Original article

TITLE: PATTERN OF HAEMATOLOGICAL MALIGNANCIES AMONG ADULTS IN MURTALA MUHAMMAD SPECIALIST HOSPITAL, KANO, NIGERIA: A 3-YEAR RETROSPECTIVE REVIEW

Authors: Hauwa Ibrahim1, Awwal Musa Borodo2, Usman Muhammad Ibrahim3, Aminu Abba Yusuf2

1. **Department of Haematology, North-West University, Kano, Nigeria.**
2. **Department of Haematology, Bayero University, Kano,Nigeria**
3. **Department of Coomunity Medicine, Federal University, Dutse, Nigeria.**

Corresponding Author: Awwal Musa Borodo, Department of Haematology, Bayero University, Kano, Nigeria. musa_awwal@yahoo.com. Telephone: +2347069768708

Abstract

Context: Haematological malignancies are a significant cause of morbidity and mortality globally, with an estimated 1.3 million new cases and 700,000 deaths in 2020.

Aims: This study retrospectively analysed the pattern of haematological malignancies among adult patients at Murtala Muhammad Specialist Hospital (MMSH), Kano, Nigeria, from 2017 to 2020.

Setting and Design: Hospital records of 33 patients aged 13 years and above with haematological malignancies presenting to MMSH from November 2017 to December 2020 were reviewed.

Materials and Methods: Sociodemographic data, clinical presentation, diagnosis, and full blood count parameters at presentation were obtained from case files. Data were analysed using SPSS v20. Associations between categorical variables were tested using chi-square, with p ≤0.05 considered significant.

Results: Males comprised 57% of patients (male-to-female ratio 1.3:1), with a mean age of 34.6±14.9 years. Chronic myeloid leukemia (CML) was the most common malignancy (45%), followed by chronic lymphocytic leukemia (24.2%), acute myeloid leukemia (12.1%), and Hodgkin's lymphoma (12.1%). Leukemias accounted for 87.9% of cases, lymphomas 12.1%. Splenomegaly was observed in 60.6% of patients and was significantly associated with CML (p <0.0001). Lymph node enlargement and history of blood transfusion were reported in 24.2% and 21.2% of patients, respectively. A white blood cell count ≥50 ×10^9/L was noted in 60.6% and was significantly associated with CML, while 81.8% had hemoglobin <10 g/dL and 33.3% had thrombocytopenia (<150 ×10^9/L).

Conclusions: CML is the most common haematological malignancy among adults at MMSH, Kano. Collaborative strategies are needed for prevention, early detection, and management of haematological malignancies.

Keywords: cancer, leukaemias, lymphomas, splenomegaly, Nigeria

Introduction

Haematological malignancies are malignancies that primarily affect blood-forming tissue such as bone marrow or cells of the immune system, for example leukemia, lymphoma and multiple myeloma depending on the type of cell affected. They are an important cause of death worldwide and in 2020, there were an estimated 1.3 million new haematological malignancies with 700,000 deaths globally. [1]Incidences of most haematological malignancies increase with age and they cancers account for 6.5% of all malignancies around the world, including approximately 9.0% in the United States and Europe.[1,2] Malignancies are a major cause of death and disability in developing countries, where health systems are poorly equipped to deal with this challenge. [2] Sub-Saharan Africa, in particular, is experiencing a marked increase in burden, with more than 1 million incidents of malignancies and nearly 800 000 cancer-related deaths projected in the year 2030, representing an approximately 85% increase from 2008. [2] Haematological malignancies accounted for 8.7% of malignancy cases and 9.9% of cancer-related deaths in sub-Saharan Africa in 2008, with Non-Hodgkin Lymphoma being the 5th most common malignancy in the region. [3] In Nigeria, malignancy is responsible for 72000 deaths every year with an estimated 102 000 new cases of cancer annually. [4] Different rates of haematological malignancies have been reported in different parts of Nigeria and non-Hodgkin lymphoma (NHL) was found to be the third and fifth most common cancer in males and females respectively.[4]

