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Research Article

Haematologic Profile of Treatment Naïve Patients with Acute Leukemia

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Introduction

Acute leukemia is a malignant clonal disorder of immature cells in the haemopoietic system. These immature cells/ blasts are characterized by failure to progress through the expected lineages and to die by the process of apoptosis [1,2]. However, the clone retains the self-renewal characteristic of the stem cell and continue to re-populate the marrow; this subsequently leads to bone marrow failure [1,2]. WHO criterion for the diagnosis of acute leukemia is based on the presence of 20% or more of these blasts in the bone marrow with or without appearance in the peripheral circulation [1-3].

Acute leukemia is highly heterogenous and has been stratified into three categories based on their lineages; Acute Lymphoblastic Leukemia (ALL), Acute Myeloid Leukemia (AML) and mixed lineage acute leukemia. [4]. French- American-British FAB divided the ALL into three different classes while AML is classified into eight different types [4-6]. The clone of Acute Leukemia characteristically takes over the marrow leading most of the times to bone marrow failure, most of the patients present with features of bone marrow failure; severe anaemia, infections and thrombocytopaenic bleeding [1,2].

The diagnosis of Acute leukemia is from the morphological findings from the blood smear and bone marrow aspiration smear examinations with subsequent cytochemical staining, immunophenotyping and molecular tests. [1,3,7]. In sub Saharan Africa, the diagnosis of acute leukemia is based principally on blood and bone marrow aspiration smear findings as most of the subsequent investigations are not readily accessible. Acute lymphoblastic leukemia is commoner in children while AML is commoner in adults and the most common of the two categories, the mixed form acute leukemia is rare [2,7].

It has been widely documented that total white cell count in acute leukemia patients could be normal, low or high at presentation, it could be greater than 500×109/L especially in T-cell Acute Lymphoblastic Leukemia. High total white cell count has been found to be of poor prognostic significance in acute leukemia. In fact, the duration of remission is known to be inversely proportional to the total white cell count. However, the effect of total leucocyte count is not as significant as the immunological or cytogenetic characteristics of the leukemias, Also, in Acute Leukemia with good prognostic cytogenetics, it was observed that the total white cell count at diagnosis had a great influence on the overall prognosis, other prognostic factors include age, performance score, cytogenetics and response to induction chemotherapy [2]. The objective of this study is to evaluate the haematological profile (Haematocrit, white cell count, platelet, percentage blast from Bone marrow), frequency of occurrence and sub classification of acute leukemia patients at presentation in the University College Hospital, Ibadan**.**

Materials and Methods

In this study, a painstaking analysis of hospital records of 46 patients diagnosed with acute leukemia at the University College Hospital, Ibadan between January 2011 and July 2016 was undertaken.

The diagnosis of acute leukemia in each patient was based on clinical findings, peripheral blood and marrow findings. Morphological sub typing was done according to the French-American-British (FAB) criteria. Data were analyzed using SPSS version 22.

Results

A total of 46 patients were recruited within this period in the department of haematology, the age ranged from 1.5 years to 69 years with mean age of 23.6 years. Male: Female ratio was 1.5:1 (Table 1a,b,c).

Age interval	ALL	AML	Total	% of total
0 – 4	2(4.4%)	4(8.7%)	6 (13%)	13
5-9	1(2.2%)	1(2.2%)	2(4.3%)	4.3
10-14	3(6.5%)	6(13%)	9(19.6%)	19.6
15-19	5(10.9%)	4(8.7%)	9(19.6%)	19.6
20-24	0	2(4.3%	2(4.3%)	4.3
25-29	1(2.2%)	6(13%)	7(15.2%)	15.2
30-34	0	1(2.2%)	1(2.2%)	2.2
35-39	0	0	0	0
40-44	0	1(2.2%)	1(2.2%)	2.2
45-49	1(2.2%)	2(4.3%)	3(6.5%)	6.5
50-54	0	1(2.2%)	1(2.2%)	2.2
55-59	0	0	0	0
60-64	0	2(4.3%)	2(4.3%)	4.3
65-69	0	3(6.5%)	3(6.5%)	6.5
Total	13(28.4)	33(71.6%)	46	

Table 1a: Age range of patients against type of Acute Leukemia.

