Impact of COVID-19 Pandemic on Treatment of Pediatric Oncology Patients: Report from Resource-limited Setting

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ABSTRACT

The aim of this study was to determine how the COVID-19 pandemic impacted on the effective management; and the outcome of pediatric oncology patients in Shaukat Khanum Memorial Cancer Hospital & Research Centre, Lahore. Data was retrospectively reviewed from 15 March to 15 June 2020 after the approval of Institutional Review Board Committee. A total of 258 patients on active oncology treatment between the study period were included. The total number of patients whose treatment was affected were 118 (45.7%), while 140 (54.3%) patients received treatment in time. There was total 34 (13.2%) patients relapsed, 23 (67.6%) patients in which treatment delayed, and 11 (32.4%) patients in which their treatment not delayed; while, n=218 (84.5%) were in remission, and 6 (2.3%) patients absconded. COVID-19 pandemic caused a sudden impediment in the treatment of pediatric oncology patients, and is likely to affect the long–term survival outcome of pediatric oncology patients.

Key Words: *Chemotherapy, Radiotherapy, Surgery, Long term outcome.*

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INTRODUCTION

Severe acute respiratory syndrome *Coronavirus-2 (SARS-CoV-2*) is a novel beta coronavirus that has caused more than 95,000 cases and over 3000 deaths worldwide as of early March 2020.[1] In immunocompromised patients, risk factors of severe disease or death due to coronavirus (COVID-19)are less well known.[2] In this rapidly evolving and uncertain healthcare landscape, there is an urgent need among health professionals and families for informed guidance on the range of reasonable and safe adaptations to their services and cancer treatment; while, preserving the health and safety of staff, patients and families.[3]

This retrospective descriptive study was approved by Institutional Review Board of Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore. Patients on active cancer treatment were selected from March 15 to June 15, 2020. During the time of COVID-19 pandemic, this hospital made new polices for ongoing cancer treatment patients to take over COVID-19 affected patients. Delay was defined as delay of 48 hours in receiving chemotherapy, surgery procedure and radiotherapy.

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All pediatric oncology patients, who were on active cancer treatment, were included. All pediatric oncology post-treatment patients on follow-up were excluded from this study. Timing of relapse were as follows: Very early relapse: Who were relapsed within 18 months of starting therapy. Early relapse: More than 18 months after starting therapy but less than 6 months from stopping therapy. Late relapse: More than 6 months from stopping therapy.

Data were collected on the patient diagnosis, treatment protocol, delay in chemotherapy, duration of delay in chemotherapy in days, number of cycles of chemotherapy affected, delay in surgery, duration of delay of surgery, radiotherapy delay along with duration of delay, the reasons of delay and outcome after one year of follow-up. Statistical Package for Social Sciences (SPSS) version 20 was used; percentages were used for categorical variables, while mean and standard deviation was used for continuous variables. Chi-square or Fisher Exact tests were used to measure the outcome of the patients.

A total of 258 patients on active oncology treatment were included from March 15 to June 15, 2020. Descriptive statistics of delay in treatment and its impact on outcome presented in Table I. The most common malignancy was pre-B acute lymphoblastic leukemia. All those patients were followed for one year, and after one year, 23 (19.4%) patients relapsed. In those 23 patients, n=7 (30%) patients had very early relapse, n=13 (56.5%) had early relapse, and n=3 (13.5%) had late relapse. While those patients whose treatments were not delayed, n=8 (5.7%) patients relapsed, including two (25%) patients with very early relapse, five (62.5%) with early relapse, and one (12.5%) had late relapse.

Table I: Descriptive statistics of different delay in treatment and its impact on outcome.

Total patients 258	Frequency N (%)
Delay in chemotherapy Yes No	 105(40.7) 153 (60.3)
Delay in surgery Yes No	 9(3.5) 1(0.4)
Delay in radiotherapy Yes No	 4 (1.6) 3 (1.2)
Delay in treatment Yes No	 118 (45.7) 140
Outcome of patients whose treatment delayed (n=118) Remission Relapse Absconded	 89 (75.6) 23 (19.4) 6 (5)
Outcome of patients whose treatment not delayed (n=140) Remission Relapse	 129 (92.1) 11 (7.9)
Number of relapses in different malignancies ALL n=146 Osteosarcoma n=31 Ewing sarcoma n=12 Hepatoblastoma n=5 Burkitt's lymphoma n=9 Wilms tumor n=13 Retinoblastoma n=13	 20 (13) 5 (16) 3 (25) 3 (60) 1 (11) 1 (8) 1 (8)

In pediatric oncology patients, the overall morbidity of COVID -19 infections were low with only 5% requiring hospitalisation for symptoms of COVID-19 and less than 1% of cases reported from China were in children younger than 10 years.[4] Lee *et al*. showed patients age, gender and comorbidities affected the mortality due to COVID-19 infection.

However, they were not able to find evidence that cancer patients on cytotoxic chemotherapy or other anticancer treatment are at an increased risk of mortality from COVID-19 disease compared with those of on active treatment.

The routine oncological care such as induction of new cancer patients and in patient services were affected in several ways at the study centre during COVID–19 pandemic, while chemotherapy services remained continued in an outpatient ward. Ribeiro *et al*. reported in his study that there was a strong correlation between annual government healthcare expenditure per capita and childhood cancer survival. The most common cause of delay in treatment in our study was that patients did not come in hospital for planned chemotherapy due to non-availability of transport as these patients were living in faraway cities and they needed transport to reach hospital.

In this study, most affected patients were of acute lymphoblastic leukemia and approximately 60 percent of relapse patients were of acute lymphoblastic leukemia. A study conducted by *de* Oliveira *et al*. showed event free survival was higher in those patients whose had minimal interruption in chemotherapy during treatment.[5]

This study results showed that those patients whose treatment affected due to COVID-19 pandemic had relapsed more frequently than those whose treatment not interrupted. Similarly, very early relapse in acute lymphoblastic leukemia were observed in those patients whose treatment delayed.

One study, conducted by Bilal Abou Ali, *et al*, showed that in osteosarcoma patients the effect of delay in local control by surgery greatly affected the overall survival of sarcoma patients.[6]

In the present study, nine patients' surgeries were affected due to COVID -19 pandemic. In the same way, late resumption of chemotherapy after local control also affected the outcome of non-metastatic sarcoma.

Hodgkin lymphoma radiotherapy treatment was delayed more than 3 months and there is high chance of recurrence of disease due to incomplete treatment. Enucleation in group E disease retinoblastoma malignancy at an appropriate time, was very important because patients already present very late, to reduce the risk of disease metastasis.

This pandemic causes collateral damage that is bigger threat for this patient population and in fact for many other individuals as well. The impact of COVID-19 pandemic on the survival outcome of pediatric oncology patients will continue to be seen over the next two years as to how many patients relapse due to inadequate oncology management.

ETHICAL APPROVAL:

This retrospective descriptive study was approved by Institutional Review Board of Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore.

CONFLICT OF INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

IIS: Conception and design, Provision of study material, Collection and assembly of data, Data analyses and interpretation.
NS: Provision of study material, Data analyses and interpretation.
SS, AK: Administrative support, Collection and assembly of data.
HS: Data analyses and interpretation.
All authors involved in manuscript writing.

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