

## **A PRELIMINARY EPIDEMIOLOGICAL INVESTIGATION ON LEUKEMIAS AND LYMPHOMAS IN MAZANDARAN PROVINCE (NORTH OF IRAN)**

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**Key words:** *Leukemia, lymphoma, risk factor, incidence, Iran*

### **Abstract**

Cancers in all forms caused 9% of deaths throughout the world. In the developed countries it is the second ranking cause of death and in the developing countries it is ranked fourth as the cause of death. In Iran, cancers rank third as the cause of death. The second most prevalent types of cancer in Iran were Lymphomas and Leukemias (L&L). The estimated incidence of L&L in 1952 was 0.66 per 100,000 population. Our prime interest was to determine the L&L incidence rate and also to identify some of the risk factors related to L&L.

Mazandaran was selected because there is an ongoing program of registry conducted by Babol Research Station of the IPHR. In the first part of this study, the geographical distribution of all cases seen since 1992 in this province were identified. The second part was a population-based matched case - control study to identify some of the risk factors of these cancers. 257 patients of all types of L&L were selected with the same number of controls.

648 cases of leukemia and lymphoma in Mazandaran were found in cancer registry from 1992 to 1997. In all types, the male to female ratio is almost 1.5. No significant association was found with the factors studied except for history of drug addiction which is true for adult patients.

The study shows the importance of leukemias and lymphomas as important public health problems in this province. As these areas are the main centers for growing rice in the country, there is the possibility of some association of L&L with the types of insecticides and herbicides used.

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## Introduction

There are over one hundred types of cancer depending on their sites throughout the body (7) and their cytological characteristics. These types of cancer can be classified into two major categories:

(a) Solid Tumors, and (b) Leukemias and Lymphomas (L&L) (8). Cancers in all forms cause 9 percent of deaths throughout the world. In the developed countries it is the second ranking cause of death and in the developing countries it is ranked fourth as the cause of death (9,10). Out of an estimated total of 50 million deaths per year in world, around 5 million are attributed to cancer.

According to the WHO estimate, by the year 2000 the number of cancer deaths may go up to 8 million annually (8). In Iran, cancers rank third as the cause of death (5). According to a report (6), from 1939 to 1962 the most prevalent types of cancer diagnosed in the pathology laboratory of the Tehran Faculty of Medicine had been as follows: Skin cancer 33.36%, Lymphomas and Leukemias 8.72%, cancer of cervix uteri 8.6%, Esophageal cancer 7.57% and breast cancer 5.67%.

As can be seen, the second most prevalent types of cancer in Iran were Lymphomas and Leukemias. The estimated incidences of L&L reported in 1952 by the Institute of Public Health Research for Mazandaran, Gilan, Bojnourd, Ardebil were 1.47, 1.84, 2.44 respectively and 0.66 per 100,000 population (2). A retrospective analysis of pathologically confirmed cases in 2675 patients with malignant lymphoma collected during 18 years (1956-1974), was reported (8) as was also childhood Lymphoma in southern Iran (3).

All previous studies mainly focus on description of some cases based on hospital reports. Data concerning diseases, incidence rates and also risk factors by region or geographic area in Iran are not available, since no such investigations have been carried out. This study therefore was the first epidemiological survey in Iran that used a well-defined general population, and the prime interest was to determine the L&L incidence rate and also to identify some of the risk factors related to L&L.

## Materials and methods

Mazandaran is one of 26 provinces of Iran situated in the northern part of the country and has an area of 47,365 km<sup>2</sup> (Fig.1). It has 49 cities and 136 dehestans (groups of villages). According to the Iranian census in 1991, the

overall population of Mazandaran was 3,793,149 of whom 1,539,327 (40.6%) constitute the urban population and 2,253,822 (59.4%) the rural population (4). Recently this province was divided in to two provinces, Mazandaran and Golestan.

