

EFFECT OF COVID 19 INFECTION ON THE CLINICAL COURSE AND OUTCOME OF PAEDIATRICS PATIENTS WITH HAEMATOLOGICAL MALIGNANCY

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Abstract

Background: Background: - Covid 19 caused by SAR COV 2 has affected each country in rampant manner and has overwhelmed the existing medical service. In children, milder symptoms have been observed. But it is seen that immunocompromised children have prolonged and severe clinical course. **Materials and Methods:** A single-centre-based prospective observational study was conducted in paediatric patients suffering from haematological malignancy from March 2020 to September 2021 to study the effect of COVID-19 infection on the clinical course and outcome of patients (age <18 years) admitted in the cancer ward of Paediatric Department, Government Medical college Jammu. **Result:** In this study, 35 children suffering with leukaemia who had tested positive for COVID 19 infection were included. Among them 20 (57.14%) were females and 15 (42.8%) were males. 83.3% of children were patients of B-CELL ALL while 8.3% were T- CELL ALL and 8.4% were suffering from AML. Out of a total of 35 patients who tested positive, 20 were symptomatic with fever (42.8%) being the most common symptom followed by cough (31.4%). Majority (51.42%) presented with severe COVID infection while 25.7% and 22.8% presented with mild and moderate SARS-CoV-2 infection respectively. 29 children (82.8%) developed complication during hospital stay out of which 40% developed shock, 31.4% and 17.1% developed multi organ failure DIC respectively. 18 patients were hospitalized, out of which 6 patients required oxygen or mechanical ventilation while 12 (34.28) also required inotropic support in addition to oxygen / mechanical Ventilation. Chemotherapy was delayed in 30 patients for an average duration of 2 weeks. Survival rate was 85.7% while 5 patients (14.2%) died (2 COVID-19-related and 3 cancer-related). **Conclusion:** Paediatric leukaemia patients are at increased risk of complications following COVID-19 infection with significant increase in mortality with severity of infection and interruption in on-going chemotherapy.

INTRODUCTION

Coronavirus disease 2019 (COVID -19) is a novel respiratory infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-Co V - 2) which was newly discovered since December 2019.^[1-4] According to a World Health Organization a report was presented on April 1, 2020 (4), a total of 823,626 cases and over 40,000 deaths had been documented globally, suggesting the situation was rapidly evolving into a pandemic. Corona virus can replicate in different tissues, with the respiratory system and gastrointestinal tract being the most important systems involved. The infection has two phases, in the first phase virus replicates and in severe cases it is followed by second phase which is characterized by a dysregulated immune response

and tissue damage.^[4,5] The mechanisms causing lung injury in both the phases are different but can result in irreversible lung damage and death due to respiratory failure. In adults there is association between the presence of comorbidities like obesity, chronic hypertension and diabetes and the severity of covid 19. There are no such studies on paediatric population. Risk factors for severe infections include immunodeficiencies, chronic respiratory illness, congenital heart diseases and malignancies.^[6-10] There is a need for continuous chemotherapy in cancer patients and the associations of SAR-COV-2 lead to withholding the cancer treatment and use of immunomodulators. The accelerated spread of the virus has led some international cooperative cancer centres to issue some recommendations based on expert

consensus.^[11,12] As reported by previous studies, patients with pre-existing health conditions are more likely to progress to severe COVID-19 pneumonia. This study is done to observe the effects of covid 19 on children (0 to 18 years) with malignancies, disease severity, treatment taken and any morbidity or mortality and associated risks factors.

MATERIALS AND METHODS

A single-centre-based prospective observational study was conducted in paediatric patients suffering from haematological malignancy from March 2020 to September 2021 to study the effect of COVID-19 infection on the clinical course and outcome of

patients (age <18 years) admitted in the cancer ward of Paediatric Department, Government Medical college Jammu. Patients were assigned a "Disease severity score" (DSS) and categorised as asymptomatic, mild, moderate or severe and statistical analysis was performed using IBM SPSS 21. Consent was taken and Ethical clearance was taken from Institutional Ethical Committee.

RESULTS

In this study, 35 children suffering with leukaemia who had tested positive for COVID 19 infection were included. Among them 20 (57.14%) were females and 15 (42.8%) were males (Table1).

Table 1: Distribution of Subject According to Sex

Sex	No. of Subjects	Percentage
Male	15	42.8
Female	20	57.14

About 15 (42.8%) were between 0-5 years of age, 3(8.3%) 6-10 years, 9(25%) were between 11-15 years of age and 8(23.9%) above 15 years (Table 2).

