

# The Epidemiology of Haematological Malignancies at the University Of Benin Teaching Hospital: A Ten-Year Retrospective Study.

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## Abstract

Background: Haematological malignancies comprise a collection of heterogeneous mitotic conditions, all originating from cells of the bone marrow and the lymphatic system. They are a major cause of morbidity and mortality in the Niger delta region of Nigeria, a region noted for its high petrochemical activities. The burden of these malignancies has not been evaluated in this region and there is limited data on the epidemiology of these malignancies in Nigeria. Objective: The objective of this study was to determine the epidemiology of haematological malignancies, in terms of sex, age, marital status, educational background, occupation, tribe, residence, and place of origin of the patients and to determine the incidence, and prevalence rates of the various haematological malignancies. Materials and Methods: A total of four hundred and twelve (412) case notes of all patients with the diagnosis of haematological malignancies over a ten-year period (January 1999 to December 2008) were reviewed. Demographic features and the number of the various types of malignancies were extracted and analyzed using the statistical package for social science (SPSS) version 15. Results: Result showed that haematological malignancies accounted for 17.4% of all malignancies seen in the study area within the study period. They were significantly more common among the males, the adults, the married, the educated, the unemployed patients and the Bini tribe. The average incidence rate of haematological malignancies in the study area was 41.2 cases per annum. Non-Hodgkin's lymphoma (NHL) (33.5%) was found to be the most common haematological malignancy in the study area. It was followed by chronic lymphoid leukaemia (CLL) (17.0%), chronic myeloid leukaemia (CML) (9.5%), Burkitt's lymphoma (BL) (8.7%), acute lymphoblastic leukaemia (ALL) (8.3%), multiple myeloma (MM) (8.2%), Hodgkin's lymphoma (HL) (5.8%), acute myeloid leukaemia (AML) (4.9%) myelofibrosis (MF) (2.7%). The least prevalent was polycythaemia rubra vera (PRV) (1.4%). Conclusion: Haematological malignancies are relatively common in the study area. They were commoner in adults, males, the married, the educated, the unemployed and the Bini tribe. The commonest haematological malignancy in this study was Non-Hodgkin's lymphoma.

## INTRODUCTION

Medical epidemiology has been defined by John M. Last<sup>1</sup> as the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems.

Although there is no single definition to which all epidemiologists subscribe to, three components are common to most of them and these are studies of disease frequencies, studies of disease distribution and the studies of disease determinants.

Haematological malignancies comprise a collection of heterogeneous malignant conditions, all originating from

cells of the bone marrow and the lymphatic system<sup>2</sup>. They are clonal diseases which are derived from a single cell in the marrow or peripheral lymphoid tissue which has undergone genetic alteration.<sup>3</sup> There are three major groups of haematological malignancies namely: the leukaemias, the lymphomas, and the plasma cell neoplasms. Others include polycythaemia vera, myelodysplastic syndrome, and primary myelofibrosis.

Haematological malignancies are a major burden to afflicted patients, medically and financially. The pattern of distribution of these malignancies has been studied in different parts of the world, but little is known of their prevalence and distribution in our environment. A good

understanding of the epidemiology of these malignancies may help identify the risk factors in our environment, as well as provide epidemiological basis for the development of preventive strategies aimed at reducing the prevalence of these malignancies.

**MATERIALS AND METHODS**

University of Benin Teaching Hospital (UBTH) is located in Benin-city, Edo state, Nigeria. The hospital is a 600-bed tertiary health institution that renders specialist care to its host community and environs. It serves as a referral center for neighbouring states which include Delta, Ondo and Ekiti states.

The study population consisted of all patients with haematological malignancies diagnosed at the University of Benin Teaching Hospital from January 1999 to December 2008. The diagnoses were made by consultant haematologists, paediatric oncologists or histopathologists after reviewing the history, physical signs and relevant laboratory investigations of the patients. Those patients whose diagnoses were not confirmed by the above mentioned specialists 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 at the Medical Records library. The cancer register of the Histopathology Department of the hospital was also consulted in order to include those who were diagnosed but were not managed in the hospital and those who passed on before their histology results were ready.

At the Medical Records Department, the clinic attendance register, the admission/ discharge register and the death register were consulted and relevant data extracted from them.

Data that were collected included the date of presentation, the age, gender, marital status, educational background, occupation, tribe, state of residence, place of origin of the patients and type of malignancy. The data was analyzed using SPSS version 15 statistical software.

**RESULTS**

Out of a total of 2368 cases of malignancies seen over a ten-year period (January 1999 to December 2008), 412 (17.4%) were haematological malignancies. The patients were aged 11 months to 84 years of age. They comprised 231 (56.1%)

males and 181 (43.9 %) females. The male to female ratio was 1.3:1.

