

Authorization

I hereby declare that I am the sole author of the thesis. I also authorize the Chattogram Veterinary and Animal Sciences University (CVASU) to lend this thesis to other institutions or individuals for the purpose of scholarly research. I further authorize the CVASU to reproduce the thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

I, the undersigned, author of this work, declare that the electronic copy of this thesis provided to the CVASU Library, is an accurate copy of the print thesis submitted, within the limits of the technology available.

Ambarish Mitra

December 2022

**Hematological malignancies in Chattogram region:
A cross sectional study**

Ambarish Mitra

Roll no: 0120/29

Registration no: 911

Session: January- June, 2020

**This is to certify that we have examined the above Master's
thesis and have found that is complete and satisfactory in all
respects, and that all revisions required by the thesis
examination committee have been made.**

(Supervisor)

Professor Dr. S K M Azizul Islam

Professor and Head

**Department of Physiology, Biochemistry and Pharmacology,
Chattogram Veterinary and Animal Sciences University**

(Chairman of the Examination Committee)

Professor Dr. Sharmin Chowdhury

Director, One Health Institute

**Chattogram Veterinary and Animal Sciences University
Khulshi, Chattogram-4225, Bangladesh**

DECEMBER 2022

Acknowledgements

All praises to The Almighty Who gave me the opportunity to be enrolled in the One Health Institute for achieving Master in Public Health. I would like to express my veneration to honorable supervisor Prof. Dr. S K M Azizul Islam, Department of Physiology, Biochemistry and Pharmacology, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University (CVASU) for his coherent and articulated instructions. It would not be possible to complete such a laborious task without his scholastic guidelines. It was an exquisite experience for me to work under his supervision. I feel much pleasure to convey my gratitude to Prof. Dr. Md Golam Rabbani, Professor and Head, Department of Hematology and Oncology, Chittagong Medical College Hospital for his valuable suggestions. Special thanks to all the doctors, nurses and health workers for their encouragement and cordial co-operation throughout the work. I would like to acknowledge the support and encouragement received during MPH program from other teachers, technical and non-technical staffs of the One Health Institute, CVASU.

I am also grateful to my family members for their allowance and heartiest support.

Ambarish Mitra

December 2022

Table of contents

Title	Page
Chapter 1: Introduction	
1.1 Introduction	1
1.2 Rationale of the study	6
1.3 Research question	7
1.4 Objectives	7
Chapter 2: Literature review	8-29
Chapter 3: Materials and methods	
3.1 Study design	30
3.2 Study population	30
3.3 Sampling technique	30
3.4 Sample size determination	30
3.5 Selection criteria	31
3.6 Research instruments	31
3.7 Data collection technique	31
3.8 Study procedure	32
3.9 Data analysis	33
3.10 Ethical implication	33
Chapter 4: Results	
Part A: Overall Scenario of HM patients in Chattogram	34-44
Part B: Comparative clinical scenario, lab findings and treatment modalities of different types of HM	45-64
Chapter 5: Discussion	65-74
Chapter 6: Conclusion	75-76
Chapter 7: Limitations	77
Chapter 8: Recommendations	78
Chapter 9: References	79-83
Appendices	
Informed Written Consent	84
Research Questionnaire	85

List of tables

Table No.	Title of table	Page
1	An overview of widely used chemotherapeutic drugs in various Hematological Malignancies (HM) and their mechanism of action	29
2	Socio-demographic characteristics of the Patients with HM	34
3	Different types of Hematological malignancies	36
4	Common laboratory investigations of HM patients	38
5	Overall CBC finding in patients with HM	39
6	Overall bone marrow findings of different types of hematological malignancy patients	41
7	Overall flow cytometry findings of different types of hematological malignancy patients	42
8	Overall plasma electrophoresis findings of different types of hematological malignancy patients	42
9	Overall lymph node biopsy findings of different types of HM patients	43
10	Overall cytogenetic study findings of different types of HM patients	43
11	Overall immunohistochemistry findings of different types of HM patients	44
12	Overall percentage treatment modalities taken by HM patients	44
13	Percentage of different cell lineages in PBF findings among different types of HM patients-A comparison	54
14	Blast cell picture of different types of HM patients	56
15	Comparison of flowcytometry findings among different types of HM patients	57
16	Comparison of findings of cytogenetic study among different types of HM patients	58

