

# Study on the Effect of Palliative Care in the Treatment of Acute Lymphoblastic Leukemia with Pegaspargase

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## Dai: Treatment of Acute Lymphoblastic Leukemia with Pegaspargase

The aim of this study is to investigate the impact of palliative care on the treatment of acute lymphoblastic leukemia with pegaspargase in children. A hundred children with acute lymphoblastic leukemia received treatment at our hospital's hematology department from October 2021 to September 2022 and were randomly distributed to the observation and control groups. Both groups received the treatment of vincristine, daunorubicin, pegaspargase and prednisone. While the observation group underwent palliative care, the control group received regular nursing care simultaneously. We conducted a statistical analysis of adverse reactions, quality of life, and negative emotion improvement in both groups to assess the potential impact of palliative care on acute lymphoblastic leukemia. Significantly lower occurrence of adverse reactions and self-rating anxiety scale/self-rating depression scale scores were observed in the observation group compared to the control group, along with higher scores for physical, emotional, academic and daily-life functional capability. Palliative care can effectively mitigate the adverse reactions of chemotherapy, enhance the quality of life, and improve the psychological state of children with acute lymphoblastic leukemia.

**Key words:** Acute lymphoblastic leukemia, palliative care, pegaspargase, chemotherapy, radiotherapy

Acute Lymphoblastic Leukemia (ALL), a common childhood malignancy, is characterized by symptoms such as anemia, infection, fever, bleeding and infiltration of organs and tissues<sup>[1,2]</sup>. The conventional treatment method for ALL patients includes chemotherapy, radiotherapy and stem cell transplantation. Pegaspargase, a highly selective biological enzyme, can enter the blood stream and act on plasma asparagine synthetase to promote the death of leukemia cells. It has been widely recognized by clinicians for its efficacy in treating ALL and is currently used as a first-line drug in children's chemotherapy regimens<sup>[3,4]</sup>. Although these treatments can effectively eliminate cancer cells, they often cause many side effects. The toxic reactions induced by chemotherapy often lead to fatigue of the immune system, damage to the nervous system, and severe gastrointestinal reactions. These adverse reactions can bring patients tremendous pain, reduce their quality of life and even endanger their lives<sup>[5]</sup>. Although some patients may have poor therapeutic effects, good pain control and care

can often significantly improve the life quality of cancer patients. Palliative care is a comprehensive care method that cares for patients through multiple approaches. Based on previous studies, this strategy has shown potential in significantly diminishing pain and emotional distress, enhancing the quality of life and expediting recovery in patients<sup>[6,7]</sup>. The application of palliative care in cancer treatment, particularly during chemotherapy, can be an important aspect of managing pain while preserving the mental health of patients. The primary objective of this investigation is to evaluate the efficacy of pegaspargase therapy and palliative care in pediatric ALL treatment, with the goal of improving treatment approaches. The goal is to increase treatment efficacy, alleviate patient pain, regulate negative emotions, improve life quality, and thereby reduce the risk of infections and complications while also reducing treatment costs. A hundred children with ALL received treatment at our hospital's hematology department from October 2021 to September 2022. Randomization using the random number table

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method resulted in the formation of an observation group and a control group with 50 patients each. The control group comprised 24 males and 26 females, aged 3 y-15 y and with disease risk grading, with an average age of  $(7.14 \pm 1.58)$  y. Participants in the observation group included 23 males and 27 females, aged between 3 y-16 y with a disease risk grade. The average age of the patients was  $(7.31 \pm 1.44)$  y. Both study groups had comparable baseline characteristics, as indicated by non-significant differences in gender, age and disease risk grading ( $p > 0.05$ ). In accordance with ethical guidelines, the ethics committee of the hospital approved this study, and informed consent forms were obtained from all patients' guardians. Inclusion criteria has the aged between 1 y-18 y old; diagnosed with ALL in accordance with the relevant criteria outlined in the "Diagnosis and Treatment Recommendations for Childhood ALL (Fourth Revision)"<sup>[8]</sup>; possessing a certain degree of self-care ability and able to provide reliable information about their condition; patients or their parents or legal guardians must have a clear understanding of the research content and signed a consent form. Exclusion criteria had the being too old or too young; having serious infections or organ dysfunction; having other malignant tumors, blood diseases, or immune diseases; having serious underlying diseases such as mental, nervous system, heart, liver or kidney diseases; having conditions such as platelet counts below  $20 \times 10^9/l$ , white blood cell counts below  $2 \times 10^9/l$ , or high intracranial pressure that are beyond the scope of this study. All patients received the Voluntary Disciplinary Alternative Program (VDAP) regimen consisting of vincristine, doxorubicin, pegaspargase and prednisone. The two groups of patients received different nursing methods including; during pegaspargase treatment, the control group received routine nursing care, which involved nurses providing health education to both patients and their family members on various aspects of the disease and treatment regimen, as well as ensuring patients follow the prescribed medication schedule. They also provided a clean treatment environment to the patients<sup>[9-11]</sup>.