Out of the 412 patients, 69 (16.7%) of them were children (0-15 years) while 343 (83.2%) were adults (>15 years). Haematological malignancies were significantly more prevalent in adults than in children. (p=0.0001). The other demographic characteristics of patients with haematological malignancies were as displayed in Table 1.

**Figure 1**

Table 1: Demographic characteristics of patients with Haematological malignancies

Variables	Frequency	Percentage	p-value
<b>Gender</b>			
Males	231	56.1	
Females	181	43.9	0.014
<b>Age (in years)</b>			
Children (<15 years)	69	16.7	
Adults (>15 years)	343	83.3	0.0001
<b>Marital status(adults) (n=343)</b>	273	79.6	
Married	70	20.4	0.0001
Single			
<b>Religion</b>			
Christian	387	93.9	
Muslim	15	3.6	
Traditional	10	2.5	0.0001
<b>Educational status</b>			
Educated	292	70.9	
Uneducated	120	29.1	0.0001
<b>State of Residence</b>			
Edo	275	66.7	
Delta	126	30.5	
Anambra	6	1.5	
Ondo	5	1.3	0.0001
<b>Occupation(Adults) (n=343)</b>			
Unemployed	120	35.0	
Civil Servants	80	23.3	
Traders	68	19.8	
Students	41	12.0	
Artisans	34	9.9	0.0001
<b>Tribe</b>			
Bini	146	35.4	
Isoko	78	18.9	
Uhrobo	65	15.7	
Esan	50	12.1	
Ibo	38	9.2	
Others	35	8.7	0.0001

Non-Hodgkin lymphoma (NHL) was the most common haematological malignancy in the study area. It affected 138 (33.5%) of the patients. The prevalence of the others were as follows, chronic lymphoid leukaemia (CLL) 70 (17.0%), chronic myeloid leukaemia (CML) 39 (9.5%), Burkitts lymphoma (BL) 36 (8.7%), acute lymphoblastic leukaemia (ALL) 34 (8.3%), multiple myeloma (MM) 34 (8.2%), Hodgkin lymphoma (HL) 24 (5.8%), acute myeloid leukaemia (AML) 20 (4.9%), myelofibrosis (MF) 10 (2.5%). The least common was polycythaemia rubra vera (PRV), which was seen in only 6 (1.4%) patients. (Table 2)

**Figure 2**

Table 2: Prevalence of haematological malignancies at the UBTH

Malignancies	Males n (%)	Females n (%)	Total n (%)
ALL	18 (4.4)	16 (3.9)	34 (8.3)
AML	11 (2.7)	9 (2.2)	20 (4.9)
CML	25 (6.1)	14 (3.4)	39 (9.5)
CLL	31 (7.5)	39 (9.5)	70 (17.0)
HL	14 (3.4)	10 (2.4)	24 (5.8)
NHL	75 (18.2)	63 (15.3)	138 (33.5)
BL	22 (5.3)	14 (3.4)	36 (8.7)
MM	20 (4.8)	14 (3.4)	34 (8.2)
MF	6 (1.5)	5 (1.2)	11 (2.7)
PRV	5 (1.2)	1 (0.2)	6 (1.4)
TOTAL	231 (56.1)	181 (43.9)	412 (100.0)

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia, HL=Hodgkins lymphoma, NHL=Non-Hodgkins leukaemia, BL=Burkitts lymphoma, MM=Multiple myeloma, MF=Myelofibrosis, PRV=Polycythaemia rubra vera.

Further analysis showed that the lymphomas (Non-Hodgkin’s lymphomas, Hodgkin’s lymphoma, and Burkitts lymphoma) were by far the most common haematological malignancies in the study area. They accounted for 48.1% (n=198) of the patients. The chronic leukaemias (chronic myeloid leukaemia, and chronic lymphoid leukaemias) followed and accounted for 26.7% (n=110) while acute leukaemias (Acute lymphoblastic leukaemia and acute myeloid leukaemia) accounted for 13.1% (n=54). (Table 3)

**Figure 3**

Table 3: Prevalence of different groups of malignancies at the UBTH

Malignancies	Frequency	Percentage
Lymphomas (NHL, HL, BL)	198	48.1
Chronic leukaemias (CML, CLL)	110	26.7
Acute leukaemias (AML, ALL)	54	13.1
Myeloproliferative disorders (non-leukaemic) (MF, PRV)	16	3.8
Plasma cell dyscrasias (MM)	34	8.3
Total	412	100.0

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia, HL=Hodgkins lymphoma, NHL=Non-Hodgkins leukaemia, BL=Burkitts lymphoma, MM=Multiple myeloma, MF=Myelofibrosis, PRV=Polycythaemia rubra vera.

