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Survival Rate of Patients with Acute Leukemia: A Case Study in Iran

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ABSTRACT

Background: Acute leukemia is a kind of aggressive disease that includes high rates of fatalities in the world, in particular in Iran. This research was done to determine the survival rate of patients with acute leukemia in Iran.

Methods: 85 adult patients who were first diagnosed with acute leukemia in Shahid Bahonar hospital of Kerman during March 2012 until March 2013 were evaluated in a retrospective descriptive study to measure the death/life status in a 5-year period (2012-2017). The required data was gathered from medical records of patients, HIS system data, and the cancer registry system, and the Kaplan-Meier estimator and Log Rank test were used to calculate the survival rate using $SPSS_{23}$.

Results: Survival rate was completely 45.9 % for patients with acute adult leukemia. It was 47.08 % in acute myelogenous leukemia (AML) and it was 43.06 % in acute lymphocytic leukemia (ALL). The 1,2,3,4 and 5-year survival of acute leukemia was respectively 87.1 %, 69.4 %, 62.4 %, 56.5 % and 45.9 %.

Conclusion: Iran's health system should design and plan to increase the survival of patients with acute leukemia by improving the methods and facilities to diagnose and treat it more quickly and more effectively.

Key words: Acute leukemia, Survival, Hospital

Citation

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Introduction

Every nation encounters major health threats and diseases (1). Nowadays, cancers are one of the main health issues in Iran and all around the world (2). Cancer is a common disease that is not special to a certain time or place. This disease has special importance due to being the second leading cause of death in the world and the third cause of death in Iran (3, 4). It is predicted that the incidence of cancers become double by 2020 (5). Leukemia is considered as the world's fifth-most fatal cancer while it is the second fatal cancer in Iran (6).

World Health Organization (WHO) reports that the leukemia rate is increasing in Iran and all over the world. According to the Iranian Cancer Registry, leukemia is one of the first four cancer cases in the country in terms of being fatal (7). Leukemia is one of the malignant diseases of the human blood system which occurs in various clinical and pathological forms (8, 9), can result in death in a short period, and sometimes results in indefinite treatment, and sometimes leads to death despite treatment (8).

Leukemia is the cancer of the hematopoietic tissues of the body, including bone marrow and lymphatic system, which disturbs the regular growth process of blood cells and makes them out of control. In acute leukemia, the body produces high amounts of premature cells and stops healthy cell growth and cannot cope with illness and blood supply. Unlike other cancers, leukemia's tumor is not solid and filled so that doctors could eliminate it by surgery, but bone marrow is the main source of this problem. Leukemia can be treated with chemotherapy and bone marrow transplantation that are the common treatments for this disease (10, 11).

The rate of deaths is often used to determine the health status of the population and prioritize community health problems, but more complex indices are more suitable for crude mortality (12). In the meantime, the effectiveness of treatments can be calculated by epidemiological indices such as survival rates. Survival analysis is the standard method to measure the advancement of cancer treatment (13) and is an appropriate index to measure the effectiveness of treatment, diagnostic and therapeutic cancer interventions, and is the rate of cancer patients who have been diagnosed in a specific period of time being alive (14).

Several studies have been conducted to measure the survival rates of cancer patients in the world as well as in Iran. Each study has reported different rates of survival according to the type of cancer. A study conducted by Danese showed that the survival rate of the total number of patients aged 65 years or older with acute lymphocytic leukemia was 112 days (15).

The study conducted by Allahyari in 2016 showed that the survival rate of acute lymphocytic leukemia of 1, 2, 3, 4, and 5 years was 62.2, 52.7, 40.6, 39.1, 22.2 %, respectively (16). Allahyari (17) indicates in another study, that the survival rates of 1, 2, 3, 4, and 5 years were 56%, 42.8 %, 34.6 %, 32.5 %, and 26.6 % respectively for acute myelogenous leukemia patients. Qavamzadeh (18) has estimated the 5-year survival of acute leukemia as the amount of 64.4 %.

This study aimed at determining the 5-year survival in patients with acute leukemia in Shahid Bahonar Hospital of Kerman, the widest province of Iran considering the importance of calculating the survival rate in acute leukemia to determine the effectiveness of the proposed treatments as well as better evidence-based policymaking about effective treatments for patients with acute leukemia. Such a study is needed to be done for this disease in Kerman province because of the incremental rate of it.

Materials and Methods

This study is a kind of retrospective analytical study that measures the survival rate of patients with acute leukemia between 2012 and 2017. According to the data resulted from all 85 patients who referred to this center and the diagnosis of acute leukemia from March 2012 to March 2013, their 5-year survival rate (March 2012 to March 2017) was calculated for the first time. The

follow-up starts from diagnosis and the last visit is done after 5 years. The collected data included age, sex, occupation, marital status, place of residence, type of cancer (myeloid or lymphocytic), and also data related to their death or life. The patients' death/life status data were collected by telephone and observance of ethical principles. Other data were also collected through the medical records of patients, hospital information systems, and the cancer registry system of Kerman. SPSS 23 was used to analyze the collected data. The Kaplan-Meier estimator and the Log Rank test were used to calculate the survival rate.

