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ORIGINAL RESEARCH

A Single-Centre Study of the Prevalence of Haematological Malignancies in the South-South Region of Nigeria

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Abstract

Background: Haematological malignancies are clonal haemopoietic disorders characterised by the accumulation of malignant haemopoietic cells in various body tissues. They arise due to varied genetic damages to several key biochemical pathways in cellular differentiation, proliferation and maturation.
Objective: To determine the prevalence of haematological malignancies in Delta State, Nigeria.
Methods: The study was a longitudinal study carried out at Delta State University Teaching Hospital, Oghara. Patients were recruited consecutively as diagnoses were made.
Results: Seventy-three patients diagnosed with haematological malignancies were involved in this study. Females were slightly more affected than males (50.7% vs 49.3%), and patients of 40 - 65 years were most affected (28.8%). Non-Hodgkin Lymphoma (16.4%) and Chronic Lymphocytic Leukaemia (16.4%) were the most common haematological malignancies. More female had CLL (91.7%), Myelodysplastic syndrome (MDS) (57.1%), Acute Myeloid Leukaemia (AML) (100%) and Polycythaemia vera (PV) (100%).
Conclusion: Haematological malignancies are common and on the rise in the centre of study and generally in Nigeria, with a notable change in the spectrum of the diseases.

Keywords: Cancers, *Haematological malignancies, Leukaemia, Lymphoma, Nigeria.*

Introduction

Haematological malignancies (HM) are clonal haemopoietic disorders characterised by the accumulation of malignant haemopoietic cells in various body tissues. [1] They arise due to varied genetic damages to several key biochemical pathways in cellular differentiation, proliferation and maturation. These events result in the unregulated proliferation of abnormal cells that are immortal.[1] These abnormal cells usually cause symptoms because of bone marrow suppression/failure and infiltration of various body tissues. Haematological malignancies are the fifth most common malignancies and the second leading cause of cancer deaths

worldwide. [2] They are classified into myeloid and lymphoid malignancies. The myeloid malignancies include Acute Myeloid Leukaemia (AML), Chronic Myeloid Leukaemia (CML), myeloproliferative neoplasms (Polycythaemia Rubra Vera, [PRV], Essential Thrombocythaemia [ET] and Primary Myelofibrosis [PMF]), Myelodysplastic Syndrome (MDS) and the Myelodysplastic/Myeloproliferative Neoplasms (MDS/MPN). In contrast, lymphoid malignancies include Acute Lymphoblastic Leukaemia (ALL), Chronic Lymphoid Leukaemias (CLL), Plasma Cell Dyscrasias (PLD), Hodgkin Lymphoma and Non-Hodgkin Lymphomas. [3]

Haematological malignancies are among the most common cancers. As the number of cases of haematological malignancies increases, the spectrum of haematological malignancies also changes.[4] Countries and regions differ in the types of haematological malignancies because of differences resulting from different socioeconomic development stages.[5] Therefore, understanding their prevalence is crucial to prevention, clinical practice improvements, funding and research resources.

Several retrospective studies on haematological malignancies have been carried out in different regions of Nigeria. [6 - 10] An eight-year retrospective study was previously conducted at the Delta State University Teaching Hospital. [9] This present study is a prospective study conducted to determine the changes in the dynamics and spectrum of haematological malignancies. This study aimed to determine the prevalence and pattern of haematological malignancies at the Delta State University Teaching Hospital, Oghara, Delta State.

Methods

Study location

The study was a prospective study carried out at Delta State University Teaching Hospital, Oghara, a tertiary health institution located in the Ethiope-West Local Government Area of Delta State, South-South Nigeria. It is a state government-owned teaching hospital with over 300-bed capacity. It is affiliated with Delta State University, Abraka, and provides services from over 20 different medical disciplines.

Study Participants

The study population comprised patients who presented at the Consultant Out-patient Haematology Clinics and Accident and Emergency ward, with the diagnosis of haematological malignancies, and voluntarily consented to participate in the study.

Sampling techniques and study duration

The participants were recruited consecutively between October 2021 and October 2023, as the diagnosis was made.

Test Procedures

Full blood count, which included haematocrit, haemoglobin concentration, red cell indices and platelet counts, was obtained from the blood sample in the EDTA bottle using an automated blood cell counter (Sysmex Haematology Autoanalyser model KN21). This was done in the main haematology laboratory at Delta State University Teaching Hospital.

Peripheral Blood Film (PBF): This was done manually on all the blood samples by the Consultant Haematologist.

