

Prevalence and Risk of Leukemia Reported Cases, Observational Descriptive Statistic from Iraqi Center for Hematology in Baghdad Province

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Abstract

Background: Leukemia is one type of blood cancer developed in the bone marrow and other blood-forming organs. Based on a combination of onset speed and cell origin, leukemia can generally be divided into four subtypes: acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), (chronic lymphocytic leukemia (CLL), and chronic myelogenous leukemia (CML).

Methods: A total of 3102 eligible leukemia cases were documented in the Iraqi Center for Hematology in the City of Medicine in Baghdad between January 2018 and December 2019. 1402 documented in 2018 and 1700 in 2019 for all types of cancer, Patients ages were between 1 year and 90 years, among all leukemia cases, the mostly 36% (n = 730) were aged ≤ 15 years. Results In our study males accounted for a higher proportion of leukemia patients, 58 % compared to 42% females, ALL was the more prevalent type among the studied group for both years ; contribute% 55.17 din male %53.45 in female, followed by AML 36.87% vs 40.27% , CLL 5.23% vs 2.22% and CML 2.73% vs 4.06% in male and female respectively. Conclusion It was observed that the prevalence of leukemia in Baghdad increased between (2018 -2019) from 1402 to 1700, the youngest age 15 registered most of leukemia cases. . Males were mostly victim of the disease as compared to females which were less frequent. It was observed that acute lymphoblastic leukemia (ALL) was most common type of leukemia.

Key Words: Leukemia; Prevalence; acute myeloid leukemia; chronic lymphocytic leukemia; and chronic myelogenous leukemia.

Introduction

Leukemia is type of blood cancer originally developed in the bone marrow and other blood-forming organs. Based on a combination of onset speed and cell origin, leukemia can generally be divided into four subtypes ⁽¹⁾:

(I) Acute lymphocytic leukemia (ALL) is a malignant transformation and proliferation of lymphoid progenitor cells in the bone marrow, blood and extramedullary sites; While 80% of ALL occurs in children, it represents

a devastating disease when it occurs in adults. Within the United States, the incidence of ALL is estimated at 1.6 per 100 000 population. In 2016 alone, an estimated 6590 new cases were diagnosed, with over 1400 deaths due to ALL (American Cancer Society). The incidence of ALL follows a bimodal distribution, with the first peak occurring in childhood and a second peak occurring around the age of 50 ⁽²⁾.

(II) Acute myelogenous leukemia (AML) is the second most common pediatric leukemia with poor outcomes indicated by 5-year survival rates of 50-60% ⁽³⁾. The difficulty of obtaining bone marrow samples and the in vitro cytarabine chemo sensitivity in primary AML cells is probably the reason for the lack of such studies, especially in pediatric patients ⁽⁴⁾.

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(III) Chronic lymphocytic leukemia (CLL) is characterized by a clonal expansion of mature CD5 CD23+ B-lymphocytes that accumulate in the bone marrow and infiltrate lymphoid tissues such as the spleen and lymph nodes⁽⁵⁾. CLL is the most common leukemia in the Western world, is a heterogeneous disease remains incurable in virtually all cases. CLL predominates in the elderly, and the incidence of the disease increases exponentially with age⁽⁶⁾. Thus, the number of CLL patients is expected to rise in the future, given the increase in the aging population, bringing to light new clinical challenges and public health issues. Patients with CLL show a tremendously variable clinical course ranging from excellent prognosis with no treatment to short-term survival, despite early initiation of therapy⁽⁷⁾.

(IV) Chronic myelogenous leukemia (CML) Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm with an incidence of 1–2 cases per 100 000 adults. It accounts for approximately 15% of newly diagnosed cases of leukemia in adults. In 2017, it is estimated about 9000 new CML cases will be diagnosed in the United States, and about 1000 patients will die of CML. Since the introduction of imatinib in 2000, the annual mortality in CML has decreased from 10%-20% down to 1%-2%. Consequently, the prevalence of CML in the United States, estimated at about 25–30 000 in 2000, has increased to an estimated 80–100 000 in 2017, and will reach a plateau of about 180 000 cases by 2030⁽⁸⁾.

