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Pathology

A Retrospective Haematological Study of Myeloproliferative Neoplasms in a Tertiary Care Centre

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ABSTRACT Myeloproliferative neoplasms (MPN) are a group of stem cell disorders characterised by overproduction of mature white cells, red cells or platelets suggesting that the maturation of the neoplastic cell line is relatively normal. The present study was conducted to have haematological interpretation in the diagnosis of myeloproliferative neoplasms.

This study was performed over a peroid of 1 year from May 2016 to April 2017. The complete haemograms were done and slides were prepared with peripheral blood and in selected cases bone marrow aspirates which were stained by leishman stain. Cytogenetic study was done in majority of cases to confirm the diagnosis.

In our study, 42 cases of myeloproliferative neoplasms were reported. After confirmation, 41 cases (97.62%) were reported as chronic myeloid leukemia (CML) and the rest 1 case (2.38%) was considered as chronic neutrophilic leukemia (CNL).

This study concluded that CML is the most common myeloproliferative neoplasm. Males are more commonly affected than females. The cytogenetic study is mandatory for confirmation of MPN.

KEYWORDS : Chronic myeloid leukemia, chronic neutrophilic leukemia, Philadelphia chromosome

INTRODUCTION

Myeloproliferative neoplasia (MPNs) are clonal bone marrow stem cell disorders involving a multipotent haematopoietic stem cell, characterised by proliferation of one or more lineages of myeloid, erythroid and megakaryocytic cell lines. This proliferation results in increased numbers of granulocytes, erythrocytes or platelets in the peripheral blood respectively.[1]

According to the World Health Organization (WHO) 2008 criteria, MPNs are now divided in classical MPNs which carry the Philadelphia (Ph+) chromosome (chronic myeloid leukaemia) and classical MPNs which do not carry the Philadelphia (Ph-) chromosome, including essential thrombocythemia, polycythemia vera, primary myelofibrosis, chronic neutrophilic leukemia, chronic eosinophilic leukemia, mastocytosis and MPN unclassifiable. The Philadelphia chromosome is a result of t(9:22) with the BCR-ABL1 fusion gene.[2]

Clinically, a CML patient is characterized by huge splenomegaly [3] and laboratory findings include low hemoglobin, total WBC count between 287×109/L and 535.7×109/L, thrombocytopenia or normal platelet count or thrombocytosis and peripheral blood smear showing increase number of mature and immature granulocytes predominantly myelocyte.[4,5]

The Bone marrow pictures in CML shows hypercellularity due to excessive proliferation of the granulocytes with myelocytes predominantly, there is decreased or normal or increased megekayrioposis as well as moderate to marked reticulin fibrosis with presence of sea-blue histiocytes and presence of blast cells from <10% to >20% in the bone marrow and peripheral blood. According to the world health organization criteria CML is divided into chronic, accelerated phases and blast crisis phase.[6,7]

MATERIALS AND METHOD

This study was carried out in the Department of Pathology, Assam Medical College and Hospital, Dibrugarh, North-East India from May 2016 to April 2017. A total of 42 cases of myeloproliferative neoplasms were reported in the Haematology section.

The complete haemograms were determined according to standard laboratory procedures. Slides were prepared with peripheral blood and in selected cases bone marrow aspirates which were stained by 'Leishman stain' to find out the myeloid cells morphology in peripheral blood predominantly and in bone marrow occasionally. Diagnosis of myeloproliferative neoplasm was made by marked leucocytosis, myelocyte and neutrophil peaks and basophilia with clinical findings of splenomegaly.

RESULTS

In our study, 42 cases of myeloproliferative disorders were reported. There were 29 cases (69.05%) of male and 13 cases (30.95%) of female. Male : female was 2.23 : 1. The maximum number of cases were found to be 41-50 year old age group followed by 31- 40 years.

Based on haematological parameters, 41 cases (97.62%) were reported as chronic myeloid leukemia (CML) and the rest 1 case (2.38%) was considered as chronic neutrophilic leukemia (CNL). The lowest and hightest total leucocyte count were found to be 75,000/mm^3 and 4,30,000/mm^3 respectively. The highest blast percentage was 46%. The haematological diagnosis (by means of complete blood count (CBC) / peripheral blood smear (PBS) / occasionally bone marrow aspirates (BMA)) and the number of cases that fall in different ranges of total leucocyte count (TLC), percentage of basophils and blasts percentage are detailed in Table 1 and Table 2.