17	Comparison of findings of immunohistochemistry among different types of HM patients	59
18	Percentage of the use of different chemotherapeutic drugs used by HM patients suffering from different types of hematological malignancy	60
19	Supply of chemotherapeutic drugs used for the treatment of HM patients	62
20	Overall percentage of the use of different immune therapy/ target therapy by the HM patients	64

List of figures

Figure No.	Title of figures	Page
Figure 1	AML revealing myeloblasts having enlarged nuclei, opened up chromatin, irregular nuclear membrane and 2-3 prominent nucleoli	12
Figure 2	FAB (French American British) Classification of Acute Myeloid Leukemia	13
Figure 3	CML revealing leukocytosis and left shift of WBC along with presence of blasts and basophilia	14
Figure 4	ALL revealing lymphoblasts with condensed chromatin, inconspicuous to single nucleoli, irregular nuclear membrane and scant amount of cytoplasm	15
Figure 5	CLL/PLL revealing mature appearing lymphocytes and few larger cells having central prominent nucleoli and scant amount of basophilic cytoplasm	16
Figure 6	Overall clinical features of HM patients	37
Figure 7	Overall cell lineages found in PBF of HM patients	40
Figure 8	Proportion of different clinical features of Acute Myeloblastic Leukemia	45
Figure 9	Comparison between different clinical features of Acute Myeloblastic Leukemia AML Except M3 and AML M3	46
Figure 10	Percentage of different clinical features of Acute Lymphoblastic Leukemia	47
Figure 11	Percentage of different clinical features of Chronic Lymphoid Leukemia	48
Figure 12	Percentage of different clinical features of CML	49
Figure 13	Comparison between different clinical features of Myelodysplastic Syndrome and Mixed Leukemia	50
Figure 14	Proportion of different clinical features of Lymphoma	51
Figure 15	Comparison between different clinical features of Hogdkin Disease and NHL	52
Figure 16	Percentage of different clinical features of Multiple Myeloma	53

List of abbreviations

AIDS	Acquired immunodeficiency syndrome
ATLL	Adult T-cell leukemia or lymphoma
ALL	Acute lymphoblastic leukemia
AML	Acute myeloid leukemia
CAC	Clinical Advisory Committee
CLL	Chronic lymphocytic leukemia
CML	Chronic myeloid leukemia
CVASU	Chattogram Veterinary and Animal Sciences University
CMCH	Chittagong medical college and hospital
DLBCL	Diffuse large B-cell lymphoma
EBV	Epstein–Barr virus
FL	Follicular lymphoma
HD	Hodgkin’s disease
HDN	Histiocytic and dendritic cell neoplasm
HM	Hematological malignancies
HSCs	Hematopoietic stem cells
LSCs	Leukemic stem cells
MBCN	Mature B cell neoplasm
MDS	Myelodysplastic syndrome
MM	Multiple myeloma
MTCN	Mature T and NK cell neoplasm
MTX	Methotrexate

