# Leukemia Cancer Mortality Trend in Iran, From 1995 to 2004

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## Abstract

**Background:** Cancer is the third most common cause of death in Iran, the leukemia cancer is one of the most important causes of cancer mortality. Regarding cancer mortality, data would be important to monitor the program screening effects, earlier diagnosis, demographic data and other prognostic factors. The aim of this study was mortality rates evaluating, then leukemia cancer trends among the Iranian population within almost a period of a decade, i.e. from 1995 to 2004.

**Methods:** National death Statistic Reported by Ministry of Health and Medical Education (MOH&ME) from 1995 to 2004, stratified by age group, sex, and cause of death, have included in this study. Leukemia cancer has expressed as the annual mortality rates/100,000, in general, and/or per gender, and age group.

**Results:** The general mortality rate of leukemia cancer has slightly increased within the mentioned study period, from 0.44 to 2.54, then leukemia cancer mortality has often seen in men more than women.

**Conclusion:** The mortality rate of leukemia has significantly increased throughout Iran. Associated risk factors with leukemia have headmost identified for their prevention and control. So, future studies to reveal leukemia risk factors among the Iranian population would be crucial in order to control its burden.

**Keywords:** Leukemia; Mortality; Trends; Iran

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## Introduction

Cancer is worldwide major cause of morbidity and mortality. According to the World Health Organization (WHO), the global burden of cancer will continuously increase, during the next 20 years [1].  Among the different types of cancers, leukemia has greatly increased in frequency.

Leukemia is one of the most common cancers among children. However, recently the incidence has been increased in adults as well [2].

In the United States, the cases that diagnosed with leukemia and lymphoma, have accounted for a third of total [2, 3]. According to World Health Organization (WHO), leukemia has increased worldwide. The cancer registry has recorded about 250,000 new cases annually [4] and a case fatality rate of 76% [5].

In Iran, the incidence registration has shown an increase in recent years, which has reached to the 7th grade after skin cancer, breast cancer, stomach cancer, colorectal cancer, bladder cancer and prostate cancer  [6, 7]. This cancer is among most

fatal cancers in Iran, including gastric cancer, lung cancer, leukemia, and liver cancer [5].

Regarding the cancer mortality, data would be important, together with other epidemiologic indicators such as incidence and survival, to monitor the effects of screening program, early diagnosis, and other prognostic factors, then also the population risk [8].

The aim of this study has determined the leukemia trends mortality among the Iranian general population within almost a decade, i.e. from 1995 to 2004.

## Materials and Methods

"National death statistic" which has reported by Ministry of Health, and Medical Education (MOH&ME) from 1995 to 2000 (registered death statistics for Iranian population at the Information Technology and Statistic Management Center, MOH&ME), then from 2001 to 2004 (published by MOH&ME) [9-11], stratified by age group, sex, and cause of death (coded according to the 10th revision

of the International Classification of Diseases [ICD-10]) have included in this analysis. Leukemia cancer [ICD-10; C91-95] has expressed as the annual mortality rates/100,000, overall, both by sex and age group (0-5, 5-14, 15-49 and >=50 years of age). The populations of Iran in 1995-2004 have estimated by age group and sex using the census from 1996 conducted by Statistics Centre of Iran and its estimation according to population growth rate for years before and after national census [12].

## Results

All death records due to leukemia cancer from 1995 to 2004 have included in the analysis. The general mortality rate of leukemia cancer dramatically has increased during these years from 0.79 to 6.45 per 100,000 during the study period (Table 1 and Figure 1). Moreover, leukemia mortality was higher among male than female (Table 1 and Figure 2). In male population, the rate of leukemia cancer mortality has increased from 0.90 (in 1995) to 7.47 (in 2004) per 100,000 but in female, the rate has increased from 0.67 to 5.38 in the same years (Table 1). Also the mortality has increased as age increased, so the highest rate has observed among elderly people, older than 50 years old (Table 1).

