

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Screening for different type of leukemia by observing peripheral blood smear in patients of Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.

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### ABSTRACT

The distribution patterns of different types of leukemia in catchment area of Rajendra Institute of Medical Sciences, Ranchi was studied. This cross-sectional observational study was done for the screening of leukemia both clinically and hematologically and carried out during the period of 2009–2010. Patients were interviewed. Thorough physical examination was done. Blood tests namely haemoglobin estimation, total and differential leukocyte count, platelets count, reticulocyte count and peripheral blood smear examination stained with Lishman & Giemsa was done. Requisition for Bone marrow examination was suggested in few selected cases. Peripheral blood smear (PBS) was done with special precaution and supportive technique. A total of 46 cases of suspected leukaemia cases were selected. Chronic Myeloid Leukemia showed the highest incidence (34.7 %), followed by Acute Lymphocytic Leukemia (15.2%), Acute Myeloid Leukemia (10.8%) and Chronic Lymphocytic Leukemia (8.6 %). 13 cases (28.26%) suspected were turned showed Leukemoid reaction. PBS can be used as a screening tool for earlier diagnosis of Leukemia.

**Keywords:** leukemia, peripheral blood smear.

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## INTRODUCTION

Leukemia is malignant neoplasm of the hematopoietic stem cells characterized by diffuse replacement of the bone marrow and/or peripheral blood by neoplastic cells. It was identified as a separate malignancy in 1889 [1]. Previous studies have shown important differences in geographic, racial/ ethnic, age and trend patterns for different types of leukemia [2]. Due to inadequate diagnostic facilities and lack of health education they are diagnosed at an advanced stage when treatment is either impossible or very difficult. As we know Chronic Myeloid Leukemia (CML), a clonal stem cell disorder characterized by increased proliferation of myeloid elements at all stages of differentiation, is principally a disease of adults [5] and accounts for less than 5% of all childhood leukemias [6].

Pattern of leukemia is known to vary widely throughout the world. In western countries Chronic Lymphocytic Leukemia (CLL) is the most common type of adult leukemia, while decreased incidence of CLL in Asians has been reported [7]. Morphologically, recognizable Blast cells was found in peripheral blood film, the sensitivity of which was absolute with no false positive at all [8]. Chronic Leukemias (CML and CLL) showed a high total leucocyte count of 1 lac or more/cmm whereas majority of the cases of acute leukaemias had counts less than 1 lac / cmm [9]. The blast cell percentage in differential counts remained very low in chronic leukemias but was higher in acute leukemias [10,11]. Anemia varied from mild to severe in intensity and Hemoglobin levels ranged between 3-12 gms. Majority had Hb values between 5-10 gms. Patients of Acute leukemias had more severe form of anaemia [12]. All the recommended / suggested corresponding bone marrow smears examination, were reported hypercellular with higher Myloid :Erythroid (M:E) ratios in CML. Blast cells predominated in acute leukemias while erythropoietic and megakaryocytic lineages were suppressed in them: Megakaryocytes were smaller in size but often increased in number in CML [13]. Hepatomegaly, splenomegaly, fever, bleeding, lymphadenopathy, bone tenderness, infection, weakness and lump abdomen were the various clinical features noted with varying incidences in different types of leukemias [14,15].

## METHODS

The present cross-sectional observational study was done for the screening of different patterns of leukemia both clinically and hematologically. The study was carried out in RIMS Ranchi during the period of 2009 -2010. Patients were interviewed; physical examination and blood tests-peripheral blood smear examination stained with Lieshman & Giemsa was done on each patient. Requisition for Bone marrow examination (just to compare the result of PBS examination) was suggested in few selected cases.

As examination of peripheral blood smear is single most important test, prior to bone marrow examination. The following special precautions and supportive techniques were applied while doing PBS.

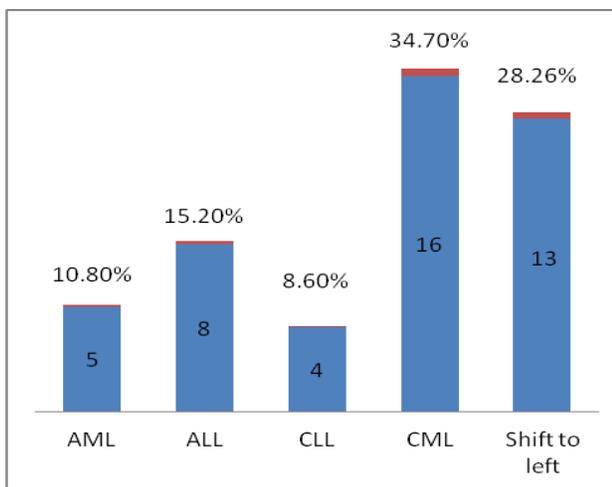
1. PBS was prepared from direct (without addition of anticoagulants) blood and the smear had a head, tail and clear margins and best part was examined near the tail end where morphology of cells were absolutely clear and details could be better perceived. Morphological typing was done according to the FAB classification using morphologic and cytochemical criteria to characterize the blast cells [3].
2. In case of cytopenia adequacy of platelets and immaturity of WBC was looked for.
3. Occasional immature cells were supposed to be present in infants. To differentiate between normal and neoplastic immature cells, other parameters like associated anemia and thrombocytopenia was looked into.
4. Sometimes azurophilic granules were hardly visible in myeloid cells (particularly in promyelo, myelo and metamyelocytes) in cases of CML undergoing chemotherapy and so the differential count sometimes created problems. MGG stain was little more helpful in such cases compared to Leishman.  
Nucleolar morphology of blast cells gave better perception in Giemsa stain [4].