Prevalence of the haematological malignancies among the different age groups showed that the prevalence of acute lymphoblastic leukaemias (ALL) was highest among those aged 0 to 20 years. AML was highest among 21-40 years of age. Chronic myeloid leukaemia and chronic lymphoid

leukaemia occurred most among those between 41-60 years of age. The modal age group affected by non-Hodgkin lymphoma and Hodgkin’s lymphoma was 21-40 years. Burkitt’s lymphoma was most prevalent among children aged 0-20 years. Multiple myeloma was most common in those aged 41-60 years of age. Most of the patients with myelofibrosis were aged 61-80 year. All the cases of polycythaemia rubra vera was seen in patients aged 41-60 years. (Table 4)

**Figure 4**

Table 4: Prevalence of haematological malignancies among different age groups

Malignancies	AGE GROUPS IN YEARS					Total n (%)
	0-20 years n(%)	21-40 years n(%)	41-60 years n(%)	61-80 years n(%)	>80 year n(%)	
ALL	18 (4.4)	14 (3.4)	0 (0.0)	2 (0.5)	0 (0.0)	34 (8.3)
AML	7 (1.7)	13 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	20 (4.9)
CML	0 (0.0)	15 (3.6)	17 (4.2)	7 (1.7)	0 (0.0)	39 (9.4)
CLL	2 (0.5)	0 (0.0)	32 (7.8)	30 (7.3)	6 (1.5)	70 (17.0)
HL	8 (1.9)	9 (2.2)	7 (1.7)	0 (0.0)	0 (0.0)	24 (5.8)
NHL	29 (7.0)	40 (9.7)	33 (8.0)	33 (8.0)	3 (0.7)	138 (33.4)
BL	35 (8.5)	0 (0.0)	1 (0.2)	0 (0.0)	0 (0.0)	36 (8.7)
MM	0 (0.0)	6 (1.5)	19 (4.6)	9 (2.2)	0 (0.0)	34 (8.3)
MF	0 (0.0)	0 (0.0)	2 (0.5)	9 (2.2)	0 (0.0)	11 (2.7)
PRV	0 (0.0)	0 (0.0)	6 (1.5)	0 (0.0)	0 (0.0)	6 (1.5)
TOTAL	99 (24.0)	97 (23.6)	118 (28.6)	89 (21.6)	9 (2.2)	412(100.0)

Key; ALL=Acute lymphoblastic leukaemia, AML=Acute myeloid leukaemia, CML=Chronic myeloid leukaemia, CLL=Chronic lymphoid leukaemia, HL=Hodgkins lymphoma, NHL=Non-Hodgkins leukaemia, BL=Burkitts lymphoma, MM=Multiple myeloma, MF=Myelofibrosis, PRV=Polycythaemia rubra vera.

**DISCUSSION**

A total of 2368 cases of malignancies were recorded at the University of Benin Teaching Hospital in the ten-year period under review. Out of this 412(17.4%) were haematological malignancies. Similar high prevalence of haematological malignancies has also been reported in other studies within and outside Africa. <sup>4</sup> At Ilorin, North West Nigeria, Babatunde et al <sup>5</sup> reported that haematological malignancies constituted 18.05% of all cancers seen at the University of Ilorin Teaching Hospital. <sup>Ojo<sup>6</sup></sup> reported that Non-Hodgkins Lymphoma was the third most common cancer among females and the second most common among males in South West Nigeria. A study conducted on patients from Northern Pakistan showed that leukaemias were the second most common cancer in males and the third commonest cancer in females.<sup>7</sup> These findings confirm haematological malignancies to be common both within and outside Africa.

This study also showed that except for chronic lymphoid leukaemia where females were more affected than males, haematological malignancies were found to be commoner in male than in females. The male: female ratio for CLL was 1:1.3. This higher prevalence of CLL in females was similar to what was reported at Ilorin, North West Nigeria <sup>by Babatunde et al.<sup>5</sup></sup> For the other haematological malignancies encountered, males were more affected. The male: female ratio was found to be 1.3: 1. This finding is in keeping with the general observation that the prevalence of most haematological malignancies is more in males than in females.<sup>8,9,10,11</sup> Onwuasigwe et al <sup>12</sup> reported similar higher preponderance of haematological malignancies among males while working in Enugu, South Eastern Nigeria. Rodriguez-Abreu<sup>2</sup> reported that the incidence rates for all types of leukaemia were slightly higher

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among males than females. The higher prevalence of haematological malignancies among males could be attributed to fact that males are more exposed to the occupational agents that predispose to the development of haematological malignancies. There is also a possibility that males may have more unstable genetic composition that does not withstand genetic injury as much as in the females. It may also be that the males have a weaker DNA repair apparatus than the females. These are areas that will require further research.

