Clinical and Laboratory Characteristics of Patients with Leukaemia in South-South Nigeria

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Citation

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Abstract

Background: South-South geopolitical region of Nigeria is a region rich with oil exploration activities. The people in this region are exposed to petroleum products which is one of the factors associated with leukaemia. There are limited data on leukaemia among these people. This study sought to document the clinical and laboratory characteristics of patients with leukaemia from this region. Materials and methods: One hundred and sixty-three (163) case notes of patients from this region with the diagnosis of leukaemia over a ten-year period (January 1999 to December 2008) were reviewed. Clinical and laboratory profiles of the patients were extracted and analyzed using the Statistical Package for Social Science (SPSS) version 15.Results: Leukaemia was found to be more common in males (52.1%) than in females (47.9%). The mean ages at diagnosis of the various subtypes of leukaemia were noted as follows: Acute lymphoblastic leukaemia (ALL) 4.4±2.3 years, acute myeloid leukaemia (AML) 25.6±3.3 years, chronic myeloid leukaemia (CML) 35.2±2.8 years and chronic lymphocytic leukaemia (CLL) 57.1±4.3. The mean duration of symptoms prior to presentation was found to be shortest (0.5 month) in AML and longest (11.5 months) in CLL. Weakness (82.2%) was found to be the most frequent symptom. This was followed by fever (78.5%), weight loss (54.6%), and bone pain (31.9%). The most common physical signs were pallor (71.2%), splenomegaly (66.3%), and hepatomegaly (47.8%). Haematocrit was found to be reduced below the reference ranges in all the leukaemias but the reduction was more in the acute leukaemias than in the chronic leukaemias. Total white cell count was moderately elevated in the acute leukaemias but markedly increased in the chronic leukaemias. Male patients had higher haematocrit, white cell count, and platelet count at presentation than the female patients. Conclusion: The clinical and laboratory features of the patients from this study were similar to what have been reported widely in literature, but the patients in our study presented late and had shorter median survival compared to their counterpart in the developed world.

INTRODUCTION

The leukaemias are a group of disorders characterized by the accumulation of malignant white cells in the bone marrow and blood.[1] They are usually divided into four major categories, with different clinical features and prognosis. They are acute lymphoblastic leukemia (ALL), chronic lymphocytic leukemia (CLL), acute myelogenous leukemia (AML), and chronic myelogenous leukemia (CML).[2]

The proliferation and accumulation of malignant white cells in the marrow result in suppression of haematopoiesis and, thereafter anaemia, thrombocytopaenia, and functional neutropaenia.[3] Extramedullary accumulation of malignant white cells may occur in various sites, especially the meninges, gonads, thymus, skin, liver, spleen and the lymph nodes.

The study of the clinical and laboratory profile of patients with leukaemia will help in determining characteristics that would help in early diagnosis and management of these conditions. In many tertiary hospitals in Nigeria, the diagnosis of leukaemia is by morphological examination of peripheral blood films, and bone marrow aspiration smears. This is grossly inadequate. Advance diagnostic procedures like cytogenetic analysis, immunophenotyping, cytochemical staining and molecular genetics are yet to be fully incorporated in the workup of leukaemia in most of the tertiary hospitals in this country. It is against this backdrop that clinical evaluation of patients is viewed as very fundamental to the diagnosis of these malignancies in Nigeria and other developing countries.

MATERIALS AND METHODS

The study was carried out at the University of Benin Teaching Hospital, Edo state, Nigeria-a 600-bed tertiary health institution that renders specialist services to its host

community. It also serves as a referral center to neighbouring states in the South-South geopolitical region of Nigeria. The hospital is equipped with adequate manpower for diagnosis and management of most haematological malignancies. It also has a very well structured records department, where patient's information are well kept and easily retrieved for research purposes.

The study population consisted of all patients with leukaemia from the South-South geopolitical region diagnosed and managed at the study centre from January 1999 to December 2008. All ages were included. The diagnoses of leukaemia were confirmed by consultant haematologists, paediatric oncologists and histopathologists. Those patients whose diagnoses were not confirmed by the above mentioned specialists or who do not reside in the South-South region were excluded from the study.

Permission was sought and obtained in writing from the Head of the Medical Records Department of the hospital to collect data from patient's case notes and from the cancer register of the hospital. Relevant data that were collected included the date of presentation, demography, clinical, laboratory features of the patients and the definitive diagnosis.

The data were analyzed using Statistical Package for Social Science (SPSS) version 15.

RESULTS

A total of one hundred and sixty-three (163) patients diagnosed of leukaemia over the study period were reviewed. The patients were aged 11 months to 62 years and comprised eight-five males (85) (52.1%) and seventy-eight females (78) (47.9 %). (Table 1)

Figure 1

Table 1; Gender Distribution of the Patients

Gender	Frequency	Percentage
Males	85	52.1
Females	78	47.9
Total	163	100.0

M:F 1.1:1

M:F 1.1:1

X^2 =0.3, df=1, p=0.583 M: F=male to female ratio. X^2=Chi-square, df= degree of freedom.