Table 2: Distribution of Subjects According to Age Group

Age (years)	No. Of subjects	Percentage
0-5	15	42.8
6-10	3	8.3
11-15	9	25
>15	8	23.9

83.3% of children were patients of B-CELL ALL while 8.3% were T- CELL ALL and 8.4% were suffering from AML (Figure1).

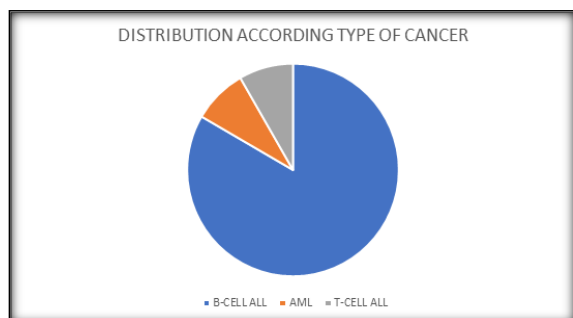


Figure 1: Distribution of subjects according to type of cancer

most common symptom followed by cough (31.4%) and coryza (31.4%) and gastrointestinal symptoms (22.8%) being the least common (Table 3) (Figure 2).

Out of a total of 35 patients who tested positive, 20 were symptomatic with fever (42.8%) being the

Table 3: Distribution of Subjects According to Symptoms

Symptoms	No. of Subjects	Percentage
Fever	15	42.8
Cough	11	31.4
Coryza	11	31.4
Abdominal symptoms	8	22.8

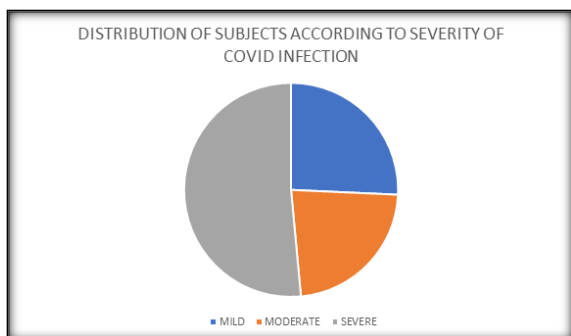


Figure 2: Distribution of subjects according to symptoms

6 (17.14%) had associated comorbidities like bone tuberculosis and CNS metastasis, however it had no effect on the outcome of the disease. Majority (51.42%) presented with severe COVID infection while 25.7% and 22.8% presented with mild and moderate SARS-CoV-2 infection respectively with severity of infection having direct association with the mortality (Table 4) (Figure 3).

Table 4: Distribution of Subjects According to Severity of Covid Infection

Severity of Covid Infection	No. of subjects	Percentage
Mild	9	25.7
Moderate	8	22.8
Severe	18	51.42

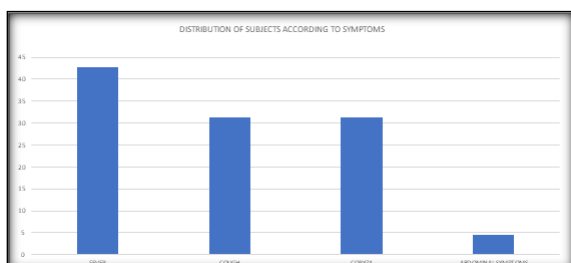


Figure 3: Distribution of subjects according to severity of covid infection

29 children (82.8%) developed complication during hospital stay out of which 40% developed shock, 31.4% and 17.1% developed multi organ failure DIC respectively (Table 5) (Figure 4).

Table 5: Distribution of Subjects According to Complication

Complication	No. Of subjects	Percentage
Nil	6	17.1
Respiratory failure	11	31.4
Dic	6	17.1
Shock	14	40
Mods	11	31.4

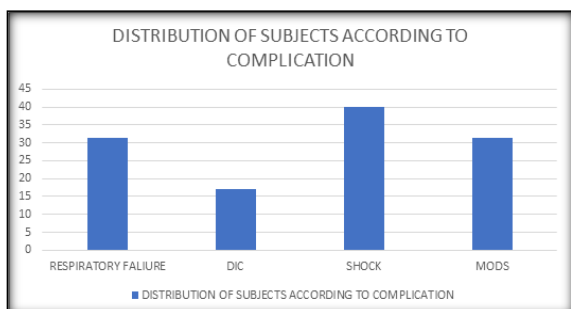


Figure 4: Distribution of subjects according to complication

18 patients were hospitalized, out of which 6 patients required oxygen or mechanical ventilation while 12 (34.28) also required inotropic support in addition to oxygen / mechanical Ventilation (Table 6).

