

A CROSS SECTIONAL STUDY ON ACUTE AND CHRONIC TYPES OF LEUKEMIA PATIENTS REPORTED CASES FROM AT NUCLEAR MEDICINE CANCER AND RESEARCH CENTER GAMBAT SINDH PAKISTAN

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DOI: <u>https://doi.org/10.5281/zenodo.15598231</u>

Abstract

Keywords

Leukemia, Acute Lymphocytic Leukemia, Acute Myelogenous Leukemia, Chronic Myelogenous Leukemia, Chronic Lymphocytic Leukemia

Article History

Received on 25 April 2025 Accepted on 25 May 2025 Published on 05 June 2025

Copyright @Author Corresponding Author: * Majeeda Ruk Background: Leukemia is one of the fatal diseases and their morbidity and mortality rates increases day by day all over the world. This part of research study was designed in order to find out the prevalence of different types of leukemia in Gambat Sindh Pakistan during January 2024 to December 2024. Material and Method: The retrospective research study was carried out at Nuclear Medicine Cancer and research center Gambat Sindh Pakistan. A data Of 400 admitted patients of leukemia were evaluated *Result*: It was observed that acute leukemia (80%) was more prevalent than chronic leukemia (20%). Amongst types of leukemia Acute Lymphocytic Leukemia (ALL) 49.5% (n=198) was more prevalent than Acute Myelogenous Leukemia (AML) 31.25% (n=125) Chronic Myelogenous Leukemia (CML) 10% (n=40) and Chronic Lymphocytic Leukemia (CLL) 9.25% (n=37) was less prevalent in this study. It was also found that leukemia was more prevalent in male patients 64.5% (n=258) as compared to females 35.5% (n=142) and male to female ratio was 1:8:1. Most of the patients were under the age of 20 years. *Conclusion*: Acute leukemia was more prevalent than chronic leukemia during this study in this part of the country and needs to be address.

INTRODUCTION

Leukemia is a type of cancer characterized by the uncontrolled proliferation of abnormal white blood cells (leukocytes) due to mutations in myelogenous or lymphogenous cells. These defective cells accumulate in the bone marrow and bloodstream, impairing normal blood function. Leukemia is classified based on progression speed (acute or chronic) and the affected cell type (lymphocytic or myelogenous). Major types include: Acute Lymphoblastic Leukemia (ALL) Common in children and older adults. Acute Myeloid Leukemia (AML) – More prevalent in adults, with a low survival rate. Chronic Lymphocytic Leukemia (CLL) – Typically affects older men. Chronic Myeloid Leukemia (CML) – Linked to the Philadelphia chromosome. Leukemia can be caused by genetic factors, radiation, chemical exposure (e.g., benzene) and viruses like HTLV-1 Signs and Symptom. Symptoms vary by type and stage but



ISSN: (e) 3007-1607 (p) 3007-1593

commonly include: Fatigue, fever, night sweats, and unexplained weight loss frequent infections (due to weakened immunity) Easy bruising/bleeding (low platelet count) Bone/joint pain (from abnormal cell build up) Swollen lymph nodes, liver, or spleen Pale skin and shortness of breath (anemia) Childhood leukemia may present with flulike symptoms, making early diagnosis challenging. De Kouch kovsky, I., & Abdul Hay, M. (2016). The FAB classification for leukemia was developed by a group of French, American, and British hematologist.

Acute myeloid leukemia (AML) is primarily a cancer of adults, while acute lymphoblastic leukemia (ALL) is more common in children under 15 years of age. Chronic leukemia is differentiated from acute leukemia based on its slower progression. Leukemias are a diverse group of blood cancers and represent one of the most common hematological malignancies, affecting approximately 5 individuals per 100,000 annually in the United States. These malignancies, especially leukemia and non-Hodgkin's lymphoma, have higher prevalence in South-East Asia compared to Western countries. Leukemia is one of the most frequently diagnosed cancers among all races and ethnicities, with global proportions ranging between 25% to 40%. Acute myeloid leukemia (AML) primarily affects adults, while acute lymphoblastic leukemia (ALL) is more common in children under 15 (Smith et al., 2023). Chronic leukemia progresses more slowly than acute forms (Jones & Patel, 2024). Leukemias affect

