

Demographic Parameters of Patients Presenting with Chronic Myeloid Leukemia in Mayo Hospital Lahore. A New Epidemiological Addition

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ABSTRACT

Objective: To ascertain the demographic characteristics of patients diagnosed with Chronic Myeloid Leukemia.

Study Design: Cross Sectional study.

Place and Duration of Study: This study was conducted at the Pathology department of King Edward Medical University Lahore from January 2021 to January 2023

Materials and Methods: Two hundred and two patients diagnosed with Chronic Myeloid Leukemia according to WHO criteria were included in the study. Ultrasound abdomen was performed to estimate spleen size. Complete blood counts of all the patients were done for analysis of Hb, TLC, Platelet count, Basophils and Eosinophil percentage. Sokal score was noted. The phases of CML were compared with stratified groups and sokal score.

Results: Statistical analysis was done using SPSS version 22. Total 202 patients of CML in all phases were included in our study. Of 202 patients in total, the mean age was $42.24 \pm SD$. Male to female ratio was calculated as 1.83:1. A high percentage of 84.6% patients presented with chronic phase. Sokal score was low in 76.6% patients. 51.2% patients were seen having age more than 40 years, 65.7% patients belonged to rural areas. A positive association was seen with high sokal score and blast crisis whereas smoking did not show any significant correlation with patients.

Conclusion: The stratification of CML in various groups provided a helpful demographic data in our population. The comparison of different phases of CML with sokal score and demographic features helped in predicting the possible prognosis of the patients

Key Words: Chronic myeloid leukaemia, leukemia, epidemiology, CML, Philadelphia chromosomes

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INTRODUCTION

Chronic myeloid leukemia is a clonal proliferation of myeloid series cells characterized by BCR-ABL fusion analysis gene created by translocation between long arm of chromosome 22 and chromosome 9^{1,2}. There are 1-1.5 cases per 10000 worldwide. Many previous studies have shown that the disease peaks in 5th and 6th decade of life and only 10% cases are seen before the age of 10 years. As far as the gender stratification is concerned, the disease is seen more among men than women.

Family history is not significant as no familial predisposition of the disease is seen. No infectious agent is seen significant in the diagnosis of the disease.

The most common presenting symptoms include generalized fatigue, fever and marked splenomegaly³. The disease is characterized by three phases; chronic, accelerated, and blast phases. In chronic phase there is leukocytosis with or without anemia. Platelets may be normal or increased and blast cells are less than 9% in blood or bone marrow. Accelerated phase is categorized according to WHO guidelines and blast cells are usually 10-19%. Blast phase is defined as blast equal or greater than 20% of nucleated marrow cells. These blast cells can be of lymphoid or myeloid origin. The majority of the patients around 80 % present in the chronic phase, around 10% present in the accelerated phase, and another 10% in the blast phase⁴.

Various clinical and laboratory parameters have been identified to have prognostic significance. Based on these parameters three models have been able to classify CML into 3 risk groups; low, intermediate and high, with different prognostic values. Three models are known till date which are EUTOS, SOKAL and

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HASHFORD. Sokal score proposed by Sokal and his colleagues in 1984 is the most widely used scoring system in our setup.⁵⁻⁸ This helps to determine the aggressiveness of the disease and can also predict the response of the drug taken.

The purpose of this study is to find the demographic parameters is to find the age and gender prevalence of CML in our setup of Mayo Hospital which is the largest hospital in Punjab. It will also stratify patients which appear in all phases of CML on basis of their habits, whether they are living in urban and rural area and also Sokal score.

It will help in providing demographic data in Pakistan and will also predict disease course amongst different groups.

MATERIALS AND METHODS

The study was conducted in Pathology Department of King Edward Medical University Lahore from January 2021 to January 2023 after taking approval from ethical committee (IRB no. 2181/2019). The patients were given a consent form to participate in the study. A detailed questionnaire was given to each patient to note the parameters like age, gender, socioeconomic status & occupation. The patients’ clinical information regarding past history and comorbidities was taken. Ultrasound abdomen was performed to estimate spleen size. Complete blood counts of all the patients were performed to note Hb, TLC, platelet count, basophils and eosinophil percentage. Sokal score of all patients was calculated at presentation.

