

# Demographic and Clinical Profile Of Chronic Myeloid Leukemia Patients in a Resource-Limited Setting: A Comprehensive Analysis

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## Abstract:

### Objective:

Chronic Myeloid Leukemia (CML) is a global healthcare burden, especially in resource-poor areas with limited access to modern treatment. This study will extensively analyze CML patients' demographic and clinical characteristics in such settings. We analyze CML prevalence, age distribution, illness presentation, treatment trends, and outcomes using [insert data source(s)]. We also examine how healthcare institutions manage CML with limited resources. This study aims to inspire personalized therapies and maximize healthcare resource allocation for improved patient outcomes by highlighting the nuanced landscape of CML in resource-limited settings.

### Methodology:

Demographic and clinical data from 410 CML patients were evaluated. Age distribution, gender, regional representation, clinical data (spleen size, WBC counts, hemoglobin levels, platelet counts), illness phase, molecular studies (PCR, FISH), risk stratification, treatment modalities, and patient outcomes were considered.

### Results:

**Demographics:** The mean age of 410 CML patients was 38.31 years, ranging from 11 to 80. Age distribution showed significant participation in the 31-50 age group (53.41%), followed by 12-30 (29.76%) and 51-70 (16.59%) groups. The gender split was 57.56% male and 42.44% female. AJK (50.49%), Punjab (27.80%), and Khyber Pakhtunkhwa (4.15%) contributed most.

**Clinical and Hematological Parameters:** Spleen size examination showed mild (4.63%), moderate (47.80%), and major (>8 cm) enlargement. Over 100,000 (31.22%) and 300,000 (17.80%) WBC counts showed diversity. Low hemoglobin (11.95%) to high hemoglobin (16.10%). Platelet counts ranged from <150,000 (7.56%) to >350,000 (37.56%).

**Disease Phase and Molecular Analysis:** Chronic phase distribution was 92.68%, accelerated phase 7.07%, and blast phase 0.24%. Quantitative PCR showed positive results in 88.29%, negative results in 2.44%, and 9.27% not tested. FISH analysis showed positive results in 6.83% and negative results in 0.49%, with 92.68% not tested.

**Risk stratification and treatment:** SOKAL score-based risk stratification classified 10.73% as low, 64.63% as intermediate, and 24.63% as high. Treatments comprised imatinib (40.49%) and nilotinib (59.51%). CHR was achieved by 85.37% of 86.83% with follow-up data.

## Conclusion:

This study covers varied demographics and clinical features of Chronic Myeloid Leukemia (CML) in a resource-limited healthcare setting. The study's findings show that controlling CML in limited settings is complicated by disease stages, risk stratification, and treatment regimens. Complete Hematological Response (CHR) rates are promising. These findings suggest age-, gender-, and regional-specific treatments to optimize patient care in resource-limited settings. The study emphasizes adaptable techniques in the face of changing demographic and clinical circumstances, adding to CML management discourse.

**Keywords:** Chronic Myeloid Leukemia, Resource-Limited Settings, Demographics, Clinical Characteristics, Treatment Patterns, Healthcare Challenges.

## Introduction:

CML is a subgroup of hematological malignancies with the Philadelphia chromosome and BCR-ABL1 fusion gene. This genetic abnormality causes myeloid cell proliferation to be dysregulated, resulting in immature bone marrow and peripheral blood cells. Historically, CML had a dismal prognosis and advanced stages with few therapy choices. However, tyrosine kinase inhibitors (TKIs), particularly imatinib, have transformed CML care into a chronic condition with long-term survival prospects.

TKIs are highly effective, but maximizing results for all patients, especially in resource-limited healthcare settings, is difficult. The demographic and clinical diversity of CML, together with differences in healthcare infrastructure and treatment access, requires unique methods for each patient community. To develop effective CML treatment techniques in resource-limited areas, one must understand the disease's particular traits and limitations.