Acute leukemia (AL)	Frequency	% of AL
ALL	6(35.3%)	13.0
AML	11(64.7%)	23.9
Total	17	36.9

Table 1b: Childhood Acute Leukemia (0-14 years).

Acute leukemia (AL)	Frequency	% of AL
ALL	7(24.1%)	15.2
AML	22(75.9%)	47.8
Total	29	63.0

Table 1c: Adult Acute Leukemia (≥15 years).

Out of the 46 cases of acute leukemia, 33(71.7%) patients were diagnosed as AML, 13(28.3%) were diagnosed as ALL, no mixed lineage acute leukemia was seen. Childhood leukemia constitutes about 36.9% of acute leukemia. Highest number of acute leukemia was seen in 2016 while the least number of patients with acute leukemia was seen in 2015, there was no patient with ALL diagnosed in 2013. The average per annum of ALL was 2.3 cases while for AML, it was 5.5 cases Table 2.

Year	ALL	AML	Total
2011	6 (13%)	1 (2.2%)	7 (15.2%)
2012	4(8.7%)	5 (10.9%)	9 (19.6%)
2013	0	4 (8.7%)	4 (8.7%)
2014	1 (2.2%)	10 (21.7%)	11(23.9%)
2015	1 (2.2%)	2 (4.3%)	3 (6.5%)
2016	1 (2.2%)	11(23.9%)	12 (26.1%)
Total	13 (28.3%)	33 (71.7%)	46 (100%)

Table 2: Frequency of Acute Leukemia over a six-year period.

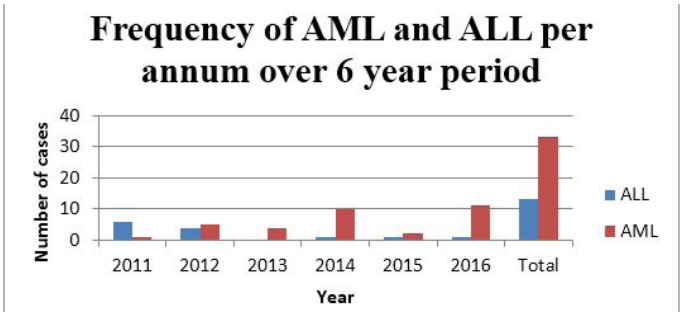

Figure 1: Frequencies of Acute Leukemia per year.

Notable finding here is ALL appeared to be the most common acute leukemia seen in 2011. Otherwise AML appear to be more common annually.

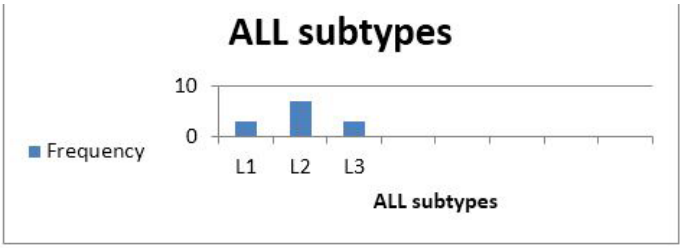

Figure 2a: FAB sub-classification of the Acute Lymphocytic Leukemia.

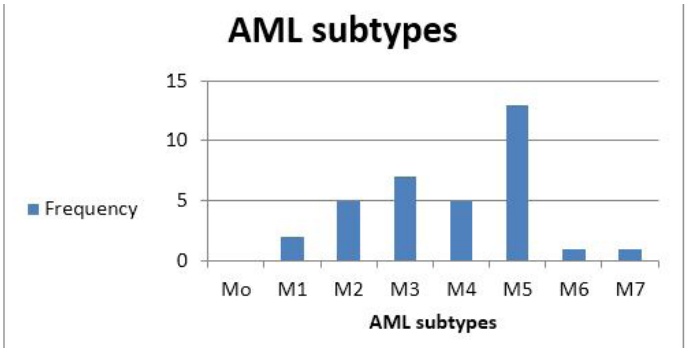

Figure 2b: FAB sub-classification of the Acute Myeloid Leukemia.

Notable finding here is that ALL-L_2 appeared to be the commonest ALL, while AML-M_5 is the commonest AML.

As shown in table 3 below; 52.2% of the patients presented with very severe anaemia, (haematocrit<20%) while only one out of the 46patients presented with haematocrit of 36% Table 3.

