

## ORIGINAL ARTICLE

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## Incidence of Leukemia in the Northwest of Iran

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### ABSTRACT

**Background:** Leukemia is cancer of the blood or bone marrow, characterized by an unusual increase in white blood cells. It is the sixth most common malignancy in the country in both males and females. The aim of this study was to document some epidemiological features of leukemia in the Northwest of Iran.

**Methods:** The study subjects (n=669, including 377 males and 292 females) comprised all leukemia cases registered/notified to the clinical and pathology centers of Tabriz and Ardebil cities, from 2003 to 2006. All patients were classified using the ICD-10 based coding system (C91-C95, C77 and C42). Ninety-five percent confidence intervals were calculated to assess the statistical significance of the data.

**Results:** Annual incidence of leukemia was 3.7 [95% CI: 3.3–4.0] and 4.9 [95% CI: 4.2–5.6] per 100 000 population in Tabriz and Ardebil, respectively, with an overall case fatality rate of 13.5 percent [95% CI: 10.8–16.0]. The sex ratio (male/female) was 1.23. Myeloid leukemia (C92) and Hematopoietic and Reticuloendothelial system (C42) accounted proportionally for more than 47 percent of cases in the region. Over the study period, the annual occurrence of leukemia in the region increased from 3.9 [95% CI: 3.4–4.5] to 4.1 [95% CI: 3.5–4.6] per 100 000 population ( $P>0.1$ ).

**Conclusions-** The data from this cross-sectional study of leukemia in the North-West of Iran may be used as the baseline information to establish a population-based registry of hematologic disorders in the area for health care and research purposes. However, more investigations are needed to develop effective strategies to control the relevant disorders in high-risk groups.

**Keywords:** Leukemia; Prevalence; Epidemiology; Iran

### Introduction

Leukemia is the cancer of the blood or bone marrow, characterized by an unusual increase in white blood cells. Although different types of leukemia can occur at any age, adults age 60+ are more likely to develop the disease than younger people are. The most common types in adults are Acute Myelogenous Leukemia (AML) and

Chronic Lymphocytic Leukemia (CLL). Acute Lymphocytic Leukemia (ALL) is the most common form of leukemia in children. Lifetime probability of developing any leukemia for adults is 1-2%. This probability varies by subtypes of leukemia: CLL=0.56%, Chronic Myelogenous Leukemia (CML) = 0.20 %, ALL= 0.06%, and

AML= 0.46% (1-4). Hematologic cancers are the sixth most common malignancies in Iran both in males and in females (5).

The aim of this study was to document some epidemiological features of leukemia in the Northwest of Iran and to provide base line information to set up a regional registry of hematology and oncology.

## **Materials and Methods**

In this cross sectional study, medical history of 669 cases (including 377 males and 292 females of leukemia between 2003 and 2006 in Northwest of Iran were studied. All subjects were registered/notified to the clinical and pathology centers of Tabriz and Ardebil cities, two major cities in the Northwest of Iran. Patients were classified using the ICD-10 based coding system (C91-C95, C77, and C42). Data collected included age, gender, date of diagnosis, treatment, residence status, and outcome. Incidence rates and descriptive indicators (i.e. case fatality rate and sex ratio, etc) were calculated to document the epidemiological features of the leukemia in the region. Ninety-five percent confidence intervals were calculated to assess the statistical significance of the data.

## **Results**

Annual occurrence of leukemia disorders in the Northwest of Iran is presented in Table 1. Annual incidence of leukemia was 3.7 [95% CI: 3.3–4.0] and 4.9 [95% CI: 4.2–5.6] per 100 000 population in Tabriz and Ardebil, respectively, with an overall annual occurrence of 3.97 [95% CI: 3.66–4.28] for the whole region. The sex ratio (male/female) was 1.2. Myeloid leukemia (C92) and Hematopoetic and Reticuloendothelial system (C42) accounted proportionally for more than 47 percent of cases in the region. Total case fatality rate was 13.5% [95% CI: 10.8–16.0]. Over the study period, the annual occur-

rence of leukemia in the region increased from 3.9 [95% CI: 3.4–4.5] to 4.1 [95% CI: 3.5–4.6] per 100 000 population ( $P>0.1$ ).

## **Discussion**

This investigation was a cross sectional study designed to describe some of epidemiological features of leukemia in the Northwest of Iran with population coverage of 4-5 millions. This study was conducted to provide the base line information to set up the first regional registry of Hematology & Oncology in Iran. Such basic data are essential for planning health care services, for screening programs and to identify clues to the etiology of hematologic malignancies.

In this study, 669 cases of some types of leukemia were identified in the Northwest of Iran with an average population size of 4855034 in the area.

Our findings on the incidence of leukemia indicated that the occurrence of leukemia among males was much higher than females. The incidence rates did also increase by age groups. These findings were almost similar to the research data reported previously (1-4, 6-12).

Despite some limitations, our study provides basic information on the magnitude and spectrum of leukemia in the region. The findings may also indicate an opportunity for future epidemiologic and etiologic investigations as well as accelerate the development of new control strategies in the population.

In conclusion, the data from this cross-sectional study of leukemia in the Northwest of Iran may be used as the baseline information to establish a population-based registry of hematologic disorders in the area for health care and research purposes. However, more investigations are needed to develop effective strategies to control the relevant disorders in high-risk groups.

**Table 1:** Occurrence of leukemia disorders in the Northwest of Iran

Parameters	Annual Rate		Confidence Interval
	n	(per 100 000)	(95%)
<b>Gender</b>			
Male	377	4.34	(3.67,5.01)
Female	292	3.5	(2.94,4.06)
<b>Age Groups</b>			
Less Than 15 (Years)	30	0.63	(0.45,0.81)
15-29	139	0.78	(0.72,0.84)
30-44	99	2.98	(1.79,4.17)
45-59	110	5.88	(1.69,10.07)
60 And More	193	13.67	(0.77,26.57)
Unknown	98	-	
<b>Types</b>			
C91 (Lymphoid Leukemia)	195	1.16	(1.07,1.25)
C92 (Myeloid Leukemia)	230	1.37	(1.26,1.48)
C93 (Monocytic Leukemia)	6	0.64	(0.59,0.69)
C94 (Other Leukemia Of Specified Cell Type)	16	0.59	(0.54,0.64)
C95 (Leukemia Of Unspecified Cell Type)	17	0.15	(0.14,0.16)
C77 (Secondary And Unspecified)	83	0.49	(0.45,0.53)
<b>Malignant Neoplasm Of Lymph Nodes)</b>			
C42 (Hematopoetic And Reticuloendothelial System)	102	0.61	(0.56,0.66)
Unknown	20	0.12	(0.11,0.13)

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