**Table 1.** Leukemia cancer mortality rate and trend by sex and age group

|  | <5 Years | | 5-14 Years | | 15-49 Years | | >=50 Years | | All ages | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |  |
| 1995 | 0.80 | 0.70 | 0.40 | 0.41 | 0.50 | 0.42 | 3.72 | 2.24 | 0.90 | 0.67 | 0.79 |
| 1996 | 1.54 | 1.42 | 0.91 | 0.56 | 1.09 | 0.88 | 6.75 | 3.73 | 1.79 | 1.19 | 1.50 |
| 1997 | 1.51 | 1.24 | 0.09 | 0.53 | 1.15 | 1.06 | 9.19 | 6.32 | 2.14 | 1.58 | 1.87 |
| 1998 | 1.97 | 1.65 | 0.96 | 0.78 | 1.50 | 1.22 | 9.86 | 6.74 | 2.44 | 1.82 | 2.14 |
| 1999 | 2.37 | 1.55 | 1.07 | 0.84 | 2.24 | 1.55 | 13.49 | 7.59 | 3.35 | 2.11 | 2.75 |
| 2000 | 1.94 | 1.69 | 1.03 | 1.06 | 2.30 | 0.15 | 13.09 | 8.77 | 3.23 | 1.54 | 2.41 |
| 2001 | 1.56 | 1.44 | 1.30 | 0.74 | 2.34 | 1.70 | 12.84 | 7.98 | 3.49 | 2.34 | 2.93 |
| 2002 | 11.30 | 10.60 | 2.10 | 1.80 | 2.90 | 0.30 | 20.80 | 10.70 | 5.64 | 2.81 | 4.27 |
| 2003 | 3.26 | 2.21 | 3.16 | 2.20 | 4.35 | 3.74 | 28.11 | 16.99 | 7.08 | 4.98 | 6.05 |
| 2004 | 2.86 | 3.54 | 2.38 | 2.12 | 5.09 | 3.83 | 30.34 | 19.36 | 7.47 | 5.38 | 6.45 |
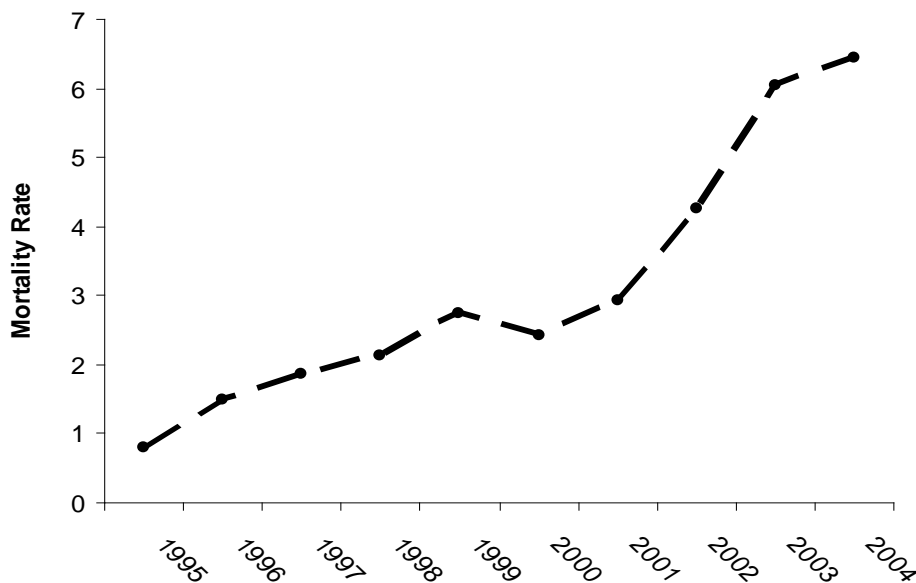