Data was analyzed using SPSS version 22. The quantitative variables including age, gender & socioeconomic status were analyzed using frequencies and percentages. Sokal score was calculated using spleen size and complete blood parameters. Patients were divided into groups according to age, gender, socioeconomic status, clinical and personal history. The phases of CML were compared with stratified groups and sokal score.

RESULTS

Total 202 patients of CML in all phases were included in our study. The mean age of all patients was 42.24 ±SD. The minimum age was 11 years and maximum

age was 81 years of all the included patients. Total 130 (64.7%) patients were male and 71 (35.3%) patients were females with male to female ratio of 1.83:1. Rest of the parameters are shown in table 1.

Table No. 1: The demographic features of patients included in our study

DEMOGRAPHIC FEATURES		Count	Column N %
GENDER	Female	70	34.8%
	Male	131	65.2%
GROUPS	<20	12	6.0%
	21-40	86	42.8%
	>40	103	51.2%
LIVING	RURAL	132	65.7%
	URBAN	69	34.3%
HABITS	ALCOHOLIC	8	4.0%
	NONSMOKER	147	73.1%
	SMOKER	46	22.9%

The patients were assessed for the phase of CML using WHO criteria and Sokal score was calculated at presentation of every patient. Majority of the patients presented in chronic phase with low sokal score as shown in table 2.

Table No. 2: The phases of CML and sokal score groups calculated at presentation

At presentation		Count	%
Phase	Accelerated phase	14	7.0%
	Blast crisis	15	7.4%
	Chronic phase	171	84.6%
	Ap	16	7.9%
Sokalgroup	Low	154	76.6%
	Intermediate	28	13.9%
	High	19	9.5%

All the demographic parameters were correlated with the phase of CML at presentation as shown in table 3. Similarly Sokal score was also correlated with the disease phase which showed a significant correlation with CML phase.

Table No. 3: Phase of CML correlation with demographic features and Sokal score.

		Accelerated phase		Blast crisis		Chronic phase		p-value
		Count	Column N %	Count	Column N %	Count	Column N %	
Gender	Female	8	57.1%	3	20.0%	58	33.9%	<0.01
	Male	6	42.9%	12	80.0%	113	66.1%	
Age groups	<20	0	0.0%	1	6.7%	11	6.4%	.295
	21-40	10	71.4%	8	53.3%	68	39.8%	
	>40	4	28.6%	6	40.0%	92	53.8%	

Living	Rural	9	64.3%	9	60.0%	113	66.1%	<0.01
	Urban	5	35.7%	6	40.0%	58	33.9%	
Habits	Alcoholic	1	7.1%	4	26.7%	3	1.8%	
	Nonsmoker	6	42.9%	5	33.3%	135	78.9%	<0.01
	Smoker	7	50.0%	6	40.0%	33	19.3%	
Sokalgroup	Low	0	0.0%	0	0.0%	154	90.1%	
	Inter	8	57.1%	2	13.3%	17	9.9%	<0.01
	High	6	42.9%	13	86.7%	0	0.0%	

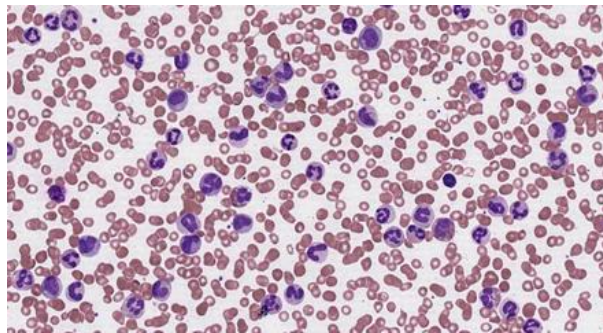


Figure No. 1: Peripheral smear CML, showing bimodal peak of neutrophils and metamyelocytes