In observation group; in addition to routine care, the observation group received palliative care intervention. Specific contents include; monitoring the patient's pain level and providing appropriate pain management based on their symptoms, including drug treatment and non-drug treatment.

Special attention was given to the type, dosage and frequency of analgesics to avoid the risk of drug dependence. In emotional support and psychological care; communicate with patients more, understand their psychological and emotional status; provide support, understanding and comfort. Psychological interviews, relaxation exercises, shaping therapy, cognitive-behavioral therapy were used to help patients relieve emotional pressure and fear. In nutritional support and disease management; Ensuring that patients receive sufficient nutrition intake, but maintaining a vegetarian diet during treatment to reduce the risk of pancreatitis. The possible complications were assessed for risk, and actively managed and prevented. Pay attention to maintaining the patient's body cleanliness and hygiene to prevent infection, maintain a suitable atmosphere, provide comfortable beds and bedding. The treatment and nursing period was 1 mo, and evaluations were conducted after four consecutive treatment cycles. The evaluation indicators of this study includes the occurrence of adverse reactions; mainly allergies, gastrointestinal reactions, liver function damage, bone marrow suppression, acute pancreatitis, etc.; evaluation of therapeutic efficacy mainly including improvement of symptoms, laboratory indices, imaging examination results and overall survival rate; compliance and adherence to treatment mainly including patient's medication compliance and adherence to doctor's instructions; the primary methods of the economic evaluation were cost-effectiveness analysis, cost-benefit analysis and cost-utility analysis.

The presentation of continuous data was accomplished *via* mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ) notation. Intergroup comparison was accomplished employing independent sample t-tests, while paired t-tests were implemented to determine any changes within each group. Results with a p value of  $\leq 0.05$  were recognized as statistically significant. Statistician utilized Statistical Package for the Social Sciences (SPSS) 22.0 software. The main complications in the two groups of patients include allergy, gastrointestinal reactions, liver function damage, bone marrow suppression and acute pancreatitis, with the incidence rates of adverse reactions being 20 % and 46 %, respectively. The incidence rate of adverse reactions was found to significantly vary between the two groups, with a probability value  $< 0.05$  as shown in Table 1. Before treatment, no significant difference

was observed in the four dimensions of physiological function, emotional function, school function and life function between the groups of patients ( $p > 0.05$ ). A considerable post-treatment improvement in the functional scores across all four dimensions was noticed in both patient groups ( $p < 0.05$ ), with the scores in the observation group significantly higher than those in the control group ( $p < 0.05$ ) as shown in Table 2. Prior to treatment, there was no substantial difference in the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) scores between the observation and control groups of patients ( $p > 0.05$ ). Following treatment, significant reductions were observed in scores for both groups of patients ( $p < 0.05$ ). Meanwhile, the SAS and SDS scores of the observation group of patients were significantly lower than those of the control group ( $p < 0.05$ ) as shown in Table 3. ALL is a prevalent malignant tumor of the blood system in children, and chemotherapy is the mainstay of the primary treatment approach. In recent years, combination chemotherapy plans for childhood ALL have made significant progress and with the continuous improvement and development of various auxiliary treatments, there has been a substantial increase in the cure rate for childhood ALL with the advancement of treatment methods<sup>[12]</sup>. However, traditional methods of chemotherapy such as intravenous injection of L-asparaginase may cause adverse reactions that adversely affect the health of patients<sup>[13]</sup>. In recent years, PEGylated asparaginase has been gradually applied in clinical settings, which has shown significant chemotherapeutic effects and relatively low incidence of side effects<sup>[14]</sup>. Most chemotherapeutic drugs have certain adverse reactions, and long-term use can cause varying degrees of complications, which can pose a severe threat to the health of patients<sup>[15]</sup>. Some patients discontinue chemotherapy because they find it challenging to tolerate severe adverse reactions, which makes it difficult to control their condition. Chemotherapy causes significant pain and stress to patients in multiple aspects, including physical, psychological and spiritual aspects, and seriously affects their quality of life<sup>[16]</sup>. Therefore, improving the survival quality of leukemia patients through appropriate treatment is an important issue for clinical work. Palliative care improves the life quality of patients and their families by identifying symptoms early, correctly evaluating them, managing pain and alleviating