We want to illuminate the demographic and clinical landscape of CML in resource-limited healthcare settings, including prevalence, clinical presentation, treatment patterns, and outcomes. We examine epidemiological and clinical data to uncover demographic differences in access to care, treatment adherence, and therapy response. We also want to understand how socioeconomic factors, healthcare infrastructure, and policy affect resource-limited CML management.

This study analyzes demographic and clinical data to enable targeted interventions that improve patient outcomes while managing resource constraints. We seek to build sustainable healthcare strategies that enable equitable access to appropriate treatment for all CML patients, regardless of geography or socioeconomic background, by identifying barriers to care and opportunities for improvement.

## Methods:

Collecting and analyzing data from 410 patients with chronic myelogenous leukemia allowed for the identification of demographic and clinical patterns. Age distribution, gender, regional representation, clinical parameters (spleen size, white blood cell counts, hemoglobin levels, platelet counts), illness phase, molecular analysis (PCR, FISH), risk stratification, treatment modalities, and patient outcomes were all categories that were included in the parameters analyzed.

## Results:

Out of the 410 patients diagnosed with Chronic Myeloid Leukemia (CML), the mean age was 38.31 years (SD = 12.812), ranging from 11 to 80 years. Age distribution revealed 122 patients (29.76%) in the 12-30 years group, 219 patients (53.41%) in the 31-50 years group, 68 patients (16.59%) in the 51-70 years group, and 1 patient (>70 years). Among the patients, 236 (57.56%) were male, and 174 (42.44%) were female.

The geographic distribution of patients indicated that 38 patients (9.27%) were from Islamabad, 114 (27.80%) from Punjab, 207 (50.49%) from AJK, 17 (4.15%) from Khyber Pakhtunkhwa (KPK), 30 (7.32%) from Gilgit-Baltistan (GB), and 4 (0.98%) from Afghanistan.

**Clinical and Hematological Parameters:** Spleen size was evaluated, revealing mild increase (1-3 cm) in 19 patients (4.63%), moderate increase (4-8 cm) in 196 patients (47.80%), and massive spleen enlargement (>8 cm) in 195 patients (47.56%). White Blood Cell (WBC) count analysis demonstrated counts above 100,000 in 128 patients (31.22%), counts between 100,000 and 300,000 in 209 patients (51.22%), and counts exceeding 300,000 in 73 patients (17.80%).

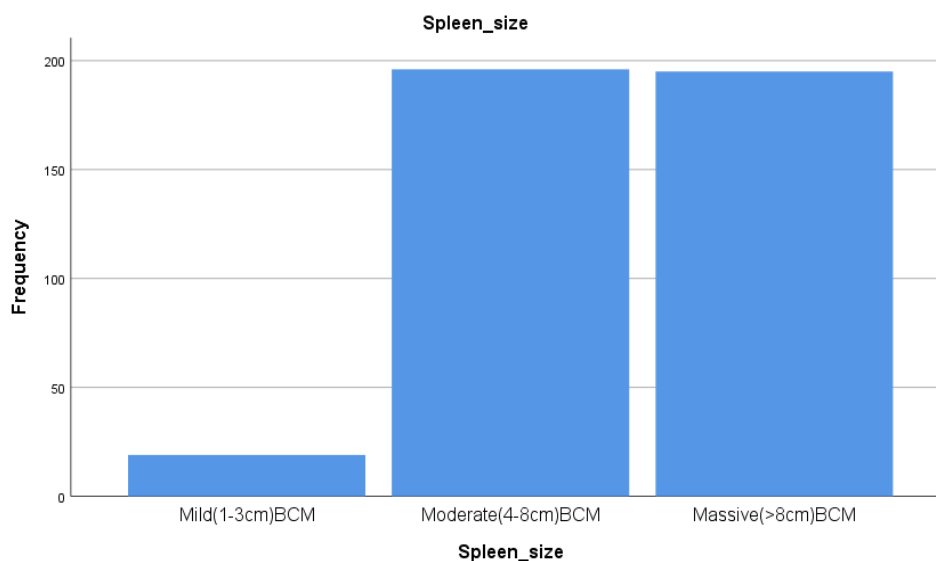
Hemoglobin levels were categorized, with 49 patients (11.95%) having Hb levels below 8 g/dL, 295 patients (71.95%) between 8 and 12 g/dL, and 66 patients (16.10%) with Hb levels above 12 g/dL. Platelet counts were distributed as follows: 31 patients (7.56%) had counts below 150,000, 225 patients (54.88%) had counts between 150,000 and 350,000, and 154 patients (37.56%) had counts exceeding 350,000.

