

Incidence of Leukemia in Iraq: A Review

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Abstract: *The incidence of leukemia among Iraqi population is reviewed from 2006-2021 in different Iraqi provinces. The incidence rates are also illustrated in relation to age, type of leukemia and year of registration. Incidence rate differs widely in relation to locality, age, sex and race. Many factors have been considered as Iraq exposed to the Iraq-Iran war, gulf war and the usage of uranium weapon in the south part of Iraq. In addition, oil wheel fire in gulf war in south of Basrah, as well as the pollution caused by cars and generators for electricity production that expected to have an effect on the increased cancer rate in Iraq. The highest incidence observed in acute lymphocytic leukemia while the lowest type was chronic myeloid leukemia. The most affected age was <15 years. Thus, epidemiological studies provide a better understanding about the incidence rates, risk factors and outcome of the disease.*

Keywords: Acute lymphoblastic leukemia, Acute myelocytic leukemia, Chronic lymphoblastic leukemia, Chronic myeloid leukemia, Iraq.

Introduction

Leukemia incidence rates in children has been reported to be the highest in the world (1). Children's cancer survival rates have significantly increased in recent years. In Iraq, leukemia represents the fourth common cancer in both male and female. Leukemia is usually had four main categories, with different presentations and outcomes: acute lymphocytic leukemia (ALL), chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML) and chronic myeloid leukemia (CML). Males have a slightly higher incidence of leukemia than females. The exact causes are still unknown but both genetic and environmental risk factors for leukemia, like exposure to chemicals (such as benzene), ionizing radiation, infection and smoking have been recognized (2,3).

Therefore, 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 risk factors especially in less developed countries which account for about 82% of the world's population (4).

The present review aimed to determine the analysis of leukemia data according to age, year of registration and leukemia type over time.

Results and Discussion

The incidence rates of leukemia are reviewed among children in different Iraqi provinces from 2006-2021. The incidence is varying from one region to another (Table 1).

The present study demonstrated increasing in the leukemia cases. The cause is not explained till now but many factors have been considered as Iraq exposed to many wars and crises that occur in Iraq. 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 the usage of depleted uranium weapon in the south part of Iraq by the American occupation (2003-2010). In addition, oil wheel fire in gulf war in south of Basrah, as well as the pollution caused by cars and generators for electricity production might have an effect on the increased leukemia rate in Iraq.

Leukemia like other cancers result from mutations in the DNA. Certain mutations can trigger leukemia by activating oncogenes or deactivating tumor suppressor genes, and thereby disrupting the regulation of cell death, differentiation or division. These mutations may occur spontaneously or as a result of exposure to radiation or carcinogenic materials (5).

The highest incidence observed in this review was acute lymphocytic leukemia in Basrah (6), Baghdad (7,8), Mosul (9,10) and Al-Najaf (11). The less frequent type was CML (Table 1). Similarly, it has been reported increasing in the incidence of leukemia cases in Saudi Arabia and Iran patients (12,13). As far as sex is concern, they have also recorded that the percentage of cases with leukemia in male (58%) was more than in female (42%). Iraqi population in Karbala Province also reported a similar finding that

accounted 58.2% for males and 41.8% for females (14). The most incidence aged was ≤ 15 years among Iraqi population more than older age (Table 1).

Conclusion: It was noticed that the incidence of leukemia among Iraqi population is increasing. The youngest age ≤ 15 registered most of leukemia cases. Males were mostly affected by the disease as compared to females which were less frequent. It was observed that (ALL) was most common type of leukemia. Epidemiological studies provide a better understanding about the incidence rates, risk factors and outcome of the disease.

Table 1. Distribution of leukemia type in relation to province, years of registration and age.

Reference No.	Province	Registrati-on years	Age (S)	Leukemia type (%)			
				ALL	CLL	AML	CML
Karim et al. (15)	Sulayman-iyah	2009-2013	<15- >75	44	19	17	20
Kadhaire et al. (11)	Al-Najaf	2021	10-69	77.3	-	20	2.7
Hagopian et al. (6)	Basrah	2006	<5-14	82	-	13	4
Mohammad et al. (7)	Baghdad	2006	1-14	72.5	-	27.5	-
Ibrahim et al. (9)	Mosul	2018-2021	1-12	82.7	-	5.2	2.6
Abdul-Rahman et al. (16)	Erbil	2019-2021	-	41	15	29	15
Alkhayat et al. (10)	Mosul	2020	2-14	80	-	8	12
Mjali et al. (14)	Karbala	2011-2018	<10- >70	41	15	19.2	24.1
Abdulridha et al. (8)	Baghdad	2018-2019	1-90	5.3	-	36.8	2.7

ALL = Acute lymphocytic leukemia.

CLL = Chronic lymphocytic leukemia.

AML = Acute myeloid leukemia.

CML = Chronic myeloid leukemia.

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