Anaemia	Hematocrit	Frequency (%)
Very severe	<20%	24 (52.2%)
Severe	20 – 24%	6 (13.0%)
Moderate	25 – 35%	15 (32.6%)

	>35%	1 (2.2%)
TOTAL		46

Table 3: Frequency of anaemia in Acute Leukemia (ALL and AML).

Leucopenia occurred in 5.1%, mainly in AML cases. Majority (60%) presented with leucocytosis, (WBC >11,000/mm3), this is more frequent in AML than ALL (38.5% VS 20.5%. Within normal range WBC was documented in approximately 36% overall but also more frequent in AML.

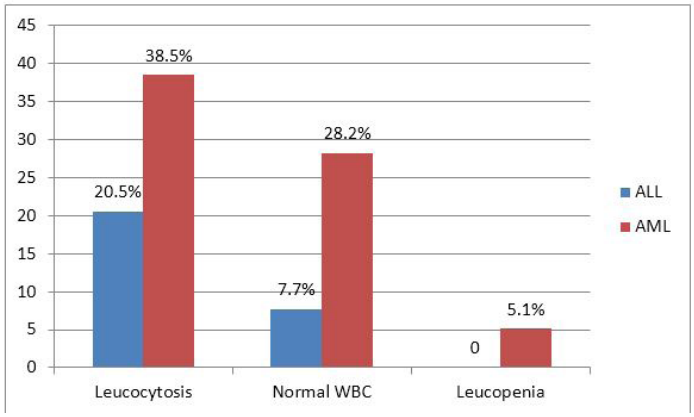

Figure 3: Pattern of WBC in Acute Leukemia (ALL and AML).

Almost all the patients with acute leukemia had thrombocytopaenia (platelet count < 90,000/mm^3) at the time of presentation, only 13% had platelet counts in the range of 90 and 350,000/mm3).

The mean percentage blast in the marrow for all patients with acute leukemia was 87.28%. The mean percentage blast for ALL and AML cases were 85.50% and 87.69% respectively.

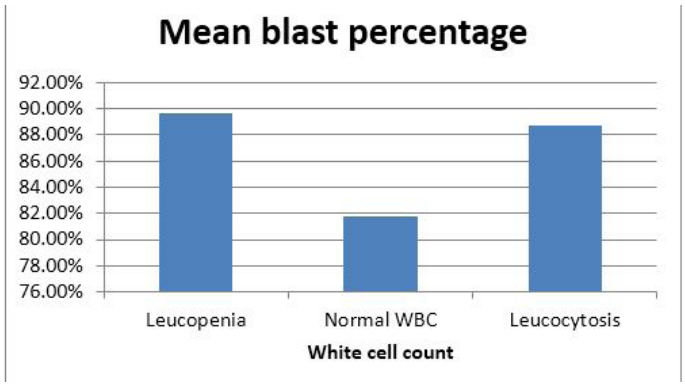

Figure 4: Correlate of percentage marrow blasts with total white cell count.

Discussion

In this study, 46 patients were diagnosed with acute leukemia over a six years period after a careful history, physical examination and morphological examinations of bone marrow aspirations though cytochemical staining, immunophenotyping and molecular tests could not be done. This is consistent with previous study done by Olaniyi JA and Umar GK where 50 patients were seen over a five-year period in the same health care institution.

In this index study, about 72% of patients seen were diagnosed of AML, this in support of previous studies that showed that AML accounts for 80% of acute leukemias seen in the adults [1,2]. Though in previous study done in this center, AML accounts for only 58% of acute leukemia patients seen [8]. Although, also in this study, the age range of our patients was 1.5 years to 69 years, though the mean age for this study was 23.6 years, the wide range of the age of the patients in the study was as a result of the inclusion criteria, in which all patients with acute leukemias were reviewed, acute lymphoblastic leukemia is commoner in children while acute myeloid leukemia is found more in the adults, so the two extremes of life are involved. [1-3]. The mean age of patients reviewed by Olaniyi JA and Umar GK in their study was 19 years.

