Patterns of Hematolymphoid Tumors in a Saudi Tertiary Care Hospital

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ABSTRACT

Background and Objectives: Hematolymphoid tumors comprise a group of most common malignancies originating from lymphoid or myeloid precursors. The appropriate diagnosis is the key to the successful management of these patients. The aim of the study is to evaluate the distribution patterns of various types and subtypes of hematolymphoid malignancies in the Saudi population.

Methods: This retrospective study was designed to determine the relative frequency of hematolymphoid malignancies in patients presented to King Khaled University Hospital, Saudi Arabia, over 5 years from January 2017 to December 2022. The clinical and medical records of the patients were accessed from the electronic database. In our analysis, Stata was utilized. The P = 0.05 threshold for statistical significance was used.

Results: This retrospective study was performed on data obtained from 727 patients with hematolymphoid malignancies, with a median age of 47.5 years. Of these, 63.5% (n = 462) patients had lymphoma. The highest frequency was observed for Large B cell lymphoma (n=179) and Classical Hodgkin's lymphoma (n=138). For myeloid malignancies and acute leukemias, ALL was the most common subtype reported in 62 (8%) patients with a median age of 16 years, followed by myeloproliferative neoplasms (7%) and acute myeloid leukemia (7%). Plasma cell dyscrasia represents 9% of hematolymphoid tumors.

Conclusion: The patterns of the subtypes of these cancers in the Saudi population are comparable to the global estimates. The incidence of rare forms of hematolymphoid malignancies suggests that the differential diagnosis is the key to increasing the overall survival rates for these cancers in Saudi Arabia and, therefore, must be considered in the management triage of lymphoma and acute leukemia patients.

Keywords: Lymphoma, Leukemia, Myeloma, DLBCL, Hodgkin lymphoma

INTRODUCTION

Hematolymphoid tumors are heterogenous group of malignancies originating from lymphoid or myeloid precursors infiltrating blood, bone marrow, or lymphoid organs. These malignancies can be further classified depending on their origin, anatomical site, and molecular biology[1]. They can arise from the myeloid or lymphoid cell lines, the two basic lineages of blood cells. The World Health Organization (WHO) classification of cancers classifies hematolymphoid malignancies as myeloid and lymphoid neoplasms, depending on their origin. It further classifies them into numerous groups based on anatomical, clinical, immunophenotypic, morphological, and molecular characteristics[2]. Myeloid cell lines give rise to acute myeloid leukemia (AML), chronic myeloid leukemia (CML), myelodysplastic syndromes (MDS), and other myeloproliferative disorders (MPD), whereas lymphoid cell lines give rise to lymphomas, lymphocytic leukemia, myelomas, and other plasma cell dyscrasias[3,4]. Diffuse large B cell lymphoma, Hodgkin lymphoma, multiple myeloma, chronic lymphocytic lymphoma, chronic myeloid leukemia, and acute leukemia are the most prevalent forms of hematolymphoid malignancies in general[5].

Hematolymphoid malignancy patients are increasingly susceptible to poor outcomes, depending on the tumor type; available treatment modalities; and the risk of complications[6]. The leading causes of morbidity in individuals with hematolymphoid malignancies are infiltration of the organs, overwhelming infection due to pancytopenia and bleeding complications[7].

Over 15 years, the trend of hematolymphoid malignancies indicated an increase in incidence rates, especially among men, with the highest incidence observed in the central region of Saudi Arabia, which requires further examination. In addition, the trend of hematolymphoid malignancies indicated an increase in death rates was probable. In recent years, the number of people diagnosed with leukemia worldwide has soared from 297,003 to 437,033[8]. As a direct result, the Saudi Cancer Registry has classified leukemia as the fifth most prevalent form of cancer among both sexes in Saudi Arabia[8]. Similarly, it is estimated that multiple myeloma and lymphomas were responsible for 9.6%–11.0% of all cancer-related deaths in the Kingdom in 2014[9]. There is a dearth of published data concerning the characteristics, treatment procedures, and results of multiple myeloma patients in Saudi Arabia.

Hematolymphoid malignancies are thus a distinct group of malignancies with high mortality rates due to the complexity of the diagnostic procedures required for their treatment and the need for aggressive therapeutic methods. The high incidence rates of hematolymphoid malignancies in Saudi Arabia warrant investigations to identify the incidence patterns of these hematolymphoid malignancies. This is essential for the right planning of resources for correct diagnosis in order to reduce the number of "non-specific diagnoses" and for the timely administration of the optimal treatment protocols. This is a retrospective investigation of the relative incidence of hematolymphoid malignancies among patients admitted to a tertiary care hospital in Saudi Arabia between 2017 and 2022.