**Disease Phase and Response:** Based on disease phase, 380 patients (92.68%) were in the chronic phase, 29 patients (7.07%) were in the accelerated phase, and 1 patient (0.24%) was in the blast phase. Quantitative PCR analysis was performed, revealing positive results in 362 patients (88.29%), negative results in 10 patients (2.44%), and PCR not conducted in 38 patients (9.27%).

Fluorescence In Situ Hybridization (FISH) analysis demonstrated positive results in 28 patients (6.83%), negative results in 2 patients (0.49%), and was not conducted in 380 patients (92.68%). Cytogenetic analysis revealed positive results in 95 patients (23.17%), negative results in 2 patients (0.49%), and was not conducted in 313 patients (76.34%).

**Risk Stratification and Treatment:** Based on the SOKAL score, 44 patients (10.73%) were categorized as low risk, 265 patients (64.63%) as intermediate risk, and 101 patients (24.63%) as high risk. Among the treatment modalities, 166 patients (40.49%) received imatinib, and 244 patients (59.51%) received nilotinib.

Follow-up data were available for 356 patients (86.83%), while 54 patients (13.17%) were lost to follow-up. Complete Hematological Response (CHR) was achieved in 350 patients (85.37%), while 6 patients (1.46%) did not achieve CHR. At the one-year mark, PCR analysis revealed Major Molecular Response (MMR) in 148 patients (36.10%), MMR not achieved in 24 patients (5.85%), and PCR not conducted in 184 patients (44.88%). Cytogenetic analysis at one year demonstrated Complete Cytogenetic Response (CCyR) in 54 patients (13.17%), CCyR not achieved in 21 patients (5.12%), and analysis was not conducted in 281 patients (68.54%).



(Image 1 | Spleen Size)

Frequency	Percent	Valid Percent	Cumulative Percent
44	10.7	10.7	10.7
265	64.6	64.6	75.4
101	24.6	24.6	100.0
410	100.0	100.0	

(Image 1 | SOKAL score)

### Discussion:

Through the findings of this study, the demographic and clinical spectrum of chronic myelogenous leukemia (CML) in a setting with limited resources was shown, highlighting the importance of individualized therapies that target different disease profiles. The management of chronic myelogenous leukemia in such settings is characterized by its multidimensional nature, which is highlighted by the distribution of disease phases, risk classification, therapy types, and patient outcomes.

### Conclusion

This extensive study on Chronic Myeloid Leukemia (CML) patients in a resource-limited healthcare context revealed important demographic and clinical characteristics of the disease. CML is prevalent across life phases, as seen by the mean age of 38.31 years and large age range. The 57.56% male representation emphasizes the necessity for gender-sensitive disease management. The geographic distribution shows CML's widespread influence, especially in AJK, Punjab, and KPK.

CML severity varies, as shown by spleen size, WBC counts, hemoglobin levels, and platelet counts. Quantitative PCR and FISH reveal CML's complex development across illness phases. SOKAL score risk stratification guides prognosis and treatment.

In resource-limited settings, imatinib and nilotinib demonstrate treatment variety. The high rate of Complete Hematological Response (CHR) suggests good treatment efficacy and results.

The study suggests tailoring therapies to age, gender, disease phase, and geography in resource-limited settings. This research recognizes the complexity of CML management and offers a roadmap for enhancing patient care and optimizing resources.

This work adds to the CML management debate by recommending personalized solutions that account for demographic, clinical, and geographical characteristics in resource-limited healthcare settings.

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