Over the years, there has been an increase in the number of cases of haematological malignancies in Nigeria including in Kano State, with MMSH as one of the facilities providing specialist care to a large number of people from Kano and other states of northern Nigeria. This study aimed to define the patient's characteristics, clinical presentation, full blood count parameters and types of haematological malignancies among adult patients presenting to the haematology clinic of Murtala Muhammad Specialist Hospital, Kano, Nigeria. There is a paucity of data on the distribution, classification and burden of malignancies in

Kano. Therefore, this review can provide information on the haematological malignancy burden and types. The study can serve as a foundation for future research and can provide the basis for policy formulation.

Methods

Ethical clearance

Ethical clearance was obtained from the Health Research Ethics Committee of Kano State Ministry of Health dated 7th December 2020 with approval number MOH/Off/797/T.I/2108. All the principles of research ethics in dealing with human subjects were adhered to throughout the research process.

Study Design and Population

This study is a retrospective study that analysed hospital records of adult patients with haematological malignancies who presented to MMSH, Kano, Nigeria from November 2017 to December 2020. Registered patients were 13 years and above and were enrolled in haematology clinics and hospital wards. Hospital records which contain all the needed information of the patients with their diagnoses, those 13 years and above with 13 years and above with documented diagnosis of haematological cancers based on bone marrow aspiration morphology, full blood count parameters/ blood film from haematology laboratory or tissue histology report from histopathology laboratory were included for data abstraction. The information retrieved includes demographic information, like age, sex, tribe, religion and occupation, clinical features at presentation, full blood count parameters at presentation and the specific cancer diagnosis of the patients. Diagnosis in the hospital register was based on the morphology of aspirated bone marrow cells, full blood count, blood film for chronic and acute leukaemias while lymphomas were diagnosed with tissue histology reports. Immunophenotyping, cytochemistry, and cytogenetics were not used for the diagnosis of these cancers as these tests are not available in resource - poor settings like our centre.

Patients whose information was incomplete, those less than 13 years of age or without a documented diagnosis of haematological malignancy were excluded from this study. Documented records of 33 patients with haemtological malignancies from November 2017 to December 2020 were obtained and analysed for this study.

Study Area

Murtala Muhammad Specialist Hospital (MMSH) is an 862-bed capacity tertiary health center owned by the Kano state

government located within the Kano metropolis. The hospital serves as a referral center for all the general hospitals within Kano state. Kano state has a projected population of 15, 172,462 as of 2023 based on the 2006 National Population Commission Census result based on a 3.3% annual growth rate.[8] The adult haematology clinic in MMSH operates once a week and an average of 10 patients with haematological conditions like malignancies, anemias and deep venous thrombosis are consulted weekly. Other potential entry points for patients with haematological disorders in the hospital are accident and emergency, medical wards, and specialty clinics among others, etc.

Data analysis and measurement of variables

All abstracted data generated were entered into Microsoft Excel, collated, cleaned and analysed using Statistical Package for Social Sciences (SPSS) version 12.0. The dependent variables(outcomes) are haematological malignancies ie acute myeloid leukemia (AML), acute lymphoblastic leukemia (ALL), chronic myeloid leukemia (CML), chronic lymphocytic (CLL), Hodgkin's lymphoma(HL) while the dependent variables are, sociodemographic features, clinical features and full blood count parameters of the patients.

Normally distributed quantitative data like age and haemoglobin count were summarized using mean and standard deviation (SD) as mean while skewed quantitative variables like white cell count, platelet count were presented as median and interquartile range. Categorical variables were presented as frequencies and proportions. Pearson chi-square test was used to test for association between two or more categorical variables with statistical significance set at $p < 0.05$.