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METHODS

Study Design and Study Participants: This retrospective study was designed to determine the relative frequency of hematolymphoid malignancies in patients presented to King Khaled University Hospital, Saudi Arabia, over 5 years from January 2017 to December 2022. The clinical and medical records of the patients were accessed from the electronic database. Final diagnoses were retrieved from pathological reports of bone marrow and lymph node biopsies which include all the ancillary studies required for accurate diagnosis. The study was approved by the Institutional Review Board and Ethical Committee.

Statistical Analysis: For continuous data, descriptive statistics were generated, including minimum and maximum values, means, standard deviations (SDs), 95% confidence intervals (CIs), and frequencies for categorical variables. Given the small sample size, categorical variables were cross-tabulated, and Fisher's exact test was applied. The student t-test was used to examine whether the mean had changed significantly for continuous variables. In our analysis, Stata was utilized. The P = 0.05 threshold for statistical significance was used.

RESULTS

This retrospective study was performed on data obtained from 727 patients with hematolymphoid malignancies, with a median age of 47.5 years. Of these, 63.5% (n = 462) patients had lymphoma. The overall frequency distribution of the subjects across different hematolymphoid malignancy types has been shown in Figure 1. The gender distribution and the median age of the main categories have been graphically depicted in figure 2 and figure 3 respectively.

Table 1 shows the lymphoma types with the highest frequency of diffuse large B cell lymphoma (DLBCL) (n=179) and Classical Hodgkin's lymphoma (cHL) (n=138). Langerhans cell histiocytosis had the lowest frequencies (n=1). The gender distribution of the lymphoma patients has been presented in figure 2.

Table 2 shows the distribution of leukemia cases. The highest number of cases have been reported for acute lymphoblastic leukemia (ALL) (n=62). The number of patients for sub-types of ALL along with the gender distribution for acute myeloid leukemia (AML) (n=49); acute leukemia of ambiguous lineage (n=3); myeloproliferative neoplasm (MPN) (n=53); and myelodysplastic syndrome (n=31).

Plasma cell dyscrasia (PCD) represent 9% (n=67). Of these, multiple myeloma accounts for 95.5% (n=64) whereas plasma cell leukemia (n=2) and amyloidosis had the lowest incidence among PCD (n=1) (Table 3).

Table 1: The distribution of the study subjects with respect to lymphoma types

Category	Total	Male	Female
Diffuse large B-cell lymphoma (DLBCL)	179	88	91
Classical Hodgkin's lymphoma (cHL)	138	68	70
Follicular lymphoma	30	16	14
Chronic lymphocytic leukemia	26	13	13
T-cell lymphoma	21	8	13
Burkitt lymphoma	7	4	3
Hairy cell leukemia	3	2	1
Marginal zone lymphoma (MZL)	7	2	5
Mantle cell lymphoma (MCL)	6	3	3
Lymphoplasmacytic lymphoma (LPL)	4	2	2
Small lymphocytic lymphoma	4	1	3
Plasmablastic lymphoma	2	1	1
Langerhans cell histiocytosis	1	0	1
Nodular lymphocyte predominant Hodgkin's lymphoma (NLPHL)	4	1	3
Total	462	224 (48.5%)	238 (51.5%)

Table 2: The distribution of the study subjects with respect to acute leukemia and myeloid malignancy types

Category	Total	Male	Female
Acute myeloid leukemia (AML)	49	27	22
AML therapy related	3	2	1
MDS related AML	2	1	1
AML with (8,21)	5	3	2
AML with (16;16)	4	1	3
AML with (15;17)	3	1	2
Pure erythroid leukemia	1		1
Acute megakaryocytic leukemia	2	1	1
AML NOS	29	18	11
Acute lymphoblastic leukemia (ALL)	62	35	27
B-ALL	53	28	25
T-ALL	9	7	2
Acute leukemia of ambiguous lineage	3	2	1
Myeloproliferative neoplasm (MPN)	53	24	29
Chronic myeloid leukemia	18	7	11
Polycythemia vera	6	2	4
Essential thrombocythemia	11	5	6
Primary myelofibrosis	13	7	6
Systematic Mastocytosis	1	1	
Chronic myelomonocytic leukemia	2	2	
Eosinophilia with PDGFRA	1		1
Myelodysplastic syndrome	31	17	14
Total	198	105 (53%)	93 (47%)

Table 3: The distribution of the study subjects with respect to plasma cell dyscrasia types

Category	Total	Male	Female
Multiple myeloma	64	23	41
Plasma cell leukemia	2	2	0
Amyloidosis	1	0	1
Total	67	25 (37.3%)	42 (62.7%)

DISCUSSION

Hematolymphoid tumor remains among the leading causes of death globally and in Saudi Arabia with high overall mortality rates[10]. The overall survival and relapse risk depend on several tumor-specific and patient related factors. The appropriate diagnosis is thus important for appropriate management and reducing the risk of mortality among these patients. This necessitates a better understanding of the distribution of different hematolymphoid malignancies that can follow diverse prognostic paths. To the best of our knowledge, no previous study has investigated the distribution patterns of different hematolymphoid malignancies across the Saudi population.

Lymphomas are one of the most common cancers in Saudi Arabia. The prevalence of lymphomas was higher than other hematolymphoid

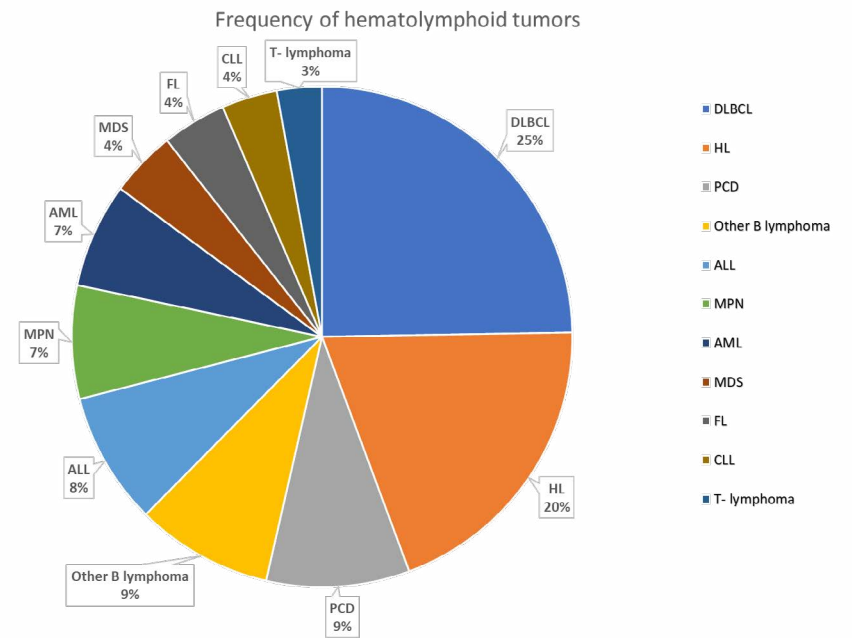

Figure 1: Pie chart for the relative percentages of hematolymphoid tumors

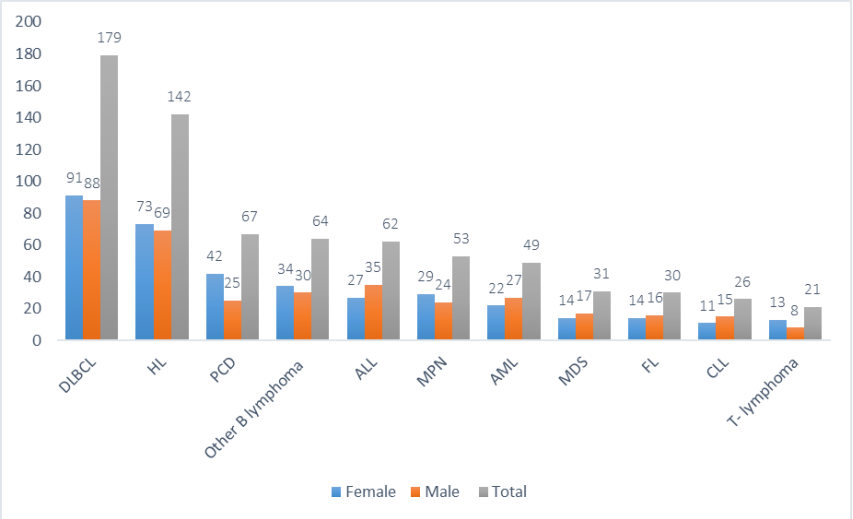

Figure 2: Distribution of hematolymphoid malignancies with respect to gender

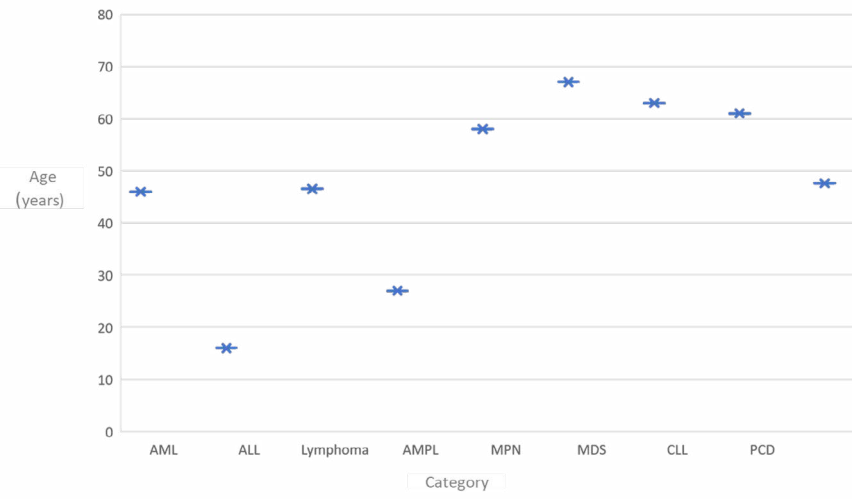

Figure 3: The median age for the main categories of hematolymphoid tumors

malignancies in our cohort. A previous report suggests that lymphoid cancers are among the most common cancers in Saudi Arabia, following breast, colorectal, prostate, and brain/central nervous system cancers[10]. Hodgkin and non-Hodgkin's lymphoma are responsible for 9.2% and 3.02% of the total cancer cases in this region[10]. The present study suggests that DLBCL is one of the most prevalent forms of lymphoid tumor accounting for 24.6%. DLBCL is an aggressive subtype of Hodgkin's lymphoma composed of large B lymphoid cells which rapidly infiltrates the lymph nodes, bone marrow, liver, spleen, or other tissues and organs[11]. According to the Saudi Cancer Registry, the prevalence of DLBCL is 15 (22.7%) in males and 3 (13%) in females in Saudi Arabia[12]. Considering the advanced and high-risk presentation of the majority of Saudi DLBCL patients, the 5-year overall survival and progression-free survival appear comparable to or better than those reported in the literature. This is due to the customization of treatment based on clinical stage and risk factors[9].

Hodgkin lymphoma (HL) was the second commonest type of hematolymphoid tumor representing 19.5%. This high prevalence can be attributed to the higher percentages of young patients in our cohort. The vast majority of HL patients were diagnosed with classical HL (97%) while nodular lymphocyte predominant Hodgkin's lymphoma (NLPHL) were 4 cases only (3%). The distribution patterns of classical HL and NLPHL in our study is similar to the global distribution of such types globally[13,14].

The prevalence of lymphomas was slightly higher among females than males. These findings are in contrast with the global estimates. In general, lymphomas have poor prognoses and decreased survival rates among males compared to females[15]. The lymphomas are, however, not sex-related disorders[16].