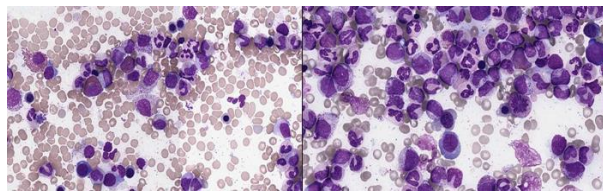


Figure No. 2: A and B showing hypercellular aspirate of CML

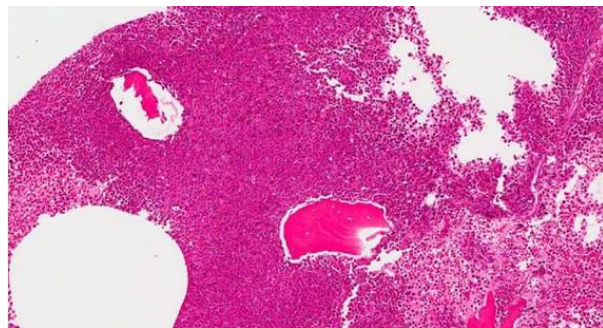


Figure No. 4: Trepine biopsy of CML showing hypercellular marrow.

DISCUSSION

A total of 202 patients diagnosed with CML were included in the study. Total 130 (64.7%) patients were male and 71 (35.3% patients were females with an Male to female ratio of 1.83:1. Similar ratio was found in the study in India by Kulkarni et al.⁹ The mean age of all patients was 42.24 SD 14.99 years. The minimum age was 11years and maximum age was 81 years of all the included patients. Confirming that mostly middle-aged people had higher risk to develop

CML. Similar age distribution was seen in the study in Nigeria by Osho PO et al.¹⁰

A very important parameter seen in the study was the phase in which the patients presented first time, those who progressed to Accelerated phase or Blast phase during the course of the disease were not considered. According to our data, 84.6% belonged to chronic phase, 7.4% presented in blast crisis where as 7.9% presented in accelerated phase of the disease. Similar results were found in the study in Saudi Arabia¹¹

The patients belonging to rural areas (65.7%) were higher than those of urban regions (34.3%). The possible reason might be due to the exposure of this group to pesticides and other environmental agents as it contributes to the etiology of the disease. Strong association of pesticides with CML was discussed in the study by Malhotra H¹²

In our study, 22.9%, 4%, and 73.1% patients were smokers, alcoholics and nonsmokers respectively, indicating that there is no correlation of smoking with CML. These results were in contradiction to the study by Muhammadi F. et al.¹³

Sokal score was the parameter used to stratify the patients in low, intermediate and high risk groups. In our study majority 76.6% belonged to chronic phase, 13.9% belonged to intermediate and 9.5% belonged to high risk group. Similar results were shown in a other study.¹⁴

Phases of CML were compared with the stratified groups and it was found that number of males who presented in blast crisis were greater than the number of females. Similar results were seen in a study in by Majuala et al.¹⁵ The age distribution showed that patients aging between 12-21 presented more in accelerated 71.4% and blast crisis 53.3% as compared to higher >40 age group. Patients living in rural areas presented in blast crisis and accelerated phase more frequently than those living in urban areas. With regard to the personal habits patients who smoked (more than one pack / day) appeared more in blast crisis 40% and accelerated phase 50% as compared to non-smokers and alcohol (taking more than 1peg/day). These are shown in table 2.¹⁶

Another association was made of phases of CML with the sokal score. Majority of patients with high risk Sokal score (>1.2) appeared in blast crisis as compared to low sokal score in whom majority (90%) appeared in chronic phase.⁵

The stratification of CML in various groups provided a good demographic data whereas the comparison of these with different phases of CML helped in predicting the possible prognosis of the patients.

CONCLUSION

The stratification of CML in various groups provided a helpful demographic data in our population. The comparison of different phases of CML with sokal score and demographic features helped in predicting the possible prognosis of the patients.

Author's Contribution:

Concept & Design of Study: Hira Babar
 Drafting: Zunairah Mughal, Sobia Ashraf
 Data Analysis: Nidda Ayub, Hamna Arif, Raana Akhtar
 Revisiting Critically: Hira Babar, Zunairah Mughal
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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