



RESEARCH ARTICLE

BONE MARROW BASED STUDY OF ACUTE LEUKEMIAS IN THE NATIVE KASHMIRI POPULACE: A TERTIARY CARE HOSPITAL BASED STUDY

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ABSTRACT

Background: Acute Leukemia's are a group of hematologic malignancies characterized by malignant proliferation of hematopoietic cells, involving the bone marrow and peripheral blood. **Methods:** This study evaluated the subtypes of Acute Leukemia's in the native Kashmiri populace based on bone marrow and peripheral blood examination, the study itself being conducted at the Tertiary care hospital of Government Medical College, Srinagar, J&K, at the Department of Pathology. The research spans three years, encompassing both retrospective and prospective cases. **Results:** During the study period 145 cases were diagnosed as Acute Leukaemia, 86 (59.31%) were diagnosed as acute myeloid leukemia (AML) subtypes and 59(40.68%) as acute lymphoblastic leukemia (ALL) subtypes. **Conclusion:** This study underscores the pivotal role of bone marrow examination in accurately diagnosing and sub-typing Acute Leukemias.

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INTRODUCTION

Acute leukemias are a group of hematologic malignancies characterized by malignant proliferation of hematopoietic cells involving the bone marrow and peripheral blood^{1,7,8}. It is classified as myeloid or lymphoid based on the cell of origin. Multiple genetic and environmental risk factors are known to cause Leukemias. Predominant types are 1. Acute myeloid leukemia (AML) characterized by >20% myeloid blasts or its equivalents (monoblasts, pro monocytes or megakaryoblasts) and is the most common acute leukemia in adults. Its subtypes per WHO NOS/FAB classification are M0, M1, M2, M3, M4, M5, M6, M7. However, WHO does exclude M3 (Acute Promyelocytic Leukemia) from its NOS classification and includes it elsewhere. 2. Acute lymphoblastic leukemia (ALL) is the most common acute leukemia in children accounting for about 80% of cases in this group versus 20% of cases in adults. Its subtypes are B cell or T cell ALL². However, WHO classification for the same puts the blast cut off percentage at 20%. Despite rapid advances in the field of molecular pathology, Bone marrow morphology is the diagnostic cornerstone to identify the various subtypes of myeloid and

lymphoid neoplasms. Bone marrow aspiration (BMA) enables us to know about the numerical and cytological features of marrow cells and the bone marrow trephine biopsies (BMB) provide excellent structural information of bone marrow^{3,9,10,11}. BMA cytology and trephine biopsy histopathology are complementary to each other and the supremacy of one method over the other depends on the underlying disorder. BMA stands independently for diagnosing acute leukemias, while BM trephine biopsies are better in assessing overall cellularity, focal marrow involvement, stromal changes and useful adjunct for IHC and molecular studies⁴.

MATERIAL AND METHODS

This study was conducted in the Department of Pathology at its Hematopathology division, Government Medical College, Srinagar, for a period of three years, from June 2020 to July 2023 (retrospective for two years and prospective for one year. Retrospective data was collected from hematopathology records section while prospective cases were the patients who were enrolled after clinical department screening, mainly from

clinical hematology. Patients from outside the valley of Kashmir, were excluded from our study. After obtaining informed written consent, BMA and BMB were performed simultaneously from posterior superior iliac spine under local anesthesia (injection 2% xylocaine). Aspiration smears were stained with Leishman stain for morphological examination. Biopsy sections after processing were stained with hemotoxylin and eosin stain. Perls stain was done in all cases for iron stores and special stains like MPO, PAS, NSE were done wherever necessary.

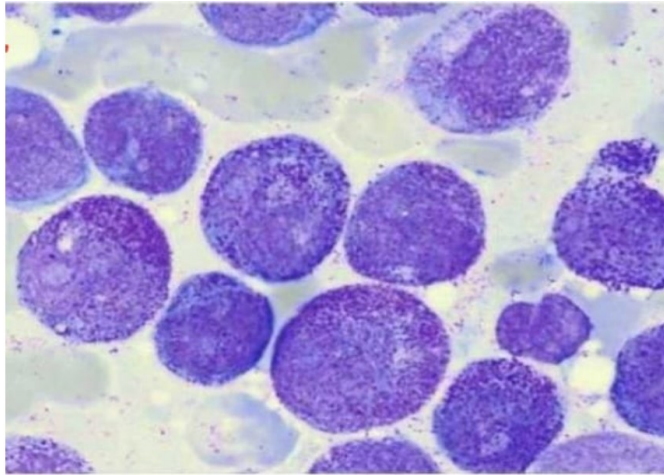


Figure 1. Photomicrograph of Bone Marrow aspiration smear of acute promyelocytic leukemia showing hypergranular promyelocytes-100x

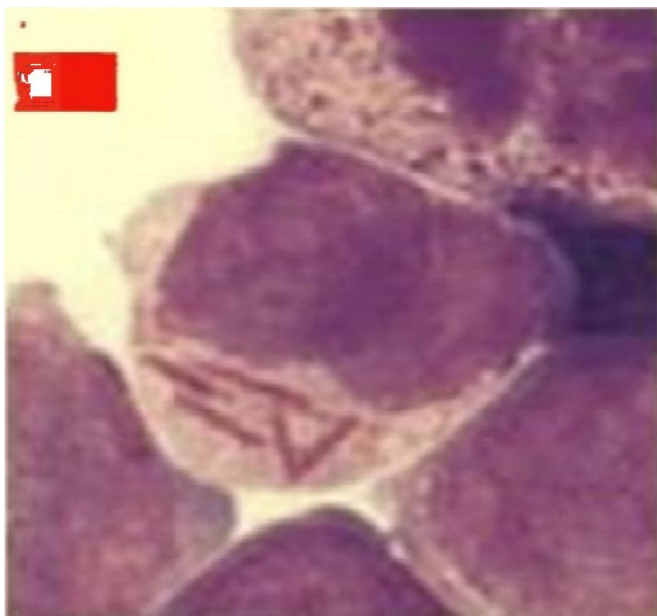


Figure 2. Promyelocyte showing bundles of Auer rods (Faggots)

RESULTS

In our study a total of 145 patients from Kashmir region who had undergone BM examination and diagnosed as acute leukemia were included of which 74 were males and 71 were females. In our study, among the Acute leukemia patients, 102 were adults (70.34%) whereas 43 were children (29.65%). As far as age is concerned, regardless of the gender, 93(64.13%) were in the age group of > 18years and 52(35.86%) were in the age group of < 18 years.