Results

Sociodemographic features of the patients Thirty-three adult patients with haematological malignancies were diagnosed and documented from November 2017 to November 2020. The majority of

the patients (57%) are males with a male–to-female ratio of 1.3:1. The minimum and maximum ages of the patients were 13 and 63 years respectively with a mean ± SD age of the patients of 34.6±14.9 years. The majority of the patients (84.8%) are Hausa-Fulani by tribe while Islam is the religion of the majority (94.0 %) of the patients. More than half of the patients (60.6%) are employed as shown in Table 1.

Clinical features of the patients

About two-thirds of the patients (60.6%) presented with splenomegaly, 21.2% had a history of blood transfusion while 78.8% had no history of blood transfusion. Two patients (6.1%) presented with bleeding symptoms, two patients (6.1%) presented with body pains and 24.2% of the patients presented with a fever. About a quarter (24.2%) of the patients had lymph node enlargement (lymphadenopathy) while 12.1% of the patients presented with night sweats and weight loss. One patient (3%) had multiple abdominal masses and two patients (6.1%) presented with leg swelling. Confusion and tinnitus were present in one patient each. Two patients (6.1%) presented with abdominal pain while one patient was pregnant. One patient presented with anemic symptoms like easy fatigability and weakness as shown in Table 3.

Haematological malignancy diagnosis of the patients

Fifteen patients (45.5%) were diagnosed with CML and eight patients (24.2%) had chronic CLL. Four patients (12.1%) were diagnosed with acute myeloid leukaemia (AML) and Hodgkin lymphoma. Acute lymphoblastic leukemia was diagnosed in 2 (6.1%) of the patients. In general, leukaemias accounted for 87.9% of the malignancies while 12.1 % of the cases were lymphomas. Myeloid lineage malignancies predominate with 29 cases (57.6%) while the remaining 14 cases are lymphoid malignancies.

Full blood count parameters of the patients at presentation

The mean haematocrit and hemoglobin of the patients are 24.8±8 % and 8.4±2.4 g/dl respectively. The median white cell count of the patients is 133.5 $x10^9$/l (IQR:16.7-269.6) while the mean white cell count is 146.8±129.9. The median platelet count of the patients was 258 $x10^9$/l (IQR: 81-411.5) while the mean platelet count was 258.4±199.9 $x10^9$/l.

About two-thirds of the patients (60.6%) of the patients had a white cell count of at least 50 $x10^9$/l at presentation,78.7% of the patients had a white cell count of more than $11x10^9$/l, 9% of the patients presented with a white cell count of less than 4 $x10^9$/l

(leucopenia). The majority of the patients (81.8%) presented with hemoglobin count of less than 10g/dl while 33.3% of the patients had low platelet count (less than 150 x10^9/l), 27.2% of the patients presented with high platelet count(greater than 400 x10^9/l). About 91% of the patients have haematocrit of less than 36%.

Association between socio-demograpic features, full blood count parameters, clinical presentation and diagnosis of the patients.

Hodgkin lymphoma was significantly found among patients below 18 years of age (p=0.037) compared to other disease. Seventy-five percent of the Hodgkin lymphoma patients are below the age of 18 years. There was no significant association between sex, tribe, religion and haematological malignancies. CML was significantly associated with a white cell count of at least 50x10^9/l (p < 0.0001) and a platelet count of 150x10^9/L and above (p=0.037) compared to other diseases. The Overwhelming majority of CML patients (93.3% and 86.6%) presented with a white cell count of more than 50 x10^9/L and a platelet count of at least 150x 10^9/l respectively. The association between hemoglobin level, haematocrit level and haematological malignancy diagnosis was not statistically significant.

About two-third of the patients (60.6%) presented with an enlarged spleen (splenomegaly) and splenomegaly was significantly associated with chronic myeloid leukaemia (p < 0.0001) as 65% of CML patients presented with splenomegaly.