Bone Marrow Aspiration: The Consultant Haematologist performed this test manually where indicated.

Bone Marrow Biopsy for Histology: Each bone marrow sample, where necessary, was manually obtained by the Consultant Haematologist while the Consultant Histopathologist did the histology.

Lymph Node Biopsy for Histology and Immunohistochemistry: Samples were obtained by the Consultant General Surgeon while the Consultant Histopathologist carried out histology and Immunohistochemistry.
Molecular studies: Samples were sent to a molecular laboratory [identity concealed for legal reasons] for analysis.

Data analysis
Data were analysed using Statistical Package for the Social Sciences (SPSS) version 23. The results were summarised using descriptive statistics (frequencies and percentages) and presented as figures, tables and charts.

Results

A total of seventy-three (73) cases of haematological malignancies were diagnosed during the study period out of 426 patients with cancers seen in the hospital during this study. This represented a 17.1% prevalence rate. The patients were aged between 18 and 84 years old with a peak of 60 to 69 years (28.8%), followed by 49 to 59 years (21.9%). The least common age group was less than 20 years (5.9%), as shown in Figure 1.

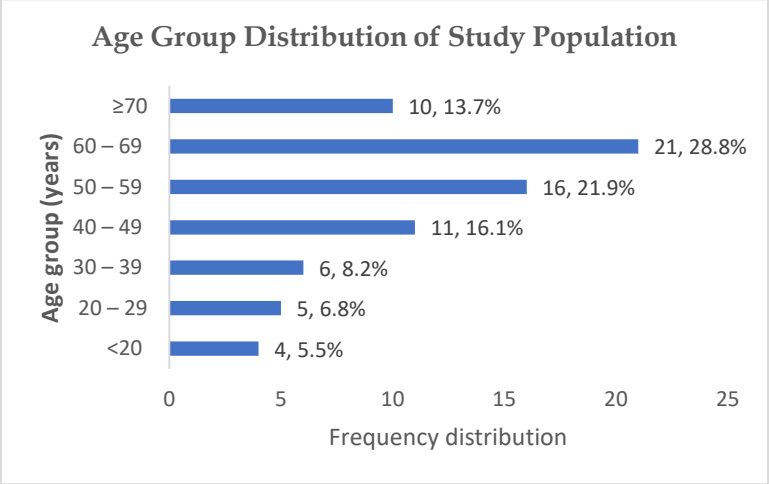

Figure 1. Age distribution of patients with haematological malignancies

There were 17 (24.2%) cases of lymphomas, consisting of 12 (16.4%) cases of Non-Hodgkin lymphomas (NHL) and 5 (6.8%) cases of Hodgkin lymphoma (HL). Amongst the NHLs were three cases of HIV- HIV-associated lymphomas and one Burkitt lymphoma. There were 30 (44.0%) cases of leukaemias, comprising 10 (13.6%) cases of acute leukaemias and 20 (27.4%) cases of chronic leukaemias. Chronic lymphocytic leukaemia (CLL) represented the most frequent leukaemia constituting 12 (16.4%) of all cases of haematological malignancies, followed by chronic granulocytic leukaemia (CGL) (11.0%). Acute lymphoblastic leukaemia (ALL) and Acute myeloid leukaemia (AML) were of equal frequencies (6.8% in each case). There were also 11 (15.1%) cases of multiple myeloma, 7 (9.6%) cases of myelodysplastic syndrome (MDS), 7 (9.6%) cases of myeloproliferative neoplasms (MPD) [essential thrombocythemia - 5 (6.6%), polycythaemia vera (PV) - 1 (1.4%), primary myelofibrosis - 1 (1.4%)], and one case of the MPD/MDS as shown in Figure 2.