psychological and psychiatric problems<sup>[17]</sup>. In this study, the therapeutic effects of combining palliative care with PEGylated asparaginase treatment for ALL were evaluated from several aspects, including the incidence of adverse reactions, quality of life, and improvement of negative emotions. Chemotherapy for leukemia can cause adverse reactions such as vomiting and nausea, and interventions should be targeted against common adverse reactions, including skin and oral hygiene to prevent infection<sup>[18]</sup>. The incidence of common post-chemotherapy adverse reactions, such as gastrointestinal reactions, bone marrow suppression, allergies, liver function damage and acute pancreatitis, was significantly lower in the observation group compared to the control group, indicating that palliative care can effectively reduce the incidence of adverse reactions to chemotherapy. According to Lin *et al.*<sup>[19]</sup> research, patients who received palliative care demonstrated a lower overall incidence of complications and infections than their counterparts in the control group. This may be attributed to the meticulous monitoring of vital signs, effective pain management, lowered oxygen consumption, and improved patient comfort that is inherent in palliative care, as observed by Lin *et al.*<sup>[19]</sup>. Compared with conventional nursing, palliative care focuses more on psychological interventions for patients, providing appropriate intervention strategies based on their specific psychological conditions to alleviate patient psychological status and improve their hope levels<sup>[20]</sup>. Palliative care was associated with a marked improvement in the quality of life and emotional well-being of patients, as per the findings of this study. The restricted number of participants and the use of a single-center study design were among the limitations of this research. To improve the reliability and generalizability of the study, future large-scale studies should consider a broader range of patient populations. Within the context of pediatric ALL, the findings of this research highlight the pivotal role palliative care can play in helping minimize chemotherapy's adverse reactions, while simultaneously improving the quality of life and psychological status of affected children. However, more large-scale studies are needed to confirm this and explore the mechanism of action of palliative care, thereby optimizing comprehensive treatment strategies to maximize the therapeutic effects and life quality of ALL patients.

**TABLE 1: COMPARISON OF ADVERSE REACTIONS (n %)**

Group	n	Allergy	Gastrointestinal reactions	Impaired liver function	Myelosuppression	Acute pancreas	Overall (%)
Observation	50	1 (2)	2 (4)	3 (6)	4 (8)	0 (0)	10 (20)
Control	50	2 (4)	7 (14)	7 (14)	6 (12)	1 (2)	23 (46)
$\chi^2$							7.644
p							0.006

**TABLE 2: COMPARISON OF PedsQL 4.0 QUALITY OF LIFE UNIVERSAL CORE SCALE SCORES (SCORE,  $\bar{x}\pm s$ )**

Functional dimension	Group	Before	After	t	p
Physiological	Observation	53.13 $\pm$ 5.24	75.93 $\pm$ 6.42	8.391	<0.05
	Control	54.34 $\pm$ 5.51	70.17 $\pm$ 6.16	6.145	<0.05
	t	3.846	7.362		
	p	>0.05	<0.05		
Emotional	Observation	54.62 $\pm$ 6.56	77.14 $\pm$ 7.48	10.184	<0.05
	Control	53.83 $\pm$ 6.17	66.95 $\pm$ 6.87	5.298	<0.05
	t	2.284	6.994		
	p	>0.05	<0.05		
School	Observation	57.14 $\pm$ 7.63	78.38 $\pm$ 9.22	10.273	<0.05
	Control	57.88 $\pm$ 7.39	66.26 $\pm$ 7.82	6.193	<0.05
	t	3.273	8.463		
	p	>0.05	<0.05		
Life	Observation	54.96 $\pm$ 6.15	75.45 $\pm$ 8.28	9.836	<0.05
	Control	55.13 $\pm$ 6.29	66.27 $\pm$ 7.01	6.763	<0.05
	t	4.726	8.649		
	p	>0.05	<0.05		

**TABLE 3: COMPARISON OF EMOTIONAL STATUS**

Scale	Group	Before	After	t	p
SAS	Observation	60.12 $\pm$ 6.34	40.13 $\pm$ 4.47	6.43	<0.05
	Control	60.65 $\pm$ 6.12	49.77 $\pm$ 5.96	9.65	<0.05
	t	0.631	8.452		
	p	>0.05	<0.05		
SDS	Observation	63.14 $\pm$ 6.48	45.82 $\pm$ 5.75	8.612	<0.05
	Control	62.28 $\pm$ 6.33	53.63 $\pm$ 6.65	8.369	<0.05
	t	-2.245	-3.263		
	p	>0.05	<0.05		
	Control	Control	Control	Control	Control

**Conflict of interests:**

The authors declared no conflict of interests.

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