About 21% of the patients have a history of blood transfusion but none of the CML patients had a history of blood transfusion while all the patients with ALL and 75% of AML patients had a history of blood transfusion. Only 2 patients out of 33 presented with bleeding symptoms while 8 patients (24.2%) presented with a history of recurrent fever. Lymph node enlargement (lymphadenopathy) was present in 24% of the patients and 75% (3 patients). Hodgkin lymphoma patients have lymph node enlargement. Among the 4 HL patients, two presented with cervical lymph node enlargement, one patient presented with axillary lymph node enlargement and one patient presented with multiple abdominal masses. All two patients with ALL presented with lymph node enlargement as shown in Table 3

Association between other clinical features like weight loss, night sweats, bleeding symptoms, anaemic symptoms and haematological malignancies was not statistically significant.

Table 1: Sociodemographic features of the study participants

Variable	Number	Percentage
Age(Years)		
13 – 19	**8**	**24.2**
20 – 29	**6**	**18.2**
30 – 39	**5**	**15.1**
40- 49	**8**	**24.2**
50- 59	**3**	**9.1**
60- 69	**3**	**9.1**
Gender		
Male	**18**	**54.5**
Female	**15**	**45.4**
Tribe		
Hausa-Fulani	**28**	**84.8**
Others	**5**	**15.2**
Occupation		
Trade	**9**	**27.3**
Teaching	**4**	**12.1**
Tailoring	**2**	**6.1**
Miscellaneous	**5**	**15.1**
Unemployed	**13**	**39.4**

Table 2: **Haematological malignancy diagnosis of the patients**

Cancer diagnosis	Number	Percentage (%)
ALL	**2**	**6.1**
AML	**4**	**12.1**
CLL	**8**	**24.2**
CML	**15**	**45.5**
HL	**4**	**12.1**

Key: ALL – Acute Lymphoblastic Leukaemia, AML – Acute Myeloblastic Leukaemia, CLL – Chronic Lymphocytic Leukaemia, CML – Chronic Myeloid Leukaemia, HL – Hodgkin Lymphoma

Table 3: Clinical presentation of the patients with Haematological malignancies in MMSH, Kano.

Clinical features	Number	Percentage
Splenomegaly	**20**	**60.6**
Anemic symptoms		
(weakness, easy fatiquability etc)	**1**	**3**
History blood transfusion	**7**	**21.2**
Lymph node enlargement	**8**	**24.2**
Multiple abdominal masses	**1**	**3**
Bleeding symptoms	**2**	**6**
Fever	**8**	**24.2**
Body pain	**2**	**6**
Night sweats	**4**	**12**
Weight loss	**4**	**12**
Leg swelling	**2**	**6**
Confusion	**1**	**3**
Tinitus	**1**	**3**
Abdominal pain	**1**	**3**
Pregnancy	**1**	**3**

FBC PARAMETER	FREQUENCY	PERCENTAGE(%)
WBC count		
$> 11 \times 10^9/l$	**26**	**78.7**
$\leq 11 \times 10^9/l$	**7**	**21.3**
$\geq 50 \times 10^9/l$	20	**60.6**
Haematocrit		
$\geq 36\%$	3	9
$< 36\%$	30	91
Hemoglobin		
≥ 10 g/dl	6	18.2
< 10g/dl	27	81.8
Platelet count		
$< 150 \times 10^9/L$	11	33.3
$150 – 400 \times 10^9/L$	13	39.4
$> 400 \times 10^9/L$	**9**	**27.3**

DISCUSSION

More than half of our patients are males which is similar to what was reported in some centres in Nigeria and the USA, but higher than what was reported in Latin America.[11,6,1,2] The study conducted in Latin America however did not analyse patients with acute leukaemias which is in contrast to our study. The median age of malignancy diagnosis in our study is far lower than the median age of 64 years in the US study and 61 years observed in the Latin America study. [2] The mean age of 34 years

reported in our study was lower than the mean age of 44 years reported in Jos, Nigeria for leukaemia patients and also lower than the 49 years reported in Abakaliki, Nigeria. [6,11]The lower median age of Nigeria (17.2 years) compared to the USA (38.1 years) and other South American countries like Brazil (33.6 years).Argentina (31.9 years) and Mexico(29.8 years) will explain this disparity. [1,2]