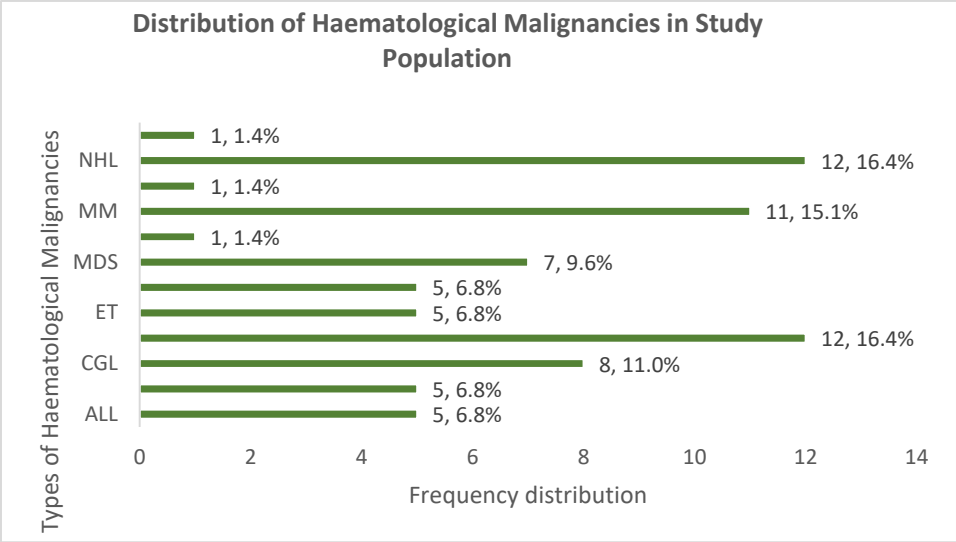

Figure 2. Frequency of haematological malignancies

Table I shows the sex distribution, marital status and age distributions for each of the various haematological malignancies: 13 (17.8%) patients were single, 45 (61.7%) were married, and 15 (20.5% were widows (er). All the cases (100%) of AML and PV were females aged 40 to 69 years. More female cases were recorded for CLL (91.7%) and MDS (57.1%), while more male cases were diagnosed with ALL (100%), ET (60%), MF (100%), MPD/MDS (100%), HL (60%), NHL (66.7%), and MM (63.6%). An equal number of male and female cases were observed for CGL.

Most (56.2%) of the patients with haematological malignancies lived in Warri. This was followed by Sapele (13.7%) and Ughelli (11.0%). The least number of patients (1.4%) resided in Obiaroko and Ozoro areas of Delta State. More cases of patients with haematological malignancies residing in Warri were recorded for each category except for PV, where the only patient resided in Ughelli (Table II).

Thirty-one (42.5%) of the patients were from the Urhobo ethnic group. This is followed by Isoko (12.3%) and the Edos (11.0%). The Urhobo ethnic group recorded the highest cases, which cut across the various categories of haematological malignancies: ALL (40%), CGL (37.5%), ET (80%), HL (60.0%), MF (100%), and MM (36.4%) as shown in Table III.

Discussion

Seventy-three cases of haematological malignancies with a prevalence of 17.1% were diagnosed during the study period. This is similar to previous studies from Benin City (17.4%), [11] South-South Nigeria and Ilorin (18.5%), [7] Jos (19.3%) [8] and Abuja (18.9%) [13], all in North-Central Nigeria. However, this differed from a previous study carried out in the same centre in the past (2019), which recorded a prevalence of 11.8%. [9]

Table I: Frequency, sex distribution, marital status and age distributions of patients with haematological malignancies

	ALL n = 5	AML n = 5	CGL n = 8	CLL n = 12	ET n = 5	HL n =5	MDS n = 7	MF n = 1	MM n = 11	MPN/MDS n = 1	NHL n = 12	PRV n = 1	TOTAL n = 73
Age group													
<20	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0(0.0)	2 -40	0(0.0)	0(0.0)	0(0.0)	0 (0.0)	1 (8.3)	0 (0.0)	4 (5.5)
20 – 29	3 (60.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 -20	0(0.0)	0(0.0)	0(0.0)	0 (0.0)	1 (8.3)	0 (0.0)	5 (6.8)
30 – 39	0 (0.0)	0 (0.0)	3 (37.5)	1 (8.3)	0 (0.0)	2(40.0)	0(0.0)	0(0.0)	0(0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (8.2)
40 – 49	1 (20.0)	1 (20.0)	2 (25.0)	1 (8.3)	1 -20	0(0.0)	1 -14.3	0(0.0)	2 (18.2)	0 (0.0)	2 (16.7)	0 (0.0)	11 (15.1)
50 – 59	0 (0.0)	1 (20.0)	1 (12.5)	2 (16.7)	1 -20	0(0.0)	2 (28.6)	1 100.0)	4 (36.4)	1 (100.0)	3 (25.0)	0 (0.0)	16 (21.9)
60 – 69	0 (0.0)	3 (60.0)	2 (25.0)	5 (41.7)	2(40.0)	0(0.0)	4 -57.1	0(0.0)	2 (18.2)	0 (0.0)	2 (16.7)	1 (100.0)	21 (28.8)
≥70	0 (0.0)	0 (0.0)	0 (0.0)	3 (25.0)	1(20.0)	0(0.0)	0(0.0)	0(0.0)	3 -27.3	0 (0.0)	3 (25.0)	0 (0.0)	10 (13.7)
Sex													
Female	0 (0.0)	5 (100.0)	4 (50.0)	11 (91.7)	2(40.0)	2 (40.0)	4 (57.1)	0(0.0)	4 (36.4)	0 (0.0)	4 (33.3)	1 (100.0)	37 (50.7)
Male	5 (100.0)	0 (0.0)	4 (50.0)	1 (8.3)	3(60.0)	3 (60.0)	3 (42.9)	1(100.0)	7 (63.6)	1 (100.0)	8 (66.7)	0 (0.0)	36 (49.3)
Marital status													
Single	4 (80.0)	0 (0.0)	2 (25.0)	0 (0.0)	0(0.0)	5(100.0)	0(0.0)	0(0.0)	0(0.0)	0 (0.0)	2 (16.7)	0 (0.0)	13 (17.8)
Married	1 (20.0)	4 (80.0)	5 (62.5)	5 (41.7)	4(80.0)	0 (0.0)	5 (71.4)	1(100.0)	10 (90.9)	1 (100.0)	9 (75.0)	0 (0.0)	45 (61.7)
Widow(er)	0 (0.0)	1 (20.0)	1 (12.5)	7 (58.3)	1(20.0)	0(0.0)	2(28.6)	0(0.0)	1(9.1)	0 (0.0)	1 (8.3)	1 (100.0)	15 (20.5)

