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Retrospective review of severe acute respiratory syndrome coronavirus-2 infection in children with acute leukemia from a tertiary care hospital in Northern India

To the editor

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is thought to cause milder infections in children; however various risk groups for severe coronavirus disease 2019 (COVID-19) have been identified. Few reports have highlighted poorer outcomes in children with cancer.[1] Hematological malignancies have been found to have increased mortality by 37%.[2] The highest risk of COVID-19 infection has been noted with acute lymphoblastic leukemia (ALL), at a higher risk of viral and fungal infections. However, reported data is scarce in the literature.[3] Identifying the differences with which SARS-CoV-2 behaves in an immunocompromised patient would assist in prognostication and resource allocation for this vulnerable section. The present retrospective study assessed the demographic and clinical characteristics and outcomes of children admitted with acute leukemia at our tertiary care referral center in Northern India with COVID-19 infection.

Chart review of children aged 12 years or younger, with an underlying diagnosis of acute leukemia, admitted for acute COVID-19 care between October 1, 2020, and March 31, 2021 was done. All children were positive for SARS-CoV-2 by real-time reverse transcription-polymerase chain reaction from the combined nasopharyngeal and oropharyngeal swab. The severity of COVID-19 was categorized as mild, moderate, severe, and critical based on the latest operational guidelines.[4] Children who quickly progressed to acute respiratory distress syndrome or respiratory failure and had life-threatening organ dysfunction including shock, encephalopathy, myocardial injury or heart failure, coagulation dysfunction, and acute kidney injury were classified as having a critical illness. The Institutional Ethics Committee approved the study (S.No IEC/VMMC/SJH/Project/2021-05/CC-143).

Out of 52 children admitted to the COVID-19 pediatric intensive care unit during the study period, 19 were on follow-up for acute leukemia: 12 with B-cell ALL, 5 with T-cell ALL, and 2 with acute myeloid leukemia. Out of 12 B, ALL patients, 4 were on induction chemotherapy, 3 were on consolidation, 3 were on delayed intensification, and 2 were on maintenance chemotherapy. Table 1 describes demographic and clinical characteristics. Fever was the most common clinical symptom (79%) followed by fatigue/malaise (21%), abdominal pain/distension (21%), and diarrhea (16%). None had a rash, conjunctivitis, or mucosal inflammation. Interleukin-6 and D dimer were elevated in all the patients. Critical illness was noted in 2 children (10.5%), of which one child recovered. All neutropenic children received antimicrobials as per our institutional febrile neutropenia protocol. Three children had culture-proven bacterial infections.

Two deaths were reported during the study period. Out of 2, 1 child of T ALL was admitted with early relapse during maintenance chemotherapy and had hyperleukocytosis, tumor lysis syndrome with multiorgan dysfunction, and died due to disease progression. Another child with critical illness recovered and died during further chemotherapy course for underlying disease.

Our study on 19 patients with acute leukemia with COVID-19 infection shows that the outcome is not bad compared to the general population. Fever was the predominant symptom in our study seen in 79% of acute leukemia patients contrary to a recent systematic review by Belsky et al.[5] In an immediate review by Hruzak et al. (n=9, 88%), In an immediate review by Hruzak et al. (n=9, 88%), patients are asymptomatic of mild diseases comparable to 78.95% of this study.[6] Rates of having the severe disease were comparable in the data reported by Belsky et al.[5] (20.24%) and Ferrari et al.[7] (n=21, 9.5%) to our study where 21% of the patients' required oxygen support, antiviral and immune modulator therapy. Boulad et al.[8] reported, in a cohort of 20 pediatric cancer patients with COVID-19, only 1 patient (8.3%) required noncritical care hospitalization for COVID-19 related symptoms. Millen et al.[9] reported 10% with moderate to severe disease in a cohort of 54 children of cancer and COVID-19, with 3 patients (5.5%) requiring invasive ventilation, which is also close to our study finding of 10.53%. Cases of Kawasaki-like illness and hemophagolymphocytosis are not been reported in pediatric oncology patients, as seen in our study. Patients as shown in our study. Together, few recent reports suggest that children with the hematological disease may have a mild or asymptomatic course of COVID-19.[2] Our results are comparable with the data reported for immunocompetent children from North India.[10] We still have a lot to learn about COVID-19 in our patient population. This includes role of biomarkers predicting the course and outcome of COVID-19. Also, any genetic variants that underlie susceptibility to COVID-19 and, if so, their link to tumor predisposition and treatment response. The retrospective nature of our study, tertiary hospital admission bias, and small sample size are the significant

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Table 1. Demographic and clinical characteristics of children with ALL and COVID-19 (n=19)

Characteristic	Value
Age (yr)	7 (1–12)
<1	1 (5.3)
1–5	5 (26.3)
5–10	11 (57.9)
>10	2 (10.5)
Severity	
Mild	14 (73.7)
Moderate	2 (10.5)
Severe	1 (5.3)
Male sex	16 (84.2)
Clinical features (n=19)	
Fever	15 (79.0)
Fatigue/malaise	4 (21.1)
Gastrointestinal manifestation	4 (21.1)
Respiratory manifestation	4 (21.1)
Cardiovascular manifestation	3 (15.8)
Joint pain/restriction/swelling	1 (5.3)
Drug treatment	
Antibiotics	19 (100)
Steroids	4 (21.1)
Remdesivir	3 (15. 8)
IVIG	1 (5.3)
Organ supportive therapies	
Respiratory support	4 (21)
Supplemental oxygen	2 (10.5)
Mechanical ventilation	2 (10.5)
Shock	2 (10.5)
Vasoactive agent infusion	2 (10.5)
Outcome - death	2 (10.5)
Laboratory finding	
IL-6 (n=19) (pg/mL)	217 (205.3–259.264)
CRP (n=16) (mg/gL)	0.6 (0.6–4.2)
ESR (mm/hr)	38 (38–42)

Values are presented as median (interquartile range) or number (%).
ALL, acute lymphoblastic leukemia; COVID-19, coronavirus disease 2019; IVIG, intravenous immunoglobulin; IL-6, interleukin-6; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate.

limitations of our study. A multisite study with a greater sample size is required to prove the findings of our study conclusively.

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Footnotes

Conflicts of interest: No potential conflict of interest relevant to this article was reported.

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