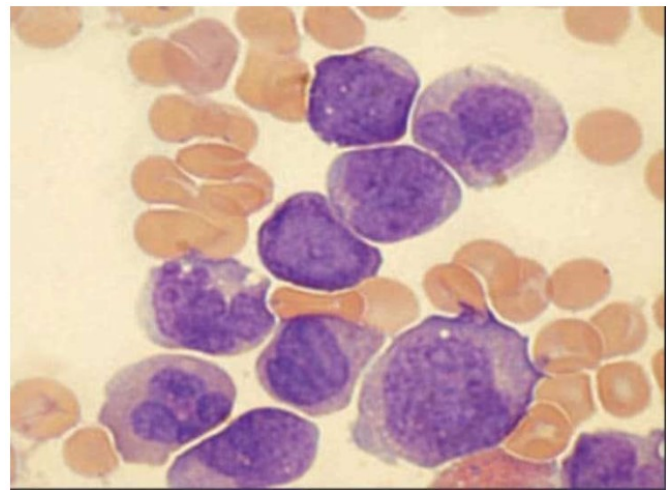


Figure 3. Acute Myelomonocytic leukemia showing Blasts and of both granulocytic and monocytic lineage maturing cells

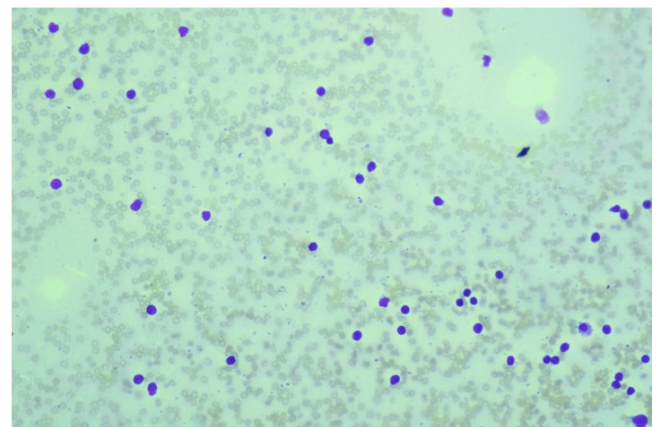


Figure 3. Photomicrograph showing lymphoid blasts in Acute Lymphoblastic Leukemia (10X)

Overall from 145 cases diagnosed as acute leukemias, 86 (59.31 %) were diagnosed as AML subtypes and 59 (40.68%) as ALL subtypes (Table 1).

Table 1. Shows Pattern of Acute Leukemias on BM Aspiration

Diagnosis	Subclass	Number of cases [%age]
AML		86 [59.31%]
AML-M0		AML with minimal differentiation 07 [4.8%]
AML-M1		AML without maturation 11 [7.5%]
AML-M2		AML with maturation 14 [9.6%]
AML-M3		Acute promyelocytic leukemia 26 [17.93%]
AML-M4		Acute myelomonocytic leukemia 10 [6.8%]
AML-M5		Acute monoblastic/monocytic leukemia 16 [11.03%]
AML-M6		Acute erythroid leukemia 2 [1.3%]
AML-M7		Acute megakaryoblastic leukemia
ALL		59 [40.68%]

The Cases of acute leukemias diagnosed on the evaluation of BMA were consistent with that of BMB. In our study, there was a high concordance rate of 98% between BM morphological/cytochemical diagnosis and flow cytometric analysis (immunophenotyping). Flow cytometric analysis was done by patients outside the institution and was not included in our study.

DISCUSSION

As Acute leukemias' show diffuse involvement of bone marrow, a BMA study usually suffices when these hematological malignancies are suspected⁵. Acute myeloid leukemia with categorization of its subtypes and acute lymphoblastic leukemias are diagnosed according to characteristics of blasts seen in BMA. In our study of 145 cases, bone marrow examination for subtyping provided a diagnostic result of 92.96%. In our study, out of 145 cases of acute leukemias, 86 cases were AML and 59 cases were ALL. The common age group in AML was 41-50 years. Among ALL, the age range was from 1-14 year. In a study conducted by Khan S P et al⁵, acute leukemias was the most common hematological malignancies accounting for 22.3%(out of 2131 cases) with acute myeloid leukemias being more common (13.2%) than acute lymphoblastic leukemia (9.1%). In a study by Dogan A, Demircioglu S⁶, the most common diagnosis based on BMA was acute leukemia (AML+ALL) detected in 99 out of 382 which was 100% consistent with the BMB report.

CONCLUSION

This study underscores the pivotal role of bone marrow examination in accurately diagnosing and subtyping Acute Leukemias. Hence, bone marrow examination should be considered as the gold standard for the analysis of acute leukemia cases, which cannot be replaced but can be supplemented by ancillary techniques of flow cytometric immunophenotyping, cytogenetic and molecular studies.

Conflict of interest: none.

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