Table II. Distribution of cases according to the places of residence

Residence	ALL n = 5	AML n = 5	CGL n = 8	CLL n = 12	ET n = 5	HL n =5	MDS n = 7	MF n = 1	MM n = 11	MPN/MDS n = 1	NHL n = 12	PRV n = 1	TOTAL n = 73
Agbor	0 (0.0)	0 (0.0)	1 (12.5)	1 (8.3)	0 (0.0)	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (4.1)
Benin	0 (0.0)	0 (0.0)	0 (0.0)	1 (8.3)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	2 (18.2)	0 (0.0)	1 (8.3)	0 (0.0)	5 (6.8)
Obiaroko	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)
Oghara	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	1 (8.3)	0 (0.0)	2 (2.7)
Ole	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)
Ozoro	0 (0.0)	0 (0.0)	0 (0.0)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.7)
Sapele	1 (20.0)	2 (40.0)	1 (12.5)	3 (25.0)	1(20.0)	1 (20.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	10 (13.7)
Ughelli	1 (20.0)	0 (0.0)	1 (12.5)	2 (16.7)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	1 (9.1)	0 (0.0)	1 (8.3)	1 (100.0)	8 (11.0)
Warri	3 (60.0)	3 (60.0)	5 (62.5)	4 (33.3)	4(80.0)	3 (60.0)	5 (71.4)	1(100.0)	3 (27.3)	1 (100.0)	9 (75.0)	0 (0.0)	41 (56.2)

Table III: Distribution of haematological malignancies according to ethnic groups

Tribe	ALL n = 5	AML n = 5	CGL n = 8	CLL n = 12	ET n = 5	HL n =5	MDS n = 7	MF n = 1	MM n = 11	MPN/MDS n = 1	NHL n = 12	PRV n = 1	TOTAL n = 73
Edo	0 (0.0)	1 (20.0)	0 (0.0)	3 (25.0)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	1 (9.1)	0 (0.0)	2 (16.7)	0 (0.0)	8 (11.0)
Ibo	1 (20.0)	2 (40.0)	1 (12.5)	2 (16.7)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (9.6)
Ijaw	0 (0.0)	1 (20.0)	2 (25.0)	0 (0.0)	0 (0.0)	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (8.3)	0 (0.0)	5 (6.8)
Ika	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	1 (8.3)	0 (0.0)	2 (2.7)
Isoko	0 (0.0)	0 (0.0)	1 (12.5)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (18.2)	0 (0.0)	5 (41.7)	0 (0.0)	9 (12.3)
Itsekiri	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)
Kwale	0 (0.0)	1 (20.0)	0 (0.0)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (18.2)	0 (0.0)	0 (0.0)	0 (0.0)	4 (5.5)
Ogoja	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)
Ukwani	0 (0.0)	0 (0.0)	1 (12.5)	1 (8.3)	0 (0.0)	1 (20.0)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	4 (5.5)
Urhobo	2 (40.0)	0 (0.0)	3 (37.5)	4 (33.3)	4 (80.)	3 (60.0)	5 (71.4)	1 (100.00)	4 (36.4)	1 (100.0)	3 (25.0)	1 (100.0)	31 (42.5)
Yoruba	0 (0.0)	0 (0.0)	0 (0.0)	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)