The mean ages at diagnosis of the various types of leukaemia were noted as follows: ALL 4.4±2.3 years, AML 25.6±3.3 years, CML 35.2±2.8 years and CLL 57.1±4.3. (Table 2)

Figure 2

Table 2: Mean Age at Diagnosis of the Different leukaemias

Malignancies	Frequency n (%)	Mean age at diagnosis (years) ± SD
ALL	34 (20.9)	4.4 ± 2.3
AML	20 (12.3)	25.6 ± 3.3
CML	39 (23.9)	35.2 ± 2.8
CLL	70 (42.9)	57.1 ± 4.3
Total	163 (100.0)	

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia

Table 3 revealed that weakness (82.2%) was the most common symptom of patients with leukaemia in the study centre. This was followed by fever (78.5%), weight loss (54.6%), lymph node enlargement (53.4%), bone pain (31.9%), and bleeding (10.4%). Lymphadenopathy was noted mainly in patients with CLL. Pallor was the most common physical sign (71.2%). It was followed by splenomegaly (66.3%) and hepatomegaly (47.8%).

Figure 3

Table 3: Clinical Features of Patients with Leukaemia

Clinical Features	ALL n=34	AML n=20	CLL n=70	CML n=39	Total	Percentage (%)
Weakness	34	19	50	31	134	82.2
Fever	32	19	49	28	128	78.5
Weight loss	10	4	56	19	89	54.6
Bone pain	33	19	0	0	52	31.9
Bleeding	7	10	0	0	17	10.4
Jaundice	3	0	4	0	7	4.3
Leg swelling	4	2	2	5	13	7.9
Lymphadenopathy	14	0	69	4	87	53.4
Pallor	32	19	42	23	116	71.2
Splenomegaly	10	4	56	38	108	66.3
Hepatomegaly	7	2	42	27	78	47.8

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia

The mean spleen and liver sizes below the costal margins

were highest in CML (11.4cm) and (8.1cm) respectively, and lowest in AML (1.5cm) and (1.0cm) respectively. (Table 4)

Figure 4

Table 4: Mean Spleen and Liver Sizes of Patients with Leukaemia at Presentation

	ALL n=34	AML n=20	CML n=39	CLL n=70
Mean spleen size(cm)	2.1	1.5	11.4	8.4
Mean liver size(cm)	1.6	1.0	8.1	4.5

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia

Analysis of the duration of the symptoms prior to presentation showed that patients with acute leukaemia had a mean duration of symptoms prior to presentation of 0.5month (AML) and 0.75month (ALL), while chronic leukaemia had an average duration of 8.5 months (CML) and 11.5 months. (CLL). (Table 5)

Figure 5

Table 5: Mean Duration of Symptoms of Patients with Leukaemia Prior to Presentation

Leukaemia subtypes	ALL n=34	AML n=20	CML n=39	CLL n=70
Mean Duration of symptom prior to presentation (months)	0.75	0.5	8.5	11.5

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia

Table 6 showed that for the acute leukaemias, male patients had a mean packed cell volume (PCV) of 21%, a mean total white cell count (WBC) of 62 $x10^9$/l and a mean platelet count of 125 $x10^9$/l at presentation while the female patients had a mean PCV of 18%, a mean WBC of 48 $x10^9$/l and a mean platelet count of 100 $x10^9$/l. The differences noted in the mean PCV, WBC and Platelet for male and female patients were not statistically significant. (p>0.05)

For the chronic myeloid leukaemia, the PCV was moderately low, the WBC was markedly elevated and the platelet count was normal for both male and female patients. Chronic lymphocytic leukaemia patients had PCV and WBC counts similar to CML patients but their platelet counts were lower. The differences observed in the haematological value of male and female patients with chronic leukaemias were not statistically significant. (p>0.05)

Figure 6

Table 6: Blood Parameters of Male and Female Patients at Presentation

Parameters	Males	Females	p-value
Acute leukaemias	n=29	n=25	
PCV (%)	21 (±10)	18 (±11)	0.290
WBC ($x10^9$/l)	62 (±43)	48 (±45)	0.456
Platelet ($x10^9$/l)	125 (±82)	100 (±90)	0.290
Chronic myeloid leukaemia	n=25	n=14	
PCV (%)	24 (±8)	20 (±10)	0.546
WBC ($x10^9$/l)	160 (±130)	132 (±120)	0.101
Platelet ($x10^9$/l)	248 (±133)	260 (±121)	0.437
Chronic lymphoid leukaemia	n=31	n=39	
PCV (%)	23 (±4)	21 (±6)	0.763
WBC ($x10^9$/l)	110 (±12)	106 (±5)	0.785
Platelet ($x10^9$/l)	101 (±14)	97 (±26)	0.776

All the patients studied were on treatment with chemotherapy, except four (2.5%) patients who died before treatment could start. The median survival of patients with the various leukaemias while on treatment was as shown in table 7. The acute leukaemia patients had median survival of less than a year and it was shorter with the AML than ALL. CML and CLL patients had median survival of 4 years and 5 years respectively.