Chronic myeloid leukemia was the most common haematological cancer diagnosed accounting for 45.5% of all cases followed by CLL with 24.2%. This is in contrast to what Chen *et al* reported in the USA which shows CML as accounting for only 4% of the cases in the registry. [1]The US study found NHL as the majority of the cases[1] and in contrast to our study, no single case of NHL was diagnosed as all our lymphoma cases were Hodgkin lymphoma. In contrast to our study, a study in Cross Rivers and Abakaliki in Nigeria found CLL and NHL respectively as the most common haematological malignancies among adults. [10,11].NHL was also the most reported malignancy in a South African study that analysed National cancer registry. [12] The shorter duration of our data (3 years) may explain these differences, because the Cross River study was a 10-year retrospective study while the Abakaliki report analysed

8-year data compared to our study which analysed 3-year data. The overwhelming majority of our cases were leukemias (87.9%) which is similar to what was reported in Jos Nigeria. [6] We did not diagnose any case of multiple myeloma-which is in contrast to what was reported in other Nigerian centers and the US by Chen et al. [1,6,10] The study in Jos and Cross Rivers, Nigeria reported the prevalence of multiple myeloma as 5.4% and 12.32% respectively while the US study quoted a prevalence of 15%.[6,1] The short period under our review (3 years) compared to the studies quoted (10 to 15 years for the Nigerian studies and 41 years for the US study) may explain why we did not get any cases of multiple myeloma and Non-Hodgkin lymphoma in our study. In general myeloid lineage malignancies predominate in our study (57.6%) compared to lymphoid malignancies and this is in contrast to what other Nigerian studies quoted which showed a preponderance of lymphoid malignancies. [10,11] The absence of NHL in our study is surprising because NHL is the 3rd and 5th most common form of cancer among males and females in Nigerians according to Nigeria National Cancer Control Plan(2018-2022).[4] All the cases of lymphoma in our study are Hodgkin lymphomas. Another possible reason for the lack of multiple myeloma in our study

may be because a significant number of patients with multiple myeloma present with back pain and pathological fractures and orthopaedic surgery clinic instead of haematology clinic is usually the first point of call for these patients in our setting.

The majority of our patients (60.3%) presented with splenomegaly which is higher than the 47 % found in Jos Nigeria. [7] This shows splenomegaly to be an important clinical feature of haematological malignancies and we found splenomegaly to be a significant factor associated with chronic myeloid leukaemia compared to other malignancies as 65% of our CML patients presented with splenomegaly. This is consistent with the clinical features of CML in the existing literature. [9] One quarter of our patients presented with lymph node enlargement which is lower than the 60.3% quoted in Jos, Nigeria. [7] This could be explained by the higher proportion of lymphoma cases (45%) in the Jos study compared to our study (12.1%). One-quarter of our patients (24.2%) had fever which is far lower than what was quoted in Jos, Nigeria. [7] Only 6.1% of our patients presented with bleeding symptoms (haematochezia), similar to the 9% found in a similar study in Nigeria. [7]

The majority of our patients had leukocytosis (78.7%) and anemia (81.3%)

which was higher than what was reported in Jos, Nigeria. [7] The larger sample size in the Jos study may explain this difference. Only 33% of the patients studied have thrombocytopenia which is higher than the 15% quoted in a similar study in Nigeria. [7] The higher sample size and lower cut-off value for thrombocytopenia (90×10^9/l) used by the Jos study may explain the disparity. In general, both studies showed only a minority of the patients presented with low platelet count.