The increased prevalence observed in the current study may reflect the effectiveness of the study method (prospective) used as no case was lost during the study period, the diagnostic tools available at our disposal, such as immunohistochemistry and molecular studies, the increasing occurrence/incidence of haematological malignancies in this major petroleum and petrochemical product-producing state, and increased health-seeking behaviour due to increased awareness of haematological malignancies. The majority of the patients presented with early diseases, unlike in the past, where the majority of patients with haematological malignancies presented with late/advanced diseases. This reflects increased health-seeking behaviour and awareness of haematological malignancies. The prevalence observed in this study also differed from those from Yola (7.0%), [10] Bauchi (11.8%), [13] both in North-Eastern Nigeria, and Calabar (10.5%), [14] in Southern Nigeria.

The most frequent cases of haematological malignancies in this study were leukaemias (44.0%) followed by lymphomas (24.2%) giving a leukaemia-lymphoma ratio of 1.8:1. This is consistent with all recent studies, including the one previously done in the same centre, [9] Abakaliki, [8] Yola, [10] Abuja, [12] Bauchi, [13] and Calabar. [14]

In contrast to the findings above, there were previous studies carried out by Babatunde [7] in Ilorin and Nwannade [11] in Benin reported the predominance of lymphomas in their centres. Of note is that findings from these two studies reflect cases seen more than 15 years ago. As reported in the recent studies cited above, they do not represent the current changes in the spectrum and dynamics of haematological malignancies.

Individually, the most common haematological malignancies reported in this study are non-Hodgkin lymphomas and chronic lymphocytic leukaemia. No other centre in Nigeria recorded equal numbers for the NHLs and CLL. NHL ranked highest in several centres [7-12,14] except in Bauchi, where ALL ranked highest, followed by marginal differences between CLL and NHL (18.5% and 18.3%). In the previous study in the same centre, Nwagu *et al.* reported Chronic Myeloid Leukaemia as the second most common haematological malignancy, followed by Chronic Lymphocytic Leukaemia. This contrasts with our study, as chronic lymphocytic leukaemia was more frequent than chronic myeloid leukaemia followed by myelodysplastic syndrome.

Of note is the high number of cases of multiple myeloma in this study ranking the second most common haematological malignancy seen at our centre. This compares only with the Abuja study, in which multiple myeloma was also ranked as the second most common haematological malignancy (16.9%).

In the present study, AML and ALL ranked fifth alongside HL. This contrasts with what was recorded in the same centre in the past, [9] which reported HL as the fourth most common haematological malignancy, with AML and ALL ranking as the least common haematological malignancy. Kingsley *et al.* [14] reported AML and ALL as the least common haematological malignancies in Calabar. However, acute leukaemias were more common in the studies conducted in Abuja, Yola, and Bauchi centres than in the present ones.

ET was more frequent in the present study than reported at the National Hospital, Abuja. [12] The least common haematological malignancies recorded in the present study were MF, PV and MDS/MPL, which were consistent with the Abuja and Benin studies.

In this study, there were marginally more females than males (50.7% vs 49.3%). which is consistent with the previous report at the same centre, [9] but

at variance with all other studies carried out in different zones of the country where male predominance was observed. Also, when considered individually, females had higher prevalence of CLL, AML, MDS and PV in this study. The higher prevalence of CLL in females was similar to what was reported in studies. [7,8,10,11,14] AML and MDS were also reported to be more frequent in females in the Abakaliki study. [8]

This study showed that 56.2% of patients with HM resided in Warri, followed by Sapele and Ughelli, with the least proportion in Ozoro and Ubiaroko. Warri is home to the Warri Refining and Petrochemical Company, a major producer of petroleum and petrochemical products in Nigeria. The petrochemical industry is a major source of hazardous and toxic air pollutants with known mutagenic and carcinogenic properties. A wealth of occupational epidemiology literature exists around petrochemical industries with adverse haematological effects identified in individuals exposed to low concentrations of aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene). [15]

Conclusion

Haematological malignancies are common and on the rise in the centre of study and generally in Nigeria, with a notable change in the spectrum of the diseases. Hospital management and governments at all levels need to recognise the increasing disease burden, empower the haematologist with the necessary tools to effectively and efficiently manage these diseases and create more public awareness of critical precautionary measures, especially in a peculiar State like ours.

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