Finally cancer is one of the leading causes of mortality in developed and developing countries. It is expected that the Incidence and burden of cancer will increase throughout the World due to the population growth and aging especially in less developed countries which account for about 82% of the world's population⁽⁹⁾.

Objective of present study is to describe the epidemiology data and the incidence of leukemia in Iraqi patients between 2018 and 2019 and compare between them in both adults, children, male and female; including the frequency and percentage of cases, ages and type of leukemia. As well as the epidemiological study can play a vital role in understanding the occurrence and outcome of the disease.

Material and Methods

We conducted a retrospective, descriptive, epidemiological study of leukemia cases for both gender in the Iraqi population diagnosed between January 2018 and December 2019. The data of this study that include the gender, clinical history, age, type of leukemia were managed and registered by Iraqi Center for Hematology, which is a clinical center in the City of Medicine in Baghdad, that diagnose and registry hematology disease in the Iraq except Basra and Kurdistan regions. The variables calculated were for example patient's age, gender, type of leukemia and their residence addresses. Controls have been chosen by keeping the patients' detail in consideration. Diagnoses were including peripheral blood films and morphology of bone marrow which involved cytochemical staining and immunophenotyping. Selected topic was accepted by scientific committee; official acceptance was taken from health authorities to conduct this study. Collected information was kept confidential.

Statistical Analysis

All statistical analysis was carried out by using statistical package for social sciences (SPSS) 16.0 version. Odds ratios with 95% confidence intervals were calculated to determine the strength of the associations.

Results

A total of 3102 eligible leukemia cases were documented in the Iraqi Center for Hematology between January 2018 and December 2019. 1402 documented in 2018, 900 were males (64.2%) and 502 were females (35.8%) and 1700 in 2019, 898 were males (52.8%) and 802 were females (47.2%). The percentage of cases with leukemia in male was more than female (Table 1). Patients ages were between 1 year and 90 years, among all leukemia cases, the mostly 36% (n = 730) were aged ≤15 years.

The commonly morphological distribution of leukemia in 2018 was acute lymphoblastic leukemia (ALL) by 498 cases (65%) for males and 273 cases (35%) for females followed by acute myeloid leukemia (AML) by 335 cases (63%) for males and 198 cases (37%) for females then chronic lymphocytic leukemia (CLL) by 59 cases (84.3 %) for males and 11 cases (15.7%) for females and finally chronic myeloid leukemia (CML) by

8 cases (29%) for males and 20 cases (71%) for females (Table 2).

The commonly morphological distribution of leukemia in 2019 was acute lymphoblastic leukemia (ALL) by 494 cases (55%) for males and 424 cases (52.9%) for females followed by acute myeloid leukemia (AML) by 328 cases (36.5%) for males and 327 cases (40.8%) for females then chronic lymphocytic leukemia (CLL) by 35 cases (3.9 %) for males and 11 cases (15.7%) for females and finally chronic myeloid leukemia (CML) by 8 cases (29%) for males and 20 cases (71%) for females (Table 3).

Regarding the distribution of types of leukemia in our study as a total, ALL was the more prevalent type among the studied group, contributed (55.17% male versus 53.45% female), followed by AML (36.87% male versus 40.27% female), CLL (5.23% male versus 2.22% female) and the less frequent type was CML which contributed only (2.73% male versus 4.06% female) . The results show a significant difference in number of cases between male and female in all types. ALL, AML and CLL more incidence in male than female while CML more incidence in female than male. (Table 4).