Our study has some limitations. One limitation is the absence of advanced diagnostic techniques in our centers like cytochemistry, immunophenotyping and cytogenetics to properly characterise our haematological malignancy patients. We relied solely on morphology to diagnose the malignancies which is typical of low resource setting. Other limitations are the short duration of our retrospective analysis (3 years) and the exclusion of children from the study. These limitations may affect the overall prevalence of the malignancies and contribute to the absence of cancers like multiple myeloma and non-Hodgkin lymphoma in our records.

Conclusion

Chronic myeloid leukemia is the most common haematological malignancy among adults in MMSH, Kano Nigeria.

Haematological malignancies affect more males than females, the majority of the patients have splenomegaly at presentation and splenomegaly was significantly associated with CML patients. Some of the patients had lymph node enlargement and fever each at presentation, similarly, most of the patients had high white cell count and anemia, with few of the patients having low platelet count at presentation. The government and relevant stakeholders should ensure cost-effective strategies for the prevention and management of haematological malignancies. Prospective studies are required to assess the overall survival, of patients with haematological cancers in Kano, Nigeria.

REFERENCES

1.Chen L, Zhen Y, Yu K, Chen S, Wang W, Gale RP, *et al*. Changing causes of death in persons with haematological cancers 1975–2016.Leukemia 2002;36:1850-1860.

2.Hungria VTM, Chiatonne C, Pavlovsky M, Abenoza LM, Agreda GP, Armenta JR, *etal*. Epidemiology of Haematological malignancies in Real-world settings: Findings from Haemato-Oncology Latin America Observational Registry Study. J. Glob. Oncol. 2019;5: 1-19.

3. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. GLOBOCAN 2008 v2.0, Cancer Incidence and Mortality Worldwide. IARC Cancer Base No. 10,2010. Available from https://www.globocan.iarc.fr

4. Federal Ministry of Health. Nigeria National Cancer Control Plan 2018 – 2022. [Accessed 10th December 2023]. Available from https://www.iccp-portal.org

5. Worldometer, world population.[Accessed 5th January 2024]. Available from https://www.worldometers.info/world-population

6. Egesie OJ , Jatau ED , Damulak OD, Zakari A , Jasini J, Akinola O , *et al*. Prevalence and type of haematological malignancies among adults in a tertiary hospital in Jos-Nigeria: a sixteen-year retrospective analysis. Highland Med Res J 2017;17(2):92-96

7. Egesie OJ, Agaba PA, Silas OA, Achenbach C, Zakari A, Abaji OO, et al. Presentation and survival in patients with hematologic malignancies in Jos, Nigeria: A retrospective cohort analysis. J Med Trop 2018 ; 20(1): 49–56.

8. Muhammad MA, Braji AI, Aminu A, Yusuf MA, Jalo RI, Gboluwaga TA, *et al*.Outcome and barriers to cervical cancer screening among Human immune deficiency virus-Positive women attending

attending Aminu Kano Teaching Hospital, Kano State, Nigeria. Dutse Journ Pur and Appl Sci 2023;9(4b):1-10.

9. Yeong D TO, Hughes T P. Chronic Myeloid leukemia. In: Hoffbrand AV, D R Higgs, D M Keeling, A B Mehta (eds). Postgraduate Haematology. 7th ed. West Sussex: Willey-Blackwell; 2016. 419-437

10. Kingsley A, Benedict N, Idongesit A, Bassey BO, Effiong O, Emem P, *et al.* Epidemiological pattern of adult haematological malignancies in a tertiary hospital in Cross River state. International Research of Oncology 2019;2(1):16-24.

11. Ugwu NI, Okoye A E, Ugwu CN, Iyare F E, Edegbe FO, Ugwu G C, *et al* . Distribution Pattern and Prevalence of Haematological Cancers among Adults in Abakaliki, South-Eastern Nigeria.Nijer.Postgrd.Med.J 2021;28(4):266-272.

12. Schonfeld SJ, Wiggill T, Singh E, Kellett P, Babb C, Schüz J. Hematologic malignancies in South Africa 2000–2006: analysis of data reported to the National Cancer Registry. Cancer Med 2016;5(4):728-738.