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Characteristics of chronic myeloid leukemia: an observational study highlighting the correlation of age with hematological parameters

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Abstract

Objective: The aim of this study was to identify the correlation of age with hematological parameters in patients admitted in medical oncology department of the Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.

Material and Methods: This was a cross sectional observational study via convenient sampling technique conducted for one and half years from April 2016 to September 2017 in Oncology ward of Jinnah Postgraduate Medical Centre, Karachi after ethical approval. The total of 100 patients who were admitted in haematology oncology unit diagnosed as chronic myeloid leukemia on complete blood count and bone marrow assessment were included in the study. Incomplete data and the patients who did not give informed consent were excluded from the study. SPSS version 20.0 was used. Pearson correlation was applied to assess the relationship and p-value of<0.05 was taken as significant value.

Results: A total of 100 patients were included in the study with mean age of 40.29±12.5 years. Mean Hb was 9.65±7.0 g/dl while Hct was 32.85±4.1%. TLC was observed to be 228.7±152.3x10³cells/mm³ though platelet count was 466.9±305.09x10³cells/mm³. Moreover no correlation existed between age and various hematological parameters in these patients.

Conclusion: The present study predicted the median age of 40.29 years in patients suffering from chronic myeloid leukemia. Furthermore, no significant difference existed in hematological parameters and therefore no correlation observed with age in various hematological parameters in these patients.

Key Words: Chronic Myeloid Leukemia; Correlation;

Introduction

Chronic Myeloid Leukemia (CML) is hematopoietic malignancy arising from a molecular modification in single pluripotent haematopoietic stem cells that results in constant creation of the myeloid progeny [1]. In 90% of cases, CML is because of the presence of Philadelphia chromosome and uncommonly by Hyperdiploidy of >50 chromosomes [2].Expansion of break point cluster region and Abelson's (BCR-ABL) a new fusion genes due to the translocation between chromosome 9 and 22 t (9,22) (q34;q11) encodes for an oncoprotein (P210) located in the cytoplasm that has a strong capability to stimulate tyrosine kinase resulting in activation of several signals that alter hematopoietic stem cells into the leukemic cells, as a result amplifying tyrosine kinase action which plays a fundamental role in the pathogenesis of CML [3].Other than leukemia induced factors, there are risk factors that enhance the CML and these factors consist of low socio-economic group, exposure to benzene, formaldehyde, high dosage of ionizing radiation among the atomic bomb survivors. Also other risk factors such as alcohol abuse, obesity, weight gain throughout adulthood and effects of preservatives or pesticides which are being used in the food industry can also lead to CML [4,5].

There are three distinct phases through which disease progresses chronic phase, accelerated phase, and blast crisis during which the leukemic clone increasingly loses its ability to differentiate [6.7]. The common clinical symptoms include fever, anemia, excessive sweating, splenomegaly anorexia, easy satiety, weight loss and fatigue.[8] Some patients have features of

hyper viscosity, spontaneous bruising or bleeding gout, priapism, vertigo and hearing loss may be present [9]. Examination of blood film reveals neutrophilia, with a left shift and repeatedly eosinophilia and basophilia. Philadelphia chromosome in around 90 – 95% of patients have been revealed in cytogenetic studies and in roughly half of the Philadelphia chromosome negative patients, BCR-ABL mutation (which can be major, minor or micro that depends on the breakpoint on BCR) could yet be reported using molecular techniques [10].

Two prognostic scoring systems are existent for risk differentiation of patients with CML. Ones core was laid in chemotherapy time and is focused on patient age, spleen size, platelet count, and the proportion of blasts in the peripheral blood [11]. An additional model is associated to patients treated with interferon which includes eosinophils and basophils in peripheral blood [12]. The literature available on the status of age as a prognostic factor for derangement of hematological parameters in CML patients is limited. Though it has been reported that patients <40 years of age have greater degrees of leukocytosis and anemia [13], this association has not been studied extensively.

This study therefore was conducted with the aim to identify the correlation of age with hematological parameters in patients admitted in medical oncology department of the Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.

Methodology

Hundred patients in total, admitted in haematology oncology unit were chosen for the study. On their initial presentation, all CML patients newly diagnosed on complete blood picture and marrow examination, aged >18 years, were included. Any case of CML who formerly received chemotherapy and patients not compliant to take part or having insufficiency in diagnostic criteria were debarred from the study. Informed consent was taken from the patients with complete concealment of the data. Age, gender and ethnicity of the patients were among the demographic data which was recognized. Complete blood picture was performed in pathological laboratory of Jinnah Hospital, including haemoglobin, total leukocyte count, haematocrit, mean corpuscular volume, neutrophils, reticulocytes, basophils, eosinophil, lymphocytes, promyelocytes, myelocytes, metamyelocytes, blast cells, platelets and plasma cells.

Data Analysis

For analysis of data the statistical software SPSS version 20.0 was used. Pearson test was applied to assess the correlation of age with different haematological parameters in this study. P-value of less than or equal to 0.05 was taken as significant.