NHL	Non-Hodgkin lymphoma
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

Abstract

Hematologic malignancies (HM) are of diverse incidence, prognosis, and etiology. HM are a heterogeneous group of cancers that originated in the hematopoietic or lymphoid tissues. The aim of the study was to evaluate the patterns of common Hematological Malignancies in Chittagong. This retrospective observational cross-sectional study was carried out from 1st January 2022 to 30th June 2022 in the department of hematology, Chattogram Medical College on 200 patients suffering from HM, who fulfilled the inclusion criteria. Informed consent was obtained from the participants. Data was collected by pre structured questionnaire addressing the socio-demographic variables, clinical features leading to diagnosis, common laboratory findings and modalities of treatment taken for overall HM patients and further comparing between various types of HM. Data were collected, processed and analyzed for descriptive statistical analysis by using computer software Statistical Package for Social Sciences (SPSS) version 23. A total of 3 categories of HM was found namely Leukemia, Lymphoma and Myeloma which was further categorized into 9 types of HM. The mean age of the respondents was 36.03 ± 18.07 years. There was 56% Male and 44% Female among the respondents. Among HM most common was AML (33%) followed by ALL (26%). In AML, AML other than M3 was (23%) and AML M3 was (10%). Subsequently NHL (12%), HD (8.5%), MM (8%), CML (7%), CLL (2%), Mixed Leukemia (2%) and MDS (1.5%) were found. The most common symptoms for HM was found to be weight loss (99.5%) followed by fever (75.5%), Bony Tenderness (50.5%), Lymphadenopathy (49.5%), Hepatomegaly (42%), Headache (22.5%), Gum Bleeding (15%), Purpura (13%), Weakness (9.5%), Jaundice (6.5%), Cough (5.5%), Back Pain (5%), Hematemesis/Malena (5%), Incidental findings (5%), Renal stone (4%), Oedema (3.5%), Hematuria (2.5%), Night Sweats (2.5%), Polyuria (2%), Fracture (2%), Pruritus (1.5%), Paraplegia (1.5%), Vomiting (0.5%), Angular Stomatitis (0.5%), Respiratory Distress (0.5%) and Ascites (0.5%). Almost all patients had done Complete blood count and PBF. In Complete blood count it is seen that Blast cells were found in almost all cases of acute leukemia and was more profound in cases of AML (63.78 ± 15.05) followed by AML M3 (61.35 ± 16.52) and ALL (60.29 ± 15.47). In PBF, Neutropenia was the most common finding (52.5%) followed by Lymphocytosis (17.5%) and Neutrophilia (15%). In cases of Leukemia, Bone marrow study, Flowcytometry and Cytogenetic study was done as part of investigation whereas in cases of Lymphoma, Lymph node biopsy and Immunohistochemistry remains the mainstay investigations. In cases of Myeloma, plasma

protein electrophoresis was done to make the diagnosis and Bone marrow study was also done. Most commonly used chemotherapeutic drug was Daunorubicin (51%) followed by Prednisolone (40%), Arsenic Trioxide (35.5%), Vincristine (35.5%), Cytarabine(27.5%), V138 (27%), Methotrexate (26%), L Asparaginase (23%), Cyclophosphamide (12%), Vesnoid (10%), Dexamethasone (9.4%), Bleomycin (8.5%), Vinblastine (8%), Dacarbazine (8%), Bordezomib (8%), Linamide (8%), Doxorubicin (3.5%) and 6 Mercaptopurine (2.5%). In cases of Immunotherapy, Rituximab (21.5%) is the most commonly used drug followed by Imatinib (15.5%). Most chemotherapeutic drugs and all immunotherapeutic drugs were supplied from private source and Radiotherapy and Bone marrow transplantation was not available in Chittagong. HM can occur in any age group, in both male and female group. This is a study of a large number of HM patients is a very first step in understanding the patterns and distribution of HM in Chattogram, Bangladesh. Radiotherapy is currently unavailable in Chittagong division and it is a serious concern related to the successful treatment of HM. Similarly bone marrow transplantation is also unavailable. It is a major modality of treatment in relapse or refractory cases of HM. Further investigations are necessary to understand the epidemiology, potential risk factors, biology and genetics of hematological malignancies in this country in rapid transition. In summary, we can say that among patients of HM, AML is the predominant variety. Symptoms are dominated by weight loss and fever mainly with neutropenia and blast cells being chief findings in complete blood count and PBF. In cases of treatment chemotherapy remains mainstay of treatment with Daunorubicin being the mostly used drug. In cases of Immunotherapy Rituximab and Imatinib remains the most commonly used drug. No Radiotherapy and Bone marrow transplantation is available.