

Improving Outcomes in Children with Cancer

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Abstract

Data of children receiving chemotherapy (age 0 – 18 years) were retrospectively collected over a study period of 2½ years (November 2018–June 2021). Age, sex, underlying diagnosis and their current disease status were recorded and analyzed. A total of 88 children with cancer have received chemotherapy in the study period. Of these, 65 children who were primarily treated in our unit were included in further analysis. The median age is five years (range 7 months–17 years) and M:F = 32:33. The underlying diagnosis include B-ALL (35), T-ALL (4), Hodgkin lymphoma (4), T-Lymphoblastic Lymphoma (2), AML (2), Ewing sarcoma (2), Germ cell tumour (2), Langerhans cell histiocytosis (2), Medulloblastoma (2), Rhabdomyosarcoma (2), Chronic Myeloid Leukemia (1), Mixed Phenotype Acute Leukemia (1), Burkitt Lymphoma (1), Neuroblastoma (1), Wilms tumour (1), Relapse ALL (1), Relapse Rhabdomyosarcoma (1) and Relapse Hodgkin lymphoma (1). In a median follow up 13 months (range: 0–31 months), the survival rate is 93.8% (61/65). Six children are on initial phase of therapy and awaiting response assessment. Among others, 88% (52/59) children are in complete remission (CR) of their disease (CR1 in 48 and CR2 in 4). Three children are in palliative care due to refractory disease and/or caretakers' choice. Cancer in children is highly curable. Treatment should be made accessible and affordable for all affected children.

Keywords: Paediatric Cancer, Chemotherapy, Survival.

Introduction

In the 1960s, the chance of cure for a child with acute lymphoblastic leukemia (ALL) was less than 10%. Now, the survival rate of childhood ALL has reached nearly 90% [1,2]. Similarly, a variety of other childhood malignancies have seen a tremendous improvement in survival rate including Wilms tumour, hepatoblastoma, lymphoma, etc. Improvement in chemotherapy regimen, surgical and radiotherapy techniques have contributed a major part in this success. The improvement in survival is also attributed to other factors including a better understanding of heterogeneity in childhood cancer and better supportive measures including instant availability of

safe blood products, prevention of infections (using prophylaxis and hygiene conditions) and availability of effective antibiotics and diagnostic modalities. Pediatric oncology in developing countries is a different entity as compared to developed world. It faces different set of obstacles including poverty, other overwhelming societal priorities, lack of awareness, lack of cancer registries, lack of access to diagnosis and treatment, lack of trained staff and health infrastructure [2]. These are increasingly dealt with collaborations among various treating institutions, NGOs, parent groups, WHO and governments around the world.

Methods

Data of children (age 0 – 18 years) who received chemotherapy from Pediatric Hematology Oncology Unit, Kauvery Hospital, Trichy were retrospectively collected over a study period of 2½ years (November 2018–June 2021). Age, sex, underlying diagnosis and their current disease status were recorded and analyzed.

Results

A total of 88 children with cancer have received chemotherapy in the study period. Of these, 23 children were primarily treated in another center and received only a part of their chemotherapy in our unit due to travel restrictions and hence were not included in further analysis.

Hence, remaining 65 children who received their entire chemotherapy regimen from our unit were included for further analysis. The demographic and clinical data were summarized in **Table 1**.

Table 1: Demographic and clinical data of 65 children

Age range	7 months–17 y (Median: 5 y)
Age groups	0–5 years: n = 35 6–10 years: n = 17 >10 years: n = 13

Sex ratio	32 boys, 33 girls
Underlying Diagnosis	B-Acute Lymphoblastic Leukemia-35(BCR-ABL + in 3) T-Acute Lymphoblastic Leukemia - 4 Hodgkin Lymphoma - 4 T-Lymphoblastic Lymphoma - 2 Acute Myeloid Leukemia - 2 Ewing sarcoma - 2 Germ cell tumour - 2 Langerhans cell histiocytosis - 2 Medulloblastoma - 2 Rhabdomyosarcoma - 2 Chronic Myeloid Leukemia - 1 Mixed Phenotype Acute Leukemia - 1 Burkitt Lymphoma - 1 Neuroblastoma - 1 Wilms tumour - 1 Relapse ALL - 1 Relapse Rhabdomyosarcoma - 1 Relapse Hodgkin - 1

- 10-year-old boy with Mixed Phenotype Acute Leukemia – disease was refractory to multiple lines of chemotherapy and was on palliative care – subsequently died of COVID-19 pneumonia.

The current status of remaining children is summarized in **Table 2**.

Table 2: Demographic and clinical data of 65 children

Overall survival (in a median follow-up of 13 months)	61/65 = 93.8%
Complete Remission 1 (maintains disease remission after 1 st line of therapy)	48 children
Complete Remission 2 (maintains disease remission after 2 nd line of therapy)	4 children
On initial therapy and awaiting response assessment	6 children
On palliative care (due to refractory disease and/or parents' choice)	3 children

Overall Survival

The median follow up of the patients is 13 months (range: 0–31 months). In this short follow up, the current survival rate is 93.8% (61 out of 65 children). There were four deaths in the study period as described below:

- 5-year-old girl with metastatic neuroblastoma–family opted for upfront palliative treatment. Remained well for one year on metronomic chemotherapy. Subsequently, she succumbed to disease progression in CNS.
- 11-year-old girl with Ph-positive B-ALL who presented with tumour lysis, renal failure and respiratory failure – initially improved and subsequently died due to severe diabetic ketoacidosis with sepsis.
- 8-year-old boy with multiply relapsed B-ALL (treated elsewhere), who came for continuation of palliative care – subsequently succumbed to disease progression six months after coming to us.

Discussion

Treatment of childhood cancer is a success story of modern medicine in which effective treatments have been identified for previously untreatable diseases [1]. As infection, respiratory illness, and malnutrition become less important contributors to mortality in developed countries, cancer becomes a more prominent cause of disease-related death. Cancer is the most common cause of disease-related death in children in the United States (27% of deaths). As public health improves and common childhood diseases are addressed successfully in low-income countries, the importance of cancer as a cause of childhood mortality increases. The gap in survival between children with cancer in low-income countries versus high-income countries continues to widen as curative therapies are developed in the latter but are not implemented in the former. Twinning programs between centers in these two different parts of the world help in

long-term feasible and effective improvements in the standard of care [2].

Mistaken Myths

Let aside lay public, even many of the medical fraternity in our country have the belief that children with cancer are not curable. The concept has significantly changed over the recent decades. Nearly 70–80 % of children diagnosed with cancer are cured in developed countries. However, making people gain access to health services poses a big problem in our country, despite significant improvements in health infrastructure. Ignorance, misguidance and financial instability remain the root causes that need to be overcome to improve the survival rate. Once under treatment in a tertiary center, to retain a patient to complete therapy is another struggle. Various interferences including misguidance by peers, loss of hope and difficulty in financial sustenance interplay in molding caretakers' interest in adhering to therapy. Having support from various NGOs have contributed in completing the treatment in a majority of children in our cohort.

Conclusion

Cancer in children is highly curable. Treatment should be made accessible and affordable for all affected children.

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Author contributions

All the authors were involved in the management of the child. Vinod Gunasekaran drafted the manuscript.

Competing interests

The authors have no competing interest to declare.

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