Results

A total of 100 patients diagnosed with CML were selected for this study with the mean age of 40.29±12.5 years. Mean hemoglobin was 9.65±7.021 gm/dl in these patients while hematocrit was 32.85±4.186 %. MCV was found to be 91.14±11.840 fl while TLC was 228.70±152.384 x10³cells/mm³ in them. Mean neutrophils was observed to be 55.75±15.080 % whilst reticulocyte count and basophils was 3.71±8.457 and 4.10±2.564 % respectively. Mean eosinophil was 3.04±1.491 % and lymphocytes were 6.83±12.011 %. Promyelocytes were noticed to be 4.80±3.667% while myeloctes and monocytes were 16.45±7.796 % 2.93±1.757 % respectively. Mean metamyelocytes were 9.10±5.703 % though blast cells were 3.51±2.472 %. Platelets were found to be 466.90±305.095 x10³cells/mm³, plasma cells were 3.38±1.509 %. (Table1) No correlation was observed between hemoglobin (p-value=0.369), hematocrit (p-value=0.534),MCV (p-value=0.330), TLC (p-value=0.296), neutrophils (p-value=0.051), reticulocytes (p-value=0.372), basophils (0.272), eosinophils (p-value=0.497), lymphocytes (p-value=0.253), promyelocytes (p-value=0.326), myelocytes(p-value=0.232), monocytes (p-value=0.766), metamyelocytes (p-value=0.999), blast cells(p-value=0.422), platelets(p-value=0.281) and plasma cells (p-value=0.979) with increasing age in patients with CML. (Table2)

Table 1: Descriptive analysis of the chronic myeloid leukemia patients (n=100)

Variables	Mean± SD
Age (years)	40.29±12.53
Hemoglobin (gm/dl)	9.65±7.02
Hematocrit (%)	32.85±4.18
Mean corpuscular volume (fl)	91.14±11.84
Total leucocyte count (x10³cells/mm³)	228.70±152.38
Neutrophils (%)	55.75±15.08
Reticulocytes (%)	3.71±8.45
Basophil (%)	4.10±2.56
Eosinophil (%)	3.04±1.49
Lymphocytes (%)	6.83±12.01
Promyelocytes (%)	4.80±3.66
Myelocytes (%)	16.45±7.79
Monocytes (%)	2.93±1.75
Metamyelocytes (%)	9.10±5.70
Blast cells (%)	3.51±2.47
Platelets (x10³cells/mm³)	466.90±305.09
Plasma cells (%)	3.38±1.50

Table 2: Correlation of age of with hematological parameters

Variables	Age (years)	
	R	P-value
Hemoglobin (gm/dl)	-0.09	0.369
Hematocrit (%)	-0.06	0.534
Mean corpuscular volume (fl)	-0.09	0.330
Total leucocyte count (x10³cells/mm³)	-0.10	0.296
Neutrophils (%)	0.19	0.051
Reticulocytes (%)	-0.09	0.372
Basophil (%)	0.11	0.272
Eosinophil (%)	-0.06	0.497
Lymphocytes (%)	0.11	0.253
Promyelocytes (%)	-0.09	0.326
Myelocytes (%)	0.12	0.232
Monocytes (%)	-0.03	0.766
Metamyelocytes (%)	0.01	0.999
Blast cells (%)	0.08	0.422
Platelets (x10³cells/mm³)	-0.10	0.281
Plasma cells (%)	0.00	0.979

Discussion

This study is one of the unusual types in the approach that the correlations of age with hematological parameters in chronic myeloid leukemia (CML) patients have not been conducted in earlier studies. The mean age presentation of CML patients in our study was a 40.29±12.5 year which was consistent with one of the study conducted by Bhutto AM et al. in which median age was 40.49 [14] but was less than the median age obtained in a study by O'Brien et al., in which the mean age was 67 years [15]. In another study, the median age presentation observed was 36.5 years with a mean haemoglobin concentration of 8.5g/dl ±2.5 and mean TLC of 293x10⁹ /L, whereas in our study it was noticed to be 9.65±7.02 g/dl and 228.7x10³cells/mm³respectively [16]. Ahmed R et al conducted a Pakistani study revealed that the mean age of CML patients presented with CML was 37.87 years. Mean haemoglobin was 9.94 g/dl ± 1.8 while mean TLC, platelets, blood and marrow blasts were 214.3x10⁹ /L, 551.4x10⁹ /L, 3.4% and 9.3% respectively [17]. The enhancement in the age of patients in our study may be because of the fact that the prevalence of CML has risen over the years. Bansal S et al reported that the median age presentation was found to be in a range of 32 to 42 years with a median haemoglobin range from 9 g/dl to 11 g/dl [18]. The median age and hemoglobin levels found in our study tend to fall within the above mentioned range and no correlation was predicted with hematological parameters.

The quantitative approach of our study has certained that we have sampled a wide range of patients who were suffering from chronic myeloid leukemia. Nevertheless, the study might not be resistant from observer and selection bias. Bearing in mind the interpretation of our study and to what range, these age groups are consistent with the clinical features of the disease would be enlightening to discover more facts about the disease.

Conclusion

The present study predicted the median age of 40.29 years in patients suffering from chronic myeloid leukemia. Furthermore, no significant correlation existed in various hematological parameters with increasing age in these patients.

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Page 4 of 4