There is male preponderance in this index study with male: female ratio of 1.5:1. This finding support previous studies done by Olaniyi et al., Mahul et al., and Preethi CR on acute leukemia in which they also found male preponderance .The commonest AML FAB subtype in our series was AML-M5, this accounted for about 40%, this is against the previous study done by Olaniyi et al., Ghosh et al., where AML-M2 subtype was the commonest seen in their study, there was no patient with M0 and M7, this could be as a result of difficulty in making the diagnosis morphologically most especially AML-M0, this is consistent with the findings in Preethi CR study. The commonest ALL subtype is ALL-L2, this is consistent with previous study Preethi CR study on ALL in which ALL-L2 constitute 100% of all cases of ALL seen.

Majority of the patients, about 95% presented with anaemia, this is because of bone marrow failure secondary to infiltration by these immature cells/ blasts, this is consistent with the previous studies done by Preethi CR and Mathul et al, all the patients in Preethi CR study presented with pallor.

In this present study, leucocytosis, predominantly blasts, is seen in about 60% of the total patients reviewed, the high white cell count also reflects the high tumor burden seen in our environment. This study established thrombocytopaenia in vast majority (87%), thrombocytopaenic bleeding is one of the presenting feature in most of the patients with acute leukemia, thrombocytopaenia is a consistent feature in acute leukemia, [1,2,6,7] this is as a result of bone marrow infiltration by the blasts, this could contribute to anaemia seen in acute leukemia as some of them has thrombocytopaenic bleeding. This is consistent with previous studies where thrombocytopaenia is a prominent feature in Acute Leukemias. Very rarely thrombocytosis could also be seen in acute leukemia but none of our patients had thrombocytosis.

Heavy Bone marrow tumor burden is found in all acute leukemia patients hence presenting with features of bone marrow failure (decreased haemopoietic reserve). The high proportion of blast in the marrow may suggest late presentation of patients in this part of the world; this is responsible for high white cell count seen in most patients as the blasts have spilled into the peripheral circulation and hence poor prognosis. The mean percentage blast for ALL and AML cases were 85.50% and 87.69% respectively this is in tandem with previous studies done by Preethi CR on both ALL and AML in which percentage blast was about 80% in the two studies.

Conclusion

The finding of high leucocyte count in these patients reflects a late presentation and connotes bad prognosis since total white cell count at diagnosis is one of the prognostic index in acute leukemia and high total leucocyte count suggests a poor prognosis. The need for cytochemistry, immunophenotyping, cytogenetics or molecular tests cannot be over emphasized in obtaining a definitive diagnosis and determine prognosis. Therefore, provision of a flow cytometer to further characterize our patients has become a mandatory requirement in order to fully profile acute leukemias and other haematological malignancies and to enhance possibility of targeted therapy.

References

1. Richard A. Larson (2016) Acute Lymphoblastic Leukemia. Williams Haematology 9: 1505-1526.
2. Jane L Liesveld, Marshall A Litchman (2016) Acute Myelogenous Leukemia. Williams Haematology 9: 1373-1436.
3. Alan K Burnett, David Grimwade (2016) Acute Myelogenous Leukemia. Postgraduate Haematology 7: 352-370.
4. Torsten Haferlach, Barbara J Bain (2016) Laboratory Diagnosis of Haematological Neoplasms Postgraduate Haematology 7: 332-351.
5. Arya LS (2000) Acute Lymphoblastic Leukaenia: Current treatment concepts. Indian Peadiatrics 37: 397-406.
6. Preethi CR (2014) Clinico-Hematological Study of Acute Myeloid Leukemias. Journal of clinical and diagnostic research Vol 8(4): FC14-FC17.
7. Preethi CR (2014) Clinico-Hematological Study of Acute Lymphoblastic Leukemias.Global Journal of Medical Research: Microbiology and Pathology 14.
8. Olaniyi JA, Umar GK (2013) An Audit of Acute Leukemias at the University College Hospital, Ibadan, Nigeria. 2: 649.
9. Bennet JM, Catovsky D, Daniel MT, Flandrin G, Galton DA, et al. (1976) Proposals for classification of the Acute Leukemias. British Journal of Haematology 33: 451-458.
10. Ghosh S, Shinde SC, Kumaran GS, Sapre RS, Dhond SR, et al. (2003) Haematologic and immunophenotypic profile of acute myeloid leukemia: an experience of Tata Memorial Hospital. Indian J. Cancer 40: 71.
11. Schwartz RS, Mackintosh FR, Greenberg PL (1986) Correlative Pattern of leucocyte counts at presentation and relapse in acute myelogenous leukemia. Acta Haematol 75: 79-82.