Figure 7

Table 7: Median survival of the patients with various leukaemia types on chemotherapy

Leukaemia subtypes	ALL n=34	AML n=20	CML n=39	CLL n=70
Median survival (months)	8	6	48 (4 years)	60 (5 years)

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia

DISCUSSION

Leukaemias were found to be more common in males in the study population. This finding is similar to what has been documented in literature.[4] The mean ages at presentation of AML, ALL, CLL, and CML noted in this study were in agreement with the pattern reported form other studies in Africa [5,6,7,8,9,10] although lower than what Manal et al [11] reported in Egypt. The mean ages at presentation of the various leukaemia subtypes except ALL and AML were lower in this study compared to what has been reported in the United States of America.[12,13] The higher prevalence of leukaemia among the middle aged in the study area may be attributed to the thinness of the aged population. This is probably due to low life expectancy in Nigeria (47years) compared to the high life expectancy in the United States

(77.7 years) and other developed world.

The commonest symptom for leukaemia in this study was weakness. It was more prevalent among the acute leukaemia patients. This group also had correspondingly lowest haematocrit levels. Weakness in these patients is attributable to low haematocrit level. The majority of the patients presented with lower than normal haematocrit for their age and sex. The low haematocrit could have resulted from bone marrow infiltration by malignant cells, autoimmune haemolytic anaemia and hypersplenism. Other causes of low haematocrit in these patients were the activity of inhibitory cytokines (released by these tumors) on the red cell precursors, poor appetite and poor food intake which were common among these patients. Next to weakness was fever. Fever in these patients may be attributable to infections. Infections are common in these patients as a result of reduced immunity and functionally incompetent white blood cells. Another cause of fever is the liberation of cytokine that have thermoregulatory effect on the hypothalamus.[14,15] Weight loss was a frequent symptom in these patients. It was seen mainly in patients with the chronic leukaemias. Weight loss was due to hypermetabolism or impaired metabolism, where the rate of catabolism is higher than that of anabolism. The mean spleen and liver sizes were noted to be high in patients with chronic leukaemias. The causes of splenomegaly and hepatomegaly could be traced to malignant infiltration of the spleen and liver by tumor cells, and expansion of the organs as a result of extramedullary erythropoiesis [16]

Results from this study showed that the average duration of symptoms prior to presentation was about 12 months in the chronic leukaemias. This demonstrated the lateness in presentation in the study area. Late presentation is common in many developing countries in contrast to early presentation seen in the developed countries. The reasons for late presentation are ignorance and poverty which are endemic in study area. Late presentation has become a serious impediment in the management of patients with haematological malignancies as well as other malignancies. Patients that present late tend to have unfavorably outcome with treatment.

Haematological parameters on presentation showed that patients with acute leukaemia had very low mean haematocrit and platelet count and moderately high white cell count while patients with chronic leukaemia had moderately low haematocrit and platelet count and very high white cell count. This was similar to what researchers reported in Malawi.[17] Female patients were found to have lower haematocrit values than the male patients with leukaemia. The lower haematocrit noted in the female patients was in keeping with the fact that normal females have a lower base line haematocrit compared to their male counterparts.

The median survival of patients with leukaemia in our study centre was lower with what has been documented in literatures. For instance, Rozman reported that the median survival for CLL was 8-10 years.[18] The lower median survival noted in our study is as a result of multiple factors which include late presentation, poverty to maintain treatment, non-compliance with treatment regimen as a result of ignorance and most importantly poor or inadequate supportive management. The reason why the median survival for ALL was longer than that of AML in our study may be attributed to the fact that ALL was more common in children while AML commoner in adults.[19] The outcome of many of the leukaemias was more favorable in children than in adults, usually as a result of co morbidity present in adults.

CONCLUSION AND RECOMMENDATIONS

The clinical and laboratory features of the patients with leukaemia from this study were similar to what has been reported widely in literature, but the patients in our study presented late and had shorter median survival compared to their counterpart in the developed world.

We also noticed that weakness and fever were the commonest symptoms of patients with leukaemia in the study area.

We therefore recommend that any person with unexplained weakness and fever should be thoroughly investigated for leukaemia and that the public should be educated on the need to present early to the physicians when they experience any symptoms.

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