence of pulmonary involvement with a negative RT-PCR test is common among children [10-12]. In addition, specific syndromes such as MIS-C may be seen in children different from the adults [13].

At the beginning of the pandemic, the disease was more prevalent and worse in the older population; however, over time and with various mutations, the prevalence of Covid-19 has increased among children [12]. In order to diagnose and effectively treat pediatric patients with Covid-19, the present study aimed to determine the clinical and laboratory findings of Covid-19 in children admitted to our hospital in Zanjan during the pandemic.

Materials and methods

In this cross-sectional study, all children between one month and 12 years of age who were admitted to Mousavi Hospital in Zanjan with a definite diagnosis of Covid-19 from March 2020 to November 2021 were evaluated. Only definite cases confirmed by PCR test were included in the study. The inclusion and Exclusion criteria in this study are as follows:

- Inclusion criteria: definitive diagnosis of covid-19, age between 1 month and 12 years.
- Exclusion criteria: ruling out covid-19 for the patient during hospitalization, negative PCR test, incomplete patients' records

Patients' demographic data, including age, sex, and clinical findings of covid-19 infection, along with the results of laboratory tests and the clinical course of patients, were extracted from the patient's records. Analysis of the data was carried out using SPSS 24.0 (SPSS Inc., Chicago, IL, USA). Comparisons for categorical variables were performed by Chi-square test. A $P < 0.05$ was considered statistically significant. This study was approved by the Ethics Committee of Zanjan University of Medical Sciences (ethical ID: IR.ZUMS.REC.1400.187).

Results

The current study was carried out on 101 children under 12 years of age with the final diagnosis of Covid-19 who were hospitalized in Mousavi Hospital in Zanjan, Iran, between March 2020 and November 2021. Fifty-seven cases had a positive PCR test result and were included in the study. The remaining 44 cases, diagnosed by other methods, were excluded from the study. Among the 57 patients with a definite diagnosis of Covid-19, 26 (45.6%) were boys, and 31 (54.4%) were girls. The range of patients' age was one month to 12 years (mean= 3.9 ± 4 years). The highest frequency in terms of age was in the age range of 1 month to 1 year (with a frequency of 25 patients). Chart 1 shows the age frequency of the studied patients.

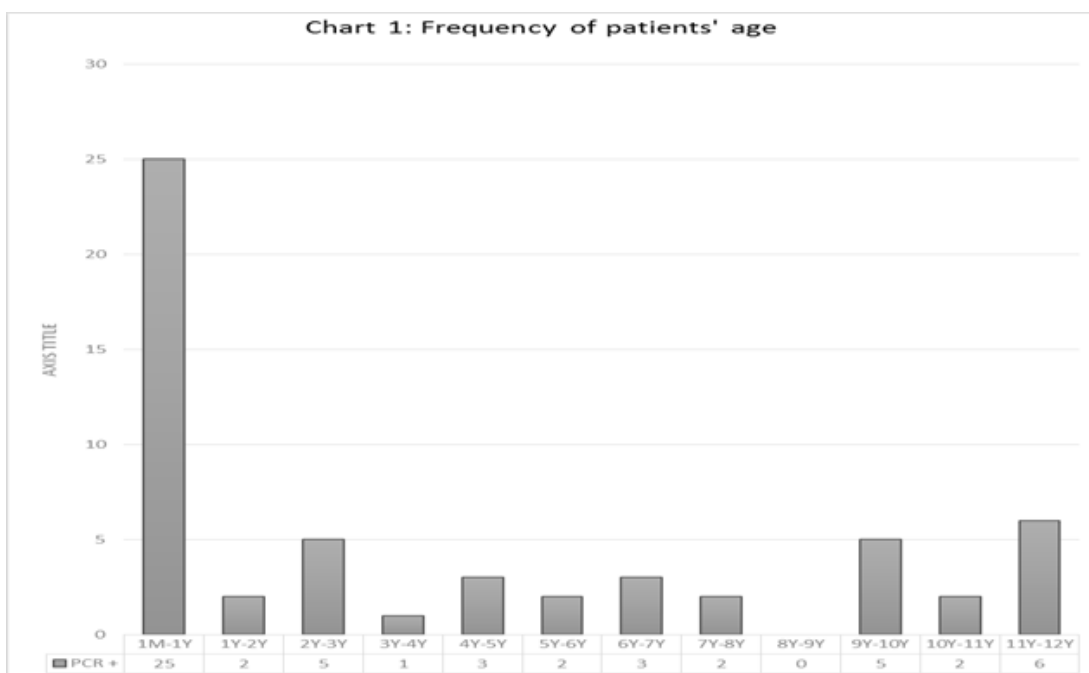


Figure 1:

Chart 2 shows the frequency of definitive hospitalization cases regarding the date of hospitalization. According to this graph, the highest frequency relates to October 2021 with 11 patients and July 2020 and April 2021 with 7 cases each.

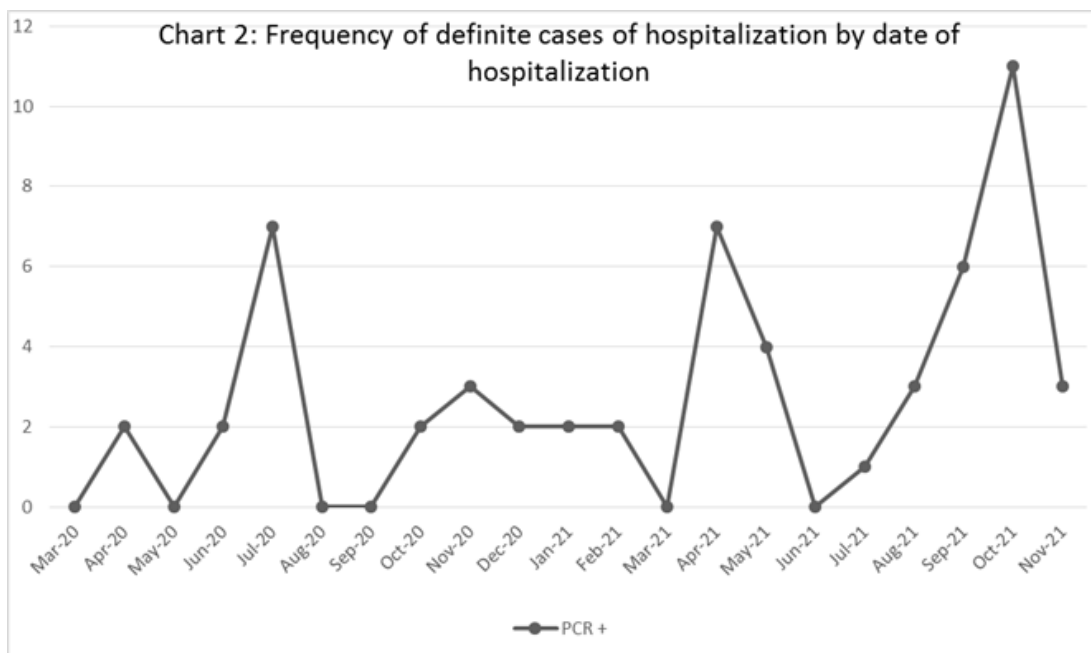


Figure 2:

The average number of hospitalization days was 6.65 ± 5.540 . The shortest length of hospitalization was one day, and the most extended length of hospitalization was 36 days.

The two most common symptoms in children with covid-19 were fever and cough, respectively, with a frequency of 78.9% and 52.6%. All of the patients who presented with seizures were also febrile.

Table 1 shows the frequency of clinical symptoms in patients.

Table 1: Frequency of Clinical Symptoms

Variable	Number	Percentage(%)
Fever	45	78.9
Cough	30	52.6
Respiratory Distress	24	42.1
coryza	6	10.5
Headache	2	3.5
Myalgia	4	7
Abdominal pain	17	29.8
Vomitting	21	36.8
Diarrhea	18	31.5
Convulsions	6	10.5
Restlessness	5	8.8
Weakness	16	28.1
Skin rash	2	3.5
Altered state of consciousness	4	7

Table 2 shows the mean and standard deviation of laboratory symptoms examined in patients.