Mazandran was selected because there is an ongoing program of registry conducted by Babol Research Station of the IPHR. In the first part of this study, we identify the geographical distribution of all cases seen since 1992 in this province and also the age distribution and the type of lymphoma and leukemia. The second part was a case-control study to identify some of the risk factors of these cancers. This part was carried out in 1994. The basic design was a population-based matched case-control study. We selected 257 patients of all types of L&L with the same number of controls. Controls were matched with cases regarding age, sex, marital status, residential area, ethnic groups, occupation and some other characteristics. All the cases of these types of cancer found in the province. This study was planned to determine some of the risk factors of L&L in mazandaran. Data were collected using a questionnaire which obtained general information about the patient, family history of previous ailments, health behavior, nutrition behavior, environmental factors etc. For each factor, several questions were formulated.

Odds ratios for matched case-control with 95% confidence intervals were calculated in order to estimate relations between cases and controls with the risk factors in L&L. McNemar's test ( $X^2$ ) was also performed for differences between cases and controls, with an  $\alpha$  level of 0.05 being chosen as significant.

## Results

Table 1 shows the number of cases of leukemia and lymphoma in Mazandaran found in cancer registry from 1992 to 1997. Definitely there is an underestimation of cases, because there were many cases reported as cancer of the bone marrow that we did not include here. Fig. 2 shows the incidence of different types in 1995-1996. Even according to these underestimated figures, these cancers are among the 5 leading types of cancer in this part of the country.

Figure 1 shows various districts of the province and Figure 3 to 5 shows the distribution of Hodgkin disease, malignant lymphomas and leukemias (all types), respectively. In the province lymphomas and leukemias are mostly seen in central districts. This is partly because of higher population density and possibly partly due to agricultural and industrial activities in these districts.

Table 2 shows the age distribution of 610 cases. The majority of leukemia cases are children and adolescents while the reverse is true for lymphomas.

Table 3 shows the distribution of L&L by sex. In all types, the male to female ratio is almost 1.5.

Table 4 shows some of the results of the case-control study. Actually we did not find any significant association with the factors studied except for history of drug addiction which is true for adult patients. There is also some association with smoking for other variable, we did not find differences between cases and controls.

### Discussion

The study shows the importance of leukemias and lymphomas as important public health problems in this province. In another study unpublished carried out on 102 cases in Tehran in 1985, 15 percent of cases seen in Tehran were from Caspian littoral areas. As these areas are the main centers for growing rice in the country, there is the possibility of some association with the types of insecticides and herbicides used. History of drug addiction also shows the role of this factor. There is the possibility of some infections especially mosquito borne viruses because the mosquito is very high due to high precipitation in these areas. As mentioned in the title, this is a preliminary investigation on these diseases. It was hoped that this will lead to more detailed investigations to find all important risk factors of the diseases that considerable proportion of them strike children and adolescents.

### Acknowledgement

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Table 1- Cases of leukemia and lymphoma seen in Mazandaran province from 1992 to 1997 due to type of cancer

Year	Type of disease			All types of L&L
	Hodgkin	N.H.L*	Leukemia	
1992	13	72	42	127
1993	19	66	28	113
1994	15	57	39	111
1995	7	59	54	120
1996	9	61	27	97
1997	17	56	27	100
Total	80	371	167	618

\*: Non Hodgkin Lymphomas

Table 2- Age distribution of 610 cases\* of leukemia and lymphoma seen in Mazandaran province due to type of cancer(1992 until 1997)

Age group Year	Type of disease			All types of L&L
	Hodgkin	N.H.L*	Leukemia	
< 10	4	19	75	98
10 - 19	15	19	37	71
20 - 49	40	134	34	208
50 +	17	188	28	233
All ages	76	360	174	610

\*: For 38 cases the exact age was not available

Table 3- Cases of lymphoma and leukemia by sex, Mazandaran 1995-1996

Type of L&L	Male	Female	Total
Hodgkin	12	5	17
Malignant Lymphoma	112	70	182
All types of leukemia	34	24	68
Total	168	99	267