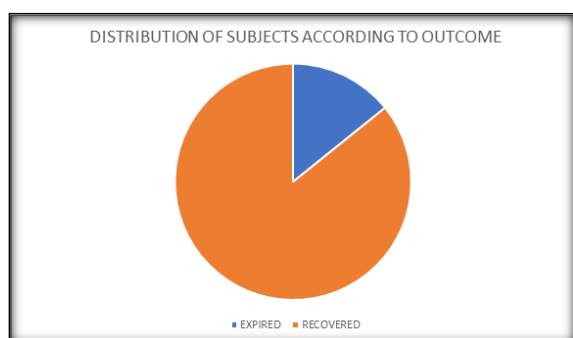
Table 6: Distribution of Subjects According to Supportive Therapy

Supportive Therapy	No. Of Subjects	Percentage
Nil	17	48.5
Oxygen/ Mechanical Ventilation (Only)	6	17.14
Oxygen/ Mechanical Ventilation And Inotropic Support	12	34.28

Antibiotics were given in all the patients, while immunomodulators were given in 8 patients (22.8%)- steroids in 7 patients and IVIG in 1 patient. Chemotherapy was delayed in 30 patients for an average duration of 2 weeks. Survival rate was 85.7% while 5 patients (14.2%) died (2 COVID-19-related and 3 cancer-related) (Table 7) (Figure 5).

Table 7: Distribution of Subjects According to Outcome

Supportive Therapy	No. Of Subjects	Percentage
Outcome	5	14.2
Death	30	85.7

**Figure 5: Distribution of subjects according to outcome**

Factors like severity of SARS-CoV-2 infection and development of complications during hospital stay had direct association with mortality, while use of immunomodulators had better outcome.

DISCUSSION

Many children with cancer had a severe course of SARSCoV-2. Early in the pandemic, some authors proposed that immunosuppressed patients would have a milder clinical course. It also became apparent that children generally experienced less severe disease than adults. Early experiences suggested that children with cancer would exhibit clinical courses similar to children without cancer. However, Emity E Johnston et al.^[14] reported 31.2% of paediatric cancer cohort was hospitalized (v 6.7% in general paediatrics), 9.2% had an ICU admission (v 1.8%), and 3.5% died because of COVID (v 0.2%). The higher hospitalization rate seen here is similar to the NY and NJ paediatric oncology SARS-CoV-2 experience (29%).^[15] In our study 35 children suffering with leukaemia had tested positive for COVID 19 infection. Among them 20 (57.14%) were females and 15 (42.8%) were males. About 15(42.8%) were between 0-5 years of age, 3(8.3%) 6-10 years, 9(25%) were between 11-15 years of age and 8(23.9%) above 15 years 83.3% of children were patients of B-CELL ALL while 8.3% were T- CELL ALL and 8.4% were suffering from AML. Out of a total of 35 patients

who tested positive, 20 were symptomatic with fever (42.8%) being the most common symptom followed by cough (31.4%) and coryza (31.4%) and gastrointestinal symptoms (22.8%) being the least common.(17.14%) had associated comorbidities like bone tuberculosis and CNS metastasis, however it had no effect on the outcome of the disease. Majority (51.42%) presented with severe COVID infection while 25.7% and 22.8% presented with mild and moderate SARS-CoV-2 infection respectively with severity of infection having direct association with the mortality.29 children (82.8%) developed complication during hospital stay out of which 40% developed shock, 31.4% and 17.1% developed multi organ failure DIC respectively (Table 5) .18 patients were hospitalized, out of which 6 patients required oxygen or mechanical ventilation while 12 (34.28) also required inotropic support in addition to oxygen / mechanical Ventilation. Antibiotics were given in all the patients, while immunomodulators were given in 8 patients (22.8%)- steroids in 7 patients and IVIG in 1 patient. Chemotherapy was delayed in 30 patients for an average duration of 2 weeks. Survival rate was 85.7% while 5 patients (14.2%) died (2 COVID-19-related and 3 cancer-related). Factors like severity of SARS-CoV-2 infection and development of complications during hospital stay had direct association with mortality, while use of immunomodulators had better outcome. Thus more severe clinical course was observed in children suffering from haematological malignancies as seen by Emity E Johnston et al and Madhusoodhan PP et al. They have compared the effects of covid infection in patients suffering from malignancies and in general Paediatric population. It is thus reported by various authors that the clinical course is prolonged and complicated in patients suffering with haematological malignancies.

CONCLUSION

Paediatric leukaemia patients are at increased risk of complications following COVID-19 infection with significant increase in mortality with severity of infection and interruption in ongoing chemotherapy.

Situation can be expected to improve as a consequence of post-infection immunity and vaccinations against SARS-CoV-2 which should further protect patients, their families and caretakers.

Conflict of interest

none

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