Data on the effect of treatment, the survival rate, the data provided by the cancer registration system, as well as the examination of the medical records of patients, the extraction of the history and age of leukemia diagnosis from patients file, and tracking them up to 5 years later was collected by studying the life/death. Data on the demographic status of patients including sex, occupation, marital status, place of residence, type of cancer, including myeloid leukemia and lymphocytic leukemia were collected by the medical records of patients to determine the effect of each one on survival.

Inclusion criteria are all patients diagnosed with acute leukemia in the adult section of the oncology department of Bahonar Hospital who were diagnosed from March 2012 to March 2013, and exclusion criteria were patients with any cancer other than acute leukemia. This study was approved at the ethics committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran (IR.SSU.SPH.REC.1396.158).

Results

The mean age of patients was 30, and 33 % were female and 61 % were male. Native people of Kerman were 93 %. 48 % were married (Table1). The survival rate in terms of the sex was not significantly different.

Table 2 shows the survival rate status in every year and the percentage rates of patients who are survived every year since being diagnosed and treated. The survival rate of one year up to five years from the start of treatment to the end of the first five years of treatment indicates the effectiveness of cancer treatment.

As Table 3 shows, the number of patients who were diagnosed with acute myeloid leukemia for the first time in 2012-2013 in Kerman was 46, including 47.8 % had five years of survival, and on average the 50.6 month was still alive and treatment methods have resulted in their (43.5 – 57.7) month survival.

Table 4 shows that the number of patients diagnosed with acute lymphocytic leukemia for the first time was 39, including 43.6 % had five years of survival, and, on average, the 41.9 months were still alive and the therapeutic methods resulted in their survival of (32.8-50.9) months.

Table 1. Background characteristics of the studied patients

Variable		Number\year	Percentage (%)
Sex	Female	28	33
	Male	57	67
location	Kerman Province	79	93
	Other	6	7
Marital Status	Single	35	41
	Married	45	48
	Not mentioned	9	11
Leukemia type	Myeloid	46	54
	Lymphoblastic	39	46

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Table 2. The survival rate of 1 to 5 years of the studied patients

Period	Survival Rate (%)
One-year survival	87.1 %
Two-year survival	69.4 %
Three-year survival	62.4 %
Four-year survival	56.5 %
Five-year survival	45.9 %

Table 3. The five-year survival rate in AMLpatients)

Variable Leukemia type	Number	Death incident	Censor		Median Survival (month)	Survival rate 95 %	Average Survival (Month)	Standard deviation
			Number	Percentage				
AML	46	24	22	47.8	56	(43.5-57.7)	50.6	3.631

Table 4. The five-year survival rate in patients with ALL

Variable Leukemia type	Number	Death incident	Censor		Median Survival (month)	Survival rate 95 %	Average Survival (Month)	Standard deviation
			Number	Percentage				
ALL	39	22	17	43.6	45	(32.8-50.9)	41.9	4.614

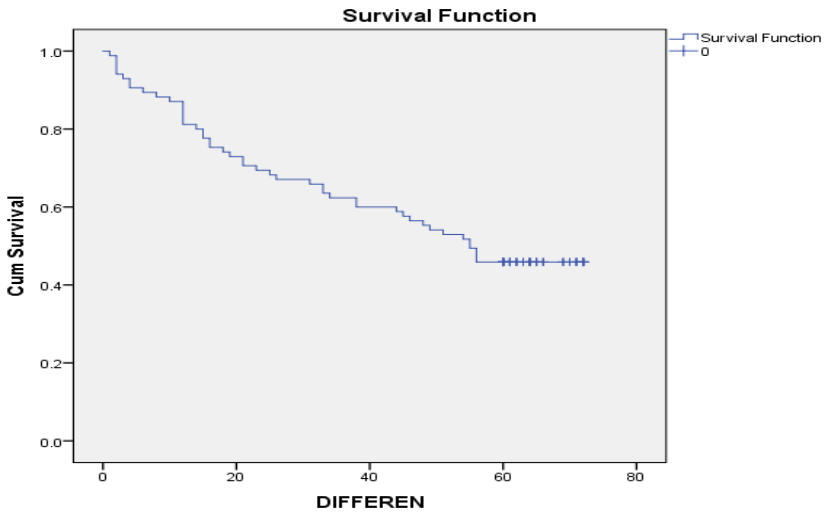

Figure 1. Survival rate of 1 to 5 years of patients in the oncology department

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