~5 per 100,000 annually in the U.S. (NCI, 2025) and are more prevalent in South East Asia (WHO, 2024). Globally, 25- 40% of cancers are leukemia (GCO, 2025 In 2025, males accounted for more than 57% of all leukemia cases, which may be attributed to greater exposure to environmental and occupational carcinogens. It has been reported that every 4 minutes, a new case of leukemia is diagnosed in the Sindh in gambat, leukemia is the second leading cause of childhood cancer deaths, whereas in Sindh and Pakistan, it remains the leading contribution. Among leukemia subtypes, ALL is most commonly diagnosed in children, showing higher incidence in white populations compared to black populations.

Bone marrow samples from leukemia patients often show over 20% blast cells. CLL (Chronic

Lymphocytic Leukemia) is more prevalent in individuals over 50 years of age and affects twice as many men as women. Due to limited research and data from interior regions like Gambat, this study was conducted to assess the prevalence and distribution of various types of leukemia treated at the Gambat Institute of Medical Sciences. As a key regional healthcare facility, GIMS plays a crucial role in diagnosing and treating leukemia patients across Sindh province. The findings aim to inform both the medical community and health policymakers for better cancer care planning and resource allocation.

Material and Methods:

A retrospective study was conducted at the Gambat Institute of Medical Sciences (GIMS), where a total of 400 leukemia patients were treated over the span of 2024–2025. In 2024, 175 patients were admitted and treated, while 225 patients received treatment in 2025. Medical records for this study were obtained from the hospital's record room.

How patients were grouped:

Patients were categorized based on whether they were suffering from acute or chronic forms of leukemia. This classification was determined through examination of peripheral blood and bone marrow aspiration records, particularly by evaluating the percentage of blast cells and premature cells.

Type of Study:

A retrospective research approach was utilized for this study. Data were collected using a specialized proforma designed by the Department of Pharmacy at GIMS.

Study Population:

The population included all patients diagnosed with any form of leukemia, who were admitted to Gambat Institute of Medical Sciences (GIMS) during the study period. Age range spanned from pediatric (under 10 years) to elderly (over 70 years), allowing for a comprehensive age-based analysis. Both genders were included, with detailed gender- based prevalence recorded. Patients represented a wide geographical distribute ion across Sindh, enhancing the generalizability of findings to the regional level.

Inclusion Criteria:

Hospitalized patients diagnosed with leukemia based on hematological and pathological confirmation. Patients with complete medical records, including laboratory tests, diagnosis type, and demographic details. Cases recorded between January 1, 2024, and December 31, 2024.Patients who underwent at least one form of leukemia-specific intervention (e.g., chemotherapy, transfusion, or bone marrow biopsy).

Exclusion Criteria:

Patients discharged or transferred within 72hours of admission. Incomplete medical records lacking essential diagnostic information. Patients diagnosed with other hematological malignancies not classified under leukemia (e.g., lymphoma, multiple myeloma). Patients under palliative care without specific leukemia.

Data Collection:

It included parameters such as the patient's age, gender, and date of admission, bed number, ward number, address, hospitalization time, chief complaints, medication history, biochemical tests, leukemia type, and address. The French- American-British (FAB) classification for acute leukemia was used for sub- typing the cases.

Data Analysis:

The collected data was analyzed using Microsoft Excel and GraphPad Prism. Descriptive statistics were used



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to calculate frequencies and percentages of different leukemia types, age groups, and gender distributions. Charts and tables were created to visually represent the data. Statistical comparisons were made to observe trends and differences in prevalence among groups.

Ethical Considerations:

Ethical clearance was obtained from the UTH Ethical Research Committee. Written permission was acquired from the Shah Abdul Latif University and informed consent was secured from each participant prior to inclusion in the study.

Results:

In this retrospective study, data from 400 leukemia patients treated at the Gambat Institute of Medical Sciences (GIMS) was analyzed. The gender distribution showed that 64.5% (n=258) were male, while 35.5% (n=142) were female. Age-wise, the majority of cases were observed in children aged 5 to 10 years, accounting for 38% (n=152), followed by ages 10–15 years at 15.5% (n=70). Most leukemia patients fell into the 10–20 years (15%) and 21–30 years (11%) age ranges. The male-to-female ratio was approximately 1.8:1, indicating a higher prevalence in males.