## RESULTS

There were a total of 46 cases of suspected leukaemia in this study. Leukemias were observed in all age groups, the youngest patient being a 14 month old child and the oldest being 72 years of age. The maximum numbers of cases (61.8%) were seen between the age group of 31 to 50 years. In this study CML was most common in adults (34.7%) while Acute Lymphocytic Leukemia (ALL) was most frequent type in children (15.2%). No case of Chronic Lymphocytic Leukemia (CLL) was detected in children while one case of juvenile myelomonocytic leukemia was observed Initially Peripheral Blood Smear Examination along with the routine hematological investigations were carried out which were requested by the respective clinicians. Cases of CML, CLL, AML and ALL were detected in varying incidence, CML showed the highest and significant incidence of ( 34.7 %), which was followed by ALL (15.2%) AML (10.8%) and CLL (8.6 %). Out of 46 cases suspected 13 cases were turned out to be with shift to the left/ Leukemoid reaction (28.26%).

**Bar- diagram showing type & incidence of different leukemias and finding of shift to left ( Leukemoid Reaction) in no. & percentage**

| Total case | AML    | ALL    | CLL   | CML    | Shift to left (Leukemoid Rk.) |
|------------|--------|--------|-------|--------|-------------------------------|
| 46         | 5      | 8      | 4     | 16     | 13                            |
|            | 10.80% | 15.20% | 8.60% | 34.70% | 28.26%                        |



*AML – Acute Myeloid Leukemia, ALL- Acute Lymphocytic Leukemia, CLL- Chronic Lymphocytic Leukemia, CML- Chronic Myeloid Leukemia*

**DISCUSSION**

Thirty three cases of leukemia were observed in this tribal area of Jharkhand, CML being the most common in them (34.7%). 16 Out of 46 cases 13 showed the picture of Leukemoid reaction (shift to the left) (28.2%) giving initial suspicion of leukemia [17]. It was also observed that ALL cases were found in the younger age group, 0-20 years. Acute lymphocytic leukemia is the most common malignant disease, affecting children and accounts for approximately 30% of childhood cancers [18]. All cases of CLL were male. This is consistent with reports of male preponderance in CLL in the literature [19]. Role of genetic and other environmental factors in decreasing CLL risk are suggested. However this subtype specific characteristic of low rate and declining incidence of CLL among Asians warrants further investigation [20]. Lymphomas represent approximately 10% of all childhood cancers and are 3rd in relative frequency after leukemia and brain tumors [21]. The incidence of non-Hodgkin’s lymphoma is steadily increasing and it is now emerging as an epidemic worldwide [22]. Some studies have shown significant summer excess for acute lymphoblastic leukemia at all ages suggestive of a seasonal rhythm of onset [23]. Other studies have found no evidence of seasonality in the diagnosis [24]. Asian subcontinent regarding a seasonal rise in incidence of leukemia during the start of spring onto the end of monsoons [25,26].

Incidence of CML was (34.7%) followed by ALL (15.2 %) & AML (10.8%) was the commonest type of leukemia in this study. But in previous study from TUTH, Nepal found AML (33.0%) followed by CML (29.5%) to be the commonest type of leukemia [27]. In Southeast Asian region it was seen that the pattern of higher incidence of myeloid type of leukemia (CML and AML) emerging from Nepal was similar to two studies from India [28,29]. Higher incidence of chronic leukemia (43.4%) as compared to acute leukemia (28.2 %) in present study is not similar to one report from Pakistan (37.2% and 62.8% respectively) [30]. This low incidence of CLL (8.6%) found in our series is similar to the low incidence found in other study from Nepal and other countries of South east Asian region where it accounted for 0 to 5.71% cases [27,30].

In case of acute leukemia ALL was the commonest in this study so was in the Middle East region, which shows ALL was the commonest type of leukemia. In one study from Kuwait AML was commonest type of leukemia. The same also in study from Riyadh [31,32]. Reports from various parts of Africa have documented frequent occurrence of chronic lymphocytic leukemia, predominantly in women, below the age of 50 years suggestive of a role for the influence of life style in leukaemogenesis [33]. The same was observed in this study significantly. Out of 4 cases of CLL 3 were female and one was male and all of them below 50 years of age. In this study incidence of CLL was (8.6%) whereas in data from European countries the occurrence of chronic lymphocytic leukemia was seen to vary up to 40% [34,35].

### CONCLUSION

Despite modern technologies such as flow cell cytometry, hematoanalyzers, immunophenotyping and molecular probing, cytomorphological examination of stained peripheral blood smears by microscopy remains the mainstay of diagnosis in a large variety of diseases. Although technically simple morphological analysis requires considerable skill. Early diagnosis in several hematological diseases is important (for example leukemia), in order to initiate adjusted therapy. Further, referral of the patient to tertiary care centers is only justified after a solid presumptive diagnosis is obtained. Many leukemic disorders can be diagnosed by pathognomonic blood smears. The present article is a short overview of important hematological disorders, which are associated with blast cells & others in the peripheral blood in relation to related clinical findings. Hence PBS can be used as a screening tool for earlier diagnosis of Leukemia.

Since this work was carried out in a very short & limited period of time with a small number of cases, it is envisaged that a long term comprehensive study in this line, will throw more light and help in formulating ways and control to early diagnosis as well as treatment of leukemia in this tribal area of Jharkhand.

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