Table 4- Distribution of some of the risk factors under study with odds ratio and 9.5% of confidence interval of odds ratio in Mazandaran province (95-96)

Some of risk factors	Control (+) & Case (-)	Control (+) & Case (-)	odds ratio (X <sup>2</sup> )	95% Confidence Interval
History of another member of family having (L&L)	31(12.0)	23(8.9)	0.74(1.19)	(0.43 1.29)
Current cigarette smoking	22(11.2)	31(15.8)	1.41(1.53)	(0.82 2.41)
Past & present cigarette smoking	41(20.9)	55(28.1)	1.34(2.04)	(0.89 2.02)
History of drug addiction (narcotics)	2(10)	9(4.6)	4.5(4.54)	(1.11 18.14)
Current drug addiction (narcotics)	8(4.1)	12(6.1)	1.5(0.8)	(0.62 3.67)



Fig. 1- Sketch map of Mazandaran province showing all districts

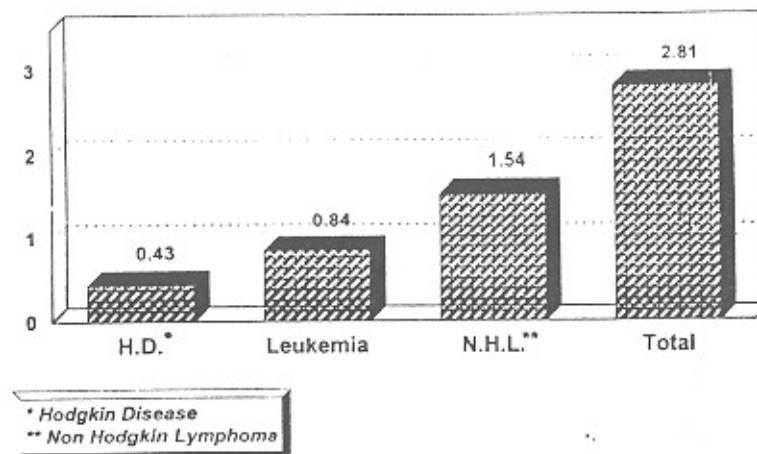


Fig. 2- Incidence of leukemias and lymphomas (per 100,000) by type of cancer in Mazandaran province (1995-96)



Fig. 3- Geographical distribution of cases of Hodgkin disease in Mazandaran in 1995-1996



Fig. 4- Geographical distribution of cases of malignant lymphoma in Mazandaran in 1995-1996



Fig. 5- Geographical distribution of cases of leukemia (all types) in Mazandaran in 1995-1996

References

- 1- Bamsadre M , Navab F, Moglabai A , Shariatmadari T (1975): High Frequency of Lymphoma in Iran, yr. of cancer 3(17): 2-6.
- 2- Ghadrrian P, Aramesh B, Malek Afzali H (1980): *Incidence of various cancers in the caspian littoral area. Results of 10 years study.* Publication no. 2044 School of Public Health, University of Tehran, Tehran, Iran.
- 3- Haghighi P, Mostafavi N, et al. (1978): Childhood lymphoma in southern Iran, *Cancer*, 44: 254-7.
- 4- Iranian Statistical Center (1993): *Statiscul of Mazandaran.*
- 5- Malek Afzali H, Mahmoudi M (1983): *A Review of Iran's vital statistics.* International Medical Seminar, 20-24, Nov. Tehran - Iran.

- 6- Nadim A, Nasseri K, Ghadirian P (1988): Geocancerology in Iran, in: *Global Geocancerology*, Melwin Howe (ed) churchill livingstone press pp: 241.
- 7- Varmus H, Weinberg RA (1993): *Genes and the biology of Cancer*. Scientific American Library, New York.
- 8- WHO (1979): Tedon. Rep. ser. No. 632.
- 9- WHO (1983): W.H.O. Statistics Annual.
- 10- WHO (1984): World Health, Aug-Sept, P. 30.