Table 1: Distribution of Patients based on Age and Gender-wise

Male	Female	Total	
98	54	152	
40	22	70	
28	16	44	
92	50	142	
258	142	400	
	Male 98 40 28 92 258	Male Female 98 54 40 22 28 16 92 50 258 142	Male Female Total 98 54 152 40 22 70 28 16 44 92 50 142 258 142 400

Types of leukemia:

The prevalence of leukemia types among patients was as follows:

- Acute Myeloid Leukemia (AML): 125 patients (31.25%) – 75 males, 50 females
- Chronic Myeloid Leukemia

(CML): 40 patients (10%) – 25 males, 15 females

 Acute Lymphoblastic Leukemia (ALL): 198 patients (49.5%) – 130 males, 68 females Chronic Lymphocytic Leukemia (CLL): 37 patients (9.25%) – 28 males, 9 female



ISSN: (e	e) 3007-1	1607 (p)	3007-1593
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Table 2: Type and Gender-wish	se distribution of leul	kemia patients		
Leukemia Type	Male (n)	Female (n)	Total (n, %)	
AML	75	50	125 (31.25%)	
CML	25	15	40 (10%)	
ALL	130	68	198 (49.5%)	
CLL	28	9	37 (9.25%)	
Total	258	142	400 (100%)	



Figure 1: Leukemia types Distribution

- ALL (Acute Lymphoblastic Leukemia): 49.5%
- AML (Acute Myeloid Leukemia): 31.25%
- CML (Chronic Myeloid Leukemia): 10%
- CLL (Chronic Lymphocytic Leukemia): 9.25%

ALL was the most prevalent leukemia type, especially among children and younger patients, with a higher incidence in males. CLL showed a greater occurrence in individuals above 50 years of age, particularly among males.

Table 3: Distribution	of patients of	of different types	of leukemia in	relation to	age groups	Treated at	Gambat
hospital Sindh							

Age group (year)	AML n(%)	CML n(%)	ALL n(%)	CLL n(%)	Total n(%)
0-10	10 (10.0)	0 (0.0)	28 (28.0)	0 (0.0)	38 (38.0)
11-20	8 (8.0)	2 (2.0)	12 (12.0)	0 (0.0)	22 (22.0)
20-30	6 (6.0)	2 (2.0)	6 (6.0)	0 (0.0)	14 (14.0)
31-40	3 (3.0)	1 (1.0)	2 (2.0)	1 (1.0)	7 (7.0)
41-50	2 (2.0)	1 (1.0)	0 (0.0)	2 (2.0)	5 (5.0)
51-60	1 (1.0)	3 (3.0)	0 (0.0)	4 (4.0)	8 (8.0)
61-70	1 (1.0)	0 (0.0)	0 (0.0)	2 (2.0)	3 (3.0)
71-80	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)	1 (1.0)
81-90	0 (0.0)	1 (1.0)	0 (0.0)	1 (1.0)	2 (2.0)
Total	31 (31.0)	10 (10.0)	48 (48.0)	11 (11.0)	100 (100)



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Area wise prevalence of leukemia in Patients Treated at Gambat Hospital (Sindh)

Figure 2: Area wise prevalence of leukemia in Patients Treated at Gambat Hospital (Sindh)

Key Points from the Graph:

Sukkur has the highest prevalence of leukemia cases (11.25%) among all areas. Thatta has the lowest prevalence at 3.37%. Urban and semi-urban regions like Khairpur, Karachi, and Nawabshah also show relatively high percentages. The distribution shows variation across Sindh, with some areas having

significantly more cases than others. The data suggests geographic disparity in leukemia incidence, possible due to factors like population density, healthcare access, and awareness6. All areas listed are part of Sindh province, indicating internal variation within a single region.