Table 2: Mean and Standard Deviation of Laboratory Data

Variable	Mean (\pm standard deviation)	min-max
Total White Blood Cells ($\times 10^3/L$)	8.4 (± 4.63)	1.8 - 28
Lymphocyte Count ($\times 10^3/L$)	3.48 (± 2.77)	0.43 - 12.02
Hemoglobin (g /dl)	12.1 (± 1.58)	7.9 - 15.1
Platelets ($\times 10^3/L$)	332.25 (± 171.36)	96 - 855
ESR (mm / hr)	23.13 (± 18.31)	1 - 74
CRP (mg / l)	13.67 (± 18.57)	1 - 82
AST (U / L)	55.26 (± 31.36)	24 - 152
ALT (U / L)	37.83 (± 32.96)	6 - 168

Table 3 shows the frequency of laboratory disorders found in patients.

Table 3: Frequency of laboratory disorders*

Variable	Number	Percentage(%)
Lymphopenia	14	24.5
Anemia	13	22.8
Thrombocytopenia	4	7.01
Increased ESR	15	26.3
Increased CRP	21	36.8
Increased AST	50	87.7
Increased ALT	24	42.1

* Lymphopenia: $<3 \times 10^3/L$ For aged 1-12 months

$<2 \times 10^3/L$ For aged 1-5 years

$<1.1 \times 10^3/L$ For aged >5 years

Anemia: <11 g/dl For aged <6 years

<11.5 g/dl For aged >6 years

Thrombocytopenia: $<150 \times 10^3$

Increased ESR: >30 mm/hr

Increased CRP: >10 mg/L

Increased AST: >31 U/L

Increased ALT: >32 U/L

One (1.8%) patient died. The deceased patient was an 11-year-old boy with microcephaly, very severe FTT suffering from the genetic disease (Cockayne Syndrome) who was admitted to this center by weakness, respiratory distress, and decreased level of consciousness. The PCR test for Covid-19 was positive. The patient underwent mechanical ventilation and died on the seventh day of hospitalization.

Discussion

This study on 57 children between 1 month and 12 years who were admitted to Mousavi hospital in Zanjan with a definite diagnosis of Covid (positive PCR) showed that fever and cough were the two most common symptoms in children with covid-19, with a frequency of 78.9 and 52.6 respectively. Increased AST (87.7%) and increased ALT (42.1%) levels were the most common laboratory disorders, followed by high CRP levels (36.8%), and increased ESR levels (26.3%).

In Soltani et al.'s study, similar to our study, the frequency of cases was higher in girls (53.3% of girls and 46.7% of boys) (14). While in some other studies, the frequency of boys was higher [11,15,16].

In almost all studies like ours, fever and then cough were the most common symptoms of patients [14, 14-19]. Seizures with fever were present in 10.5% of our study, while in the study of Nejad et al [20]. and the study of Kurd et al [21]. it was less than our study and in the study of Dilber et al., it was more than our study [22].

The frequency of lymphopenia in our study was not high (24.5%), although it was higher than in several other studies [14, 16, 23]. But the increase in liver enzymes in our study was more than in most other studies [14, 18]. The frequency of high CRP levels in our study was about 36.8% of cases, which was almost similar to the study by Xia et al [18]. and higher than the study by Zhen Dong et al. [16].

Conclusion

The current study showed that the most common clinical manifestation of covid-19 in children is fever and cough, as in adults. The highest frequency of hospitalizations occurred in young children and infants under one year of age. This study showed that gender preference is not very important in cases of hospitalization of children with coronavirus. In terms of laboratory

symptoms, the increase of liver enzymes in hospitalized patients was significant; on the contrary, lymphopenia was negligible in hospitalized patients.

Declarations

Funding

This project was not funded by any source.

Conflicts of interest/Competing interests:

There is no conflict of interest.

Availability of data and material

Not Applicable.

Code availability

Not Applicable.

Ethics approval

This work has been approved by the ethical committee of Zanjan University of Medical Sciences.

Author Contributions Statement

All authors contributed to the article concept. P.MY Contributed to writing the original draft, data and material gathering and analysis. M.S and M.KA contributed to writing and revising the original draft. All authors reviewed the manuscript.

Consent for publication

Not Applicable.

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