It was noted in this study that haematological malignancies were commoner in adults (>15 years) than in children (<15 years). The mean ages at presentation of AML, ALL, CLL, CML, NHL, and MM are in agreement with the pattern reported from other studies in Africa<sup>4,5,6,13,14,15</sup> although lower than what Manal et al<sup>16</sup> reported in Egypt. The mean age at presentation of the various haematological malignancies except ALL and AML is lower in this study compared to what has been reported in the United States of America.<sup>17,18</sup> The higher prevalence of haematological malignancies among the middle aged in the study area may be attributed to the thinness of the aged population in the study group. This is probably due to low life expectancy in Nigeria (47 years) compared to the high life expectancy in the United States (77.7 years) and other developed countries.

This study did not find any association of haematological malignancies with occupation contrary to what has been reported widely in literature<sup>19,20</sup> This finding may not be representative of the true picture because of the little attention that was paid to occupational history by the attending doctor during the time of history taking from the patients. In most cases, it was observed that the occupation of the patient was documented simply as civil servant, without stating where the patient worked, the nature of the job and the length of time that the patient worked. For those that were retired, the physicians did not include where the patient worked before retirement. In Italy researchers demonstrated that farmers and industrial workers have a significant risk for haematological malignancies.<sup>21</sup> Exposures to asbestos, aromatic hydrocarbons, fertilizers, mineral oils, pesticides, and radiations have been reported to be associated with a significant increase in the risk for these malignant diseases.<sup>22</sup>

In China, Travis et al<sup>23</sup> reported that a greater diversity of haematologic neoplasms is evident among benzene-exposed workers than previously described.

Haematological malignancies were noted to be more among married individuals than in single patients. This is expected since people get married as they advance in age and as we have noted that malignancies were more prevalent in the middle aged and the elderly, these groups are frequently

married.

Haematological malignancies were shown to be higher in educated individuals in this study. One would have expected that educated people would be learned enough to avoid the physical and biological agents that predispose to haematological malignancies and therefore reduce the prevalence of these malignancies among them.

The Bini tribe had the highest prevalence of haematological malignancies. This could be attributed to the fact that the Bini tribe is the predominant tribe in the study area. The high prevalence in the Isoko and the Urhobo tribes in Delta state may be attributed to the activities in the oil and gas sector in that region, as this has been noted to predispose to haematological malignancies.<sup>24</sup>

Lymphomas constituted 48.1% of all haematological malignancies encountered. Of this, NHL including Burkitts lymphoma constituted 42.2% while HL constituted 5.8%. The high prevalence of lymphoma noted in this study agreed with the earlier observation from previous studies in Africa and the USA.<sup>15,17,18</sup> In Kenya, for instance, Tenge et al<sup>5</sup> reported that lymphomas were commonest haematological malignancies and constituted 11.9% of all the malignancies in that region. In Northern Parkistan, Non Hodgkins lymphoma was noted as the most common cancer in males and the sixth most common cancer in females.<sup>25</sup> The improved standard of health care system in Nigeria providing easier patients access to the government-based hospitals and the precise diagnosis of lymphoma by histologic examination by qualified pathologists may have led to the observed increase in the prevalence of lymphomas. In addition, the increased prevalence could be attributed to the increase in AIDS-related lymphomas despite the era of HAART (Highly Active Anti-Retroviral Therapy). This was however contrary to what was reported in Martinique, French West Indies, where the commonest haematological malignancy was multiple myeloma followed by non-Hodgkins lymphoma.<sup>26</sup> The chronic leukaemias were the next common in frequency to NHL in this study. They accounted for 26.7% of the haematological malignancies. CLL was more common than the CML. The higher prevalence of CLL compared to CML is at variance to what was reported in other studies.<sup>14,15,27,28</sup> At Ilorin North West Nigeria, Babatunde et al<sup>5</sup> reported that the prevalence of CML was more than that of CLL. Reports from Europe stated that CLL is the commonest type of leukaemia in Western countries.<sup>29</sup>

The prevalence of chronic leukaemias was more than the acute leukaemias in this study. This finding is in keeping with observations that has been made in previous studies.<sup>13,15,27</sup> For the acute leukaemias, ALL (8.3%) was more common than the AML (4.9%). This contrasts with equal percentages of the leukaemias that was reported in a study at Ilorin North West Nigeria.<sup>5</sup> Multiple myeloma accounted for 8.2% of haematological malignancies in the study area. This value is higher than the values obtained in other studies in africa<sup>5</sup> but, however lower than what was obtained in West Indies.<sup>26</sup>

## CONCLUSION AND RECOMMENDATIONS

This study showed that haematological malignancies are relatively common in the study area, accounting for 17.4% of all cancers. They were commoner in the adults, the male gender, the married, the educated, and the Bini tribe. This study also revealed that poor attention was paid to the occupational history by the attending physicians.

We therefore recommend that adequate attention in terms of funding should be given to improve the diagnosis and treatment of these disorders in Nigeria.

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