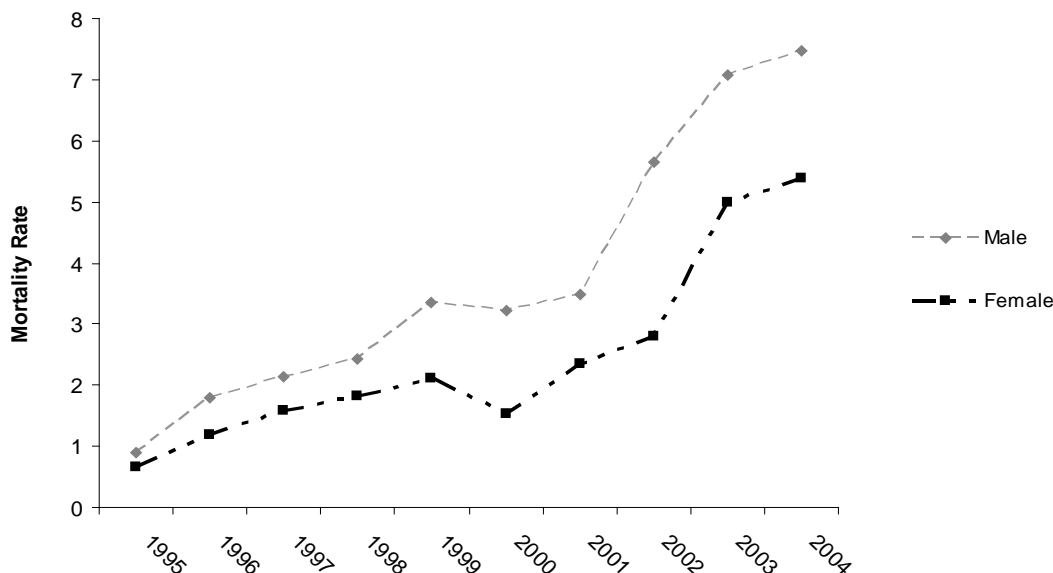**Figure 1.** Trend of leukemia cancer mortality during the period 1995-2004 is shown.

**Figure 2.** Trends of leukemia cancer mortality during the period 1995-2004 by sex are shown.

## Discussion

This study provides comprehensive projections for mortality rates due to leukemia cancer, based on the national registry data, indicating remarkable increasing trends in leukemia cancer mortality, during the study period. Our findings are in contrast to other countries.

In recent decades, important changes in leukemia mortality have occurred all over the world, then its mortality has decreased among all ages. According to World Health Organization statistics, the mortality rates of this cancer has been shown declining among all age and sex groups, in countries such France, Italy, UK and Japan [13]. A Chinese study has shown that from 1987 to 1999; there was a significant decrease in leukemia mortality in the age group 15–34 years of age [14]. Among those 15–24 years of age in Latin America, leukemia is the first cancer-related cause of death [15] but even there, data has shown decreases among the most region countries [16]. In Western Europe, leukemia death rate declining among the adolescents was lower than children [17].

Our study also has indicated mortality increase among the children younger 15 years old. In contrast, a Brazilian study about leukemia mortality rate among the children, has revealed a notable decline in Brazil [18] then based on one another study in Rio de Janeiro, Brazil has indicated the same continuous downward trend among children aged<15 over a 25-year period, again with higher rate among the males [19].

Leukemia treatments have been established and improved very well in recent decades, including a 5-year survival rate for children and adolescents of 84% [20]. However, leukemia prognosis among adults has not declined as much as children's rates [2]. So, even thought the mortality rates for young adults have decreased, but this decrease is much lower in comparison to children mortality rate [2].

According to some Asian studies, overall obesity would be a risk factor of mortality among adults [21]. Besides, a national study in US on a state-specific basis, has shown that leukemia mortality has decreased in states where smoking rates have declined, but remained unchanged in states where smoking prevalence were relatively stable [22].

This study has revealed an increasing trend of leukemia cancer mortality in Iranian population, specifically in older age and in men which could be reflects the higher risk factors including obesity and smoking for these groups. These results will help to understand the direction of the lung cancer mortality in Iran. A limitation of this study was cancers mortality underestimation in Iran due to poor registration [9]. Also we haven't reached complete crude data for all ages in order to give age-standardized mortality rates, for international comparison. But the results might be useful for health practitioners and policy makers in monitoring and projecting future rates.

In conclusion, the burden of leukemia (including incidence, prevalence and mortality) has significantly increased throughout Iran. Identification of risk factors associated with leukemia would be headmost

for its prevention and control [4]. So, future studies to reveal the risk factors of this cancer among the Iranian population would be crucial in order to control its burden.

## Acknowledgment

## Conflict of Interest

The authors have no conflict of interest in this article.

## Authors' Contribution

Mohamad Amin Pourhoseingholi has conceived and designed this study; Mohsen Vahedi and Zeinab Fazeli has interpreted the results and drafted the manuscript; Ahmadreza Baghestani and Alireza Abadi have participated in writing and revising the manuscript; Alireza Abadi and Fatemeh Sadat Fazeli Bavand-Pour have contributed in data gathering. All authors have read and approved the final manuscript.

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