Table1: Distribution of different types of myeloproliferative disorders

Diagnosis	No. of cases (%)
CML	41(97.62)
CNL	1(2.38)
Total	42

Table2: Haematological findings of all cases of myeloproliferative disorders

Haematological parameters	CML	CNL
	No. of cases	
Total leucocyte count		
<100,000	3	0
100,000 – 200,000	27	1
>200,000	11	0
Basophils percentage		
<20%	36	1
20%	5	0
Blast percentage		
<10%	32	1
10 – 19%	6	0
20%	3	0

Out of total 41 cases of chronic myeloid leukemia (CML), there were 32 cases (76.19%) in chronic phase, 6 cases (16.67%) in accelerated phase and 3 cases (7.14%) in blast crisis phase which are detailed in Table 3.

Table3: Distribution of different phases of CML

Phases of CML	No. of cases (%)
Chronic phases	32 (76.19)

Accelerated phase	6 (16.67)
Blast crisis	3 (7.14)
Total	41

Cytogenetic study (Philadelphia chromosome) was performed in majority of cases of chronic myeloid leukemia to confirm the diagnosis. Molecular genetic study (BCR/ABL fusion gene) was performed in few diagnostically difficult cases. Chronic neutrophilic leukemia (CNL) was found to be BCR/ABL negative.

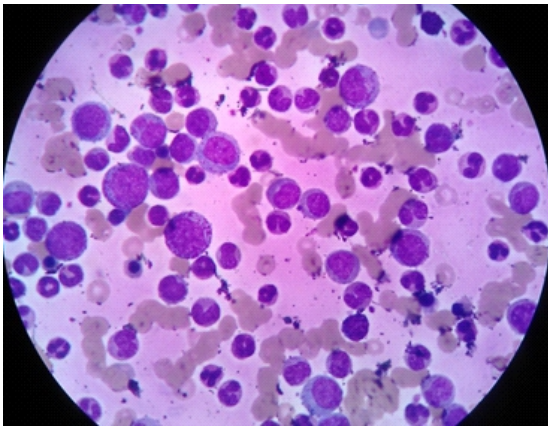

Figure 1: Photomicrograph of chronic myeloid leukemia (10x100X)

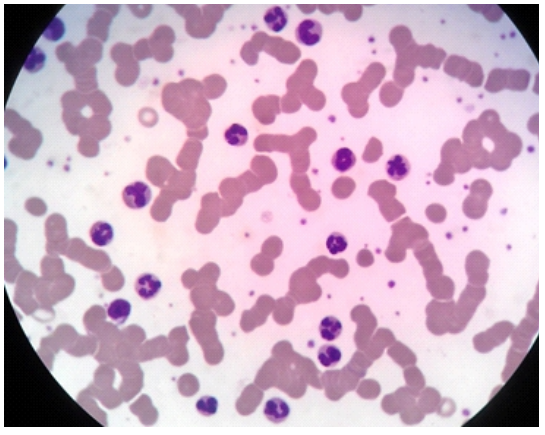

Figure 2: Photomicrograph of chronic netrophilic leukemia (10x100X)

DISCUSSION

Ahmed R et al.[8] reported that frequency of chronic phase (CP), accelerated phases (AP) and blast crisis (BC) were 77.8%, 15.5% and 6.7% respectively were observed in among the 45 patients suffering from CML with their mean age 37.9 yrs, and male: female ratio of 2.2: 1 which is closely resembled to our conducted study. Brady-West DC et al.[9] reported the presenting features of 70 patients diagnosed with chronic myeloid leukemia, with male to female ratio of 2.4: 1, had mean age of 37 years while weight loss and splenomegaly were the most frequently seen and frequencies of three phases of CML were similar with our study. Bhatti F et al.[10] studied the 335 patients with CML had mean age of 35.5 yrs, with male to female ratio of 2:1 while similar clinico hematological features and frequency of three phases of CML were recorded. Anand MS et al.[11] also got similar findings as that of our present study.

CONCLUSION

From the present study, it can be concluded that the male are affected more than the female in myeloproliferative neoplasms. Maximum number of patients of CML are presented in chronic phase and chronic phase of CML was common in younger age group. The Philadelphia chromosome detection by RT-PCR in CML patients due to the limited sources, we are unable to perform this advanced test routinely for the molecular analysis of CML.

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