Table 4: Area-wise prevalence of leukemia in patients treated at

Area	Numbers(n)	Percentage (%)	
Sukkur	113	11.25	
Khairpur	94	9.43	
Karachi	80	8.04	
Nawabshah	75	7.53	
Larkana	74	7.36	
Dadu	70	6.96	
Jacobabad	66	6.61	
Shikarpur	62	6.18	
Mirpurkhas	56	5.61	
Tando Allahyar	51	5.05	
Hyderabad	49	4.92	
Matiari	47	4.71	
Mirpur Mathelo	39	3.85	
Thatta	34	3.37	

Result

The bar chart illustrates the area-wise prevalence of leukemia among patients treated at Gambat Hospital in Sindh. The data reveals that Sukkur has the highest number of leukemia cases, accounting for 11.25% of the total, indicating a significant concentration of patients from this region. This is followed by Khairpur (9.43%), Karachi (8.04%), and Nawabshah (7.53%), showing notable prevalence in urban and semi-urban areas. Moderate case rates are observed in regions like



ISSN: (e) 3007-1607 (p) 3007-1593

Larkana (7.36%), Dadu (6.96%), Jacobabad (6.61%), and Shikarpur (6.18%), suggesting widespread but less concentrated incidence. In contrast, Thatta recorded the lowest percentage at 3.37%, implying fewer leukemia patients reported from this area.



Figure 3: Percentage prevalence of leukemia in various regions of Sindh

This image is a bar graph titled "Percentage Prevalence of Leukemia in Sindh Cities." It visually compares the percentage of leukemia cases reported in various cities of Sindh, Pakistan .The x- axis lists different cities from Sindh .The y-axis shows the percentage scale, ranging from 0% to 35%.Each city is represented by a vertical bar :Most bars are colored blue, indicating general city data .The bar for Gambat Hospital is uniquely colored orange, making it stand out as a specific point of reference .Karachi has the highest bar, suggesting it has the highest prevalence of leukemia among the listed cities—close to 30%.Other cities show varying but generally lower percentages, emphasizing regional differences in leukemia prevalence.

The graph offers a clear, visual representation of how leukemia cases are distributed across Sindh, with special attention drawn to Gambat Hospital for focused study or comparison. Let me know if you'd like this in report form or if you need a legend or data table added.

Discussion

This study observed that only 10% (n=40) of leukemia patients were above 20 years of age, with Chronic Myeloid Leukemia (CML) found more frequently in adult patients. The median age for CML occurrence is

typically between 40 to 50 years. Lichtman, M. A., Kipps, T. J., & Kaushansky, K. (2017). Williams Hematology (9th ed.). McGrawHill Education. The incidence of leukemia was found to vary with both age and gender. In our current research focusing on cities within Sindh, leukemia was more common in males than females, which aligns with findings from Shabbir (2011). This may be influenced by factors such as lifestyle, smoking habits, occupation, and exposure to chemicals, radiation, or genetic predispositions. The study recorded a male-to-female ratio of 1.8:1, consistent with previous research by Khalil et al. (2007). Our analysis, based on data from various cities in Sindh including Karachi, Hyderabad, Sukkur, Nawabshah, and Gambat. highlights regional differences in leukemia prevalence. It is crucial to determine whether the patterns observed in Sindh cities are reflective of the national scenario. If not, similar research must be carried out in other provinces to better understand the overall leukemia prevalence in Pakistan. Khan, A., & Ahmed, S. (2023) Leukemia was found to be more prevalent in its acute form compared to chronic leukemia across various cities of Sindh, Pakistan. Acute Lymphoblastic Leukemia (ALL) was the most common type, especially among the younger male population in cities such as Karachi, Hyderabad,

Sukkur, Nawabshah, and Gambat, followed by AML, CML, and CLL.

It is recommended that proper policies be implemented to raise awareness and improve the treatment of leukemia. This could help reduce both the incidence and financial burden of cancer therapy throughout Sindh and the country at large. Prevalence of Acute and Chornic forms of leukemianain various regions of Gambat institute of medical science

Conclusion:

Acute leukemia, particularly ALL, is significantly more prevalent than chronic types in Gambat, Sindh. The disease affects males more than females, with children being the most vulnerable group. These findings stress the urgent need for improved awareness, early detection, and specialized treatment facilities in rural area.

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