Table 1: Gender Distribution and percentage of 3102 Cases of Leukemia Reported During the Period 2018 – 2019

Gender	2018	2019
	Count (%)	Count (%)
Male	900 (64.2)	898 (52.8)
Female	502(35.8)	802 (47.2)

Table 2: Distribution of Leukemia in Iraq, 2018

Type of leukemia	Male	%	Female	%
ALL	498	65	273	35
AML	335	63	198	37
CLL	59	84.3	11	15.7
CML	8	29	20	71
Total	900	100	502	100

Table 3: Distribution of Leukemia in Iraq, 2019

Type of leukemia	Male	%	Female	%
ALL	494	55	424	52.9
AML	328	36.5	327	40.8
CLL	35	3.9	18	2.2

Table 4 . Comparison of Male and Female Patients with Different Types of Leukemia during 2018-2019

Leukemia type	Male group (n=1798) 58%	Female group (n=1304) 42%	OR	95% CI	P value
	N (%)	N (%)			
ALL	992 (55.17)	697 (53.45)	1.07	(0.92-1.23)	0.34
AML	663 (36.87)	525 (40.27)	0.86	(0.74-1.00)	0.05
CLL	94 (5.23)	29 (2.22)	2.42	(1.58-3.70)	0.00
CML	49 (2.73)	53 (4.06)	0.66	(0.44-0.98)	0.03

Discussion:

The present study demonstrated increasing in the leukemia cases from 2018 to 2019. This is logical due to the large number of wars and crises that occur in Iraq. In the last 31 years (1980-2010), Iraq has seen three wars, (Iran-Iraq war, 1980-88), (Gulf War, 1990-91), and (Iraq War, 2003) as well as Economic sanctions (1990-2003), Sectarian war (2006-2007) and American occupation (2003-2010). These varieties of wars and crises have a negative impact on the people's health. (10). Similarly (Alghamdi *et al.*, (2014) and . Ghoghogh *et al.*, (2015) reported increasing in the incidence of leukemia cases in Saudi Arabia and Iran patients respectively (11, 12).

The present local study demonstrating that the percentage of cases with leukemia in male (58%) was more than in female (42%). Iraqi population in other region of Iraq, Karbala Province also reported a similar finding that accounted 58.2% for males and 41.8% for females between November 2011 to May 2018 (13), in Brazil, it is estimated the prevalence of leukemia in male more than female also (14). Saudi study performed in 2001-2008 also confirmed the result (15).

The most prevalence aged were ≤ 15 years with 36% (n = 730), , an observation that has been corroborated by Iraqi population in Sulaymaniyah Province, Kurdistan, Iraq by Karim *et al.*, (2016), in which the most prevalence

aged were ≤ 15 years was clearly obtained (15), while another Iraqi study in Karbala Province, showed the most prevalence aged were ≤ 10 years (13). As well as 60% of patients in United States were under 20 years of age (16).

In our study ALL was the more prevalent type among the studied group; contributed 54.31% (% 55.17 in male %53.45 in female, followed by AML 38.57% (36.87% vs 40.27%), CLL 3.73% (5.23% vs 2.22%) and the less frequent type was CML which contributed only 3.4% (2.73% vs 4.06%). This result was in similar with the data from studies in other region of Iraq, Karbala Province that ALL is the more prevalent type with 41% followed by CML 24.1%, AML 19.2% and CLL 15.7% (13) and Sulaymaniyah province ALL was the most common type of leukemia with 44% in all cases, CML was the second type with 20% of cases followed by CLL, 18% and AML, 17% (17).

In Croatia, the most common type of leukemia was CLL, which accounted for 42% of leukemia, followed by AML with 27%, ALL with 17% and CML with 14% (18). In Bangladesh, on the other hand, AML was the most prevalent hematological malignancy 28.3% followed by CML 18.2%, ALL 14.1% and CLL 3.7% was the least common (19). In addition, Indian study seem to reinforce the result that ALL is the most prevalent type

in leukemia⁽²⁰⁾.

Conclusion

It was observed that the prevalence of leukemia in Iraqi Center for Hematology in Baghdad Province increased between (2018 -2019) from 1402 to 1700, the youngest age ≤ 15 registered most of leukemia cases. Males were mostly victim of the disease as compared to females which were less frequent. It was observed that acute lymphoblastic leukemia (ALL) was most common type of leukemia. Epidemiological study can play a vital role in understanding the occurrence and outcome of the disease.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

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