Leukemia is another type of common cancer in Saudi Arabia. Owing to the significant role played by leukemia in the overall morbidity and mortality rate among youth, the disease is considered a significant threat to the nation's overall health and well-being in Saudi Arabia. The fact that about one-fourth of the population in this country is comprised of youngsters younger than 14 years old highlights the enormous burden that such cancerous blood diseases place on this nation[8]. Children and young adults have a significantly higher rate of developing acute lymphoblastic leukemia than adults and elderly do, which is reflected by lower median age (16 years) compared with AML (45 years). The prevalence of leukemias is 6% and 6.7% among males and females living with cancer in Saudi Arabia[11,12]. However, the mean age is higher for all leukemia types in our cohort than the global data. The attributing factors for these findings need to be further investigated. The myeloid lineage tumors are not sex-related. However, the prognosis of the disease might vary for both genders. The incidence of acute leukemia was slightly higher among males than males in our cohort[17].

Multiple myeloma is a common hematolymphoid tumor accounting for 2% of all cancers in Saudi Arabia[9]. In the current study, MM represent around 9% with higher incidence in female patients. Primary plasma cell leukemia (PCL) is rare and aggressive form of plasma cell myeloma, with very poor prognosis, characterized by proliferation of plasma cells in peripheral blood and extramedullary tissues. The incidence of PCL in our study is matching the global incidence which is ranging from 0.5-4% of plasma cell dyscrasia[7].

CONCLUSION

Hematolymphoid malignancies are among the leading cause of morbidity and mortality in Saudi Arabia. DLBCL, HL and acute leukemia were the highest among all hematolymphoid tumors. Diagnosis and classification of lymphoid and myeloid tumors are based on integration of clinical, morphological and molecular criteria. The patterns of the subtypes of these cancers in the Saudi population are comparable to global estimates with minor differences related mainly to young population. Early detection and management of such aggressive tumors is the key to improve the prognosis and therapeutic outcomes.

Funding and Source of Support: This research received no specific grant from public, commercial, or not-for-profit funding agencies.

Ethics Approval and Consent to Participate: The study was approved by institutional review board (IRB) of King Saud University, Kingdom of Saudi Arabia on 4-1-2023.

Funding and Source of Support: This research received no specific grant from public, commercial, or not-for-profit funding agencies.

Potential Conflict of Interest: None.

Competing Interest: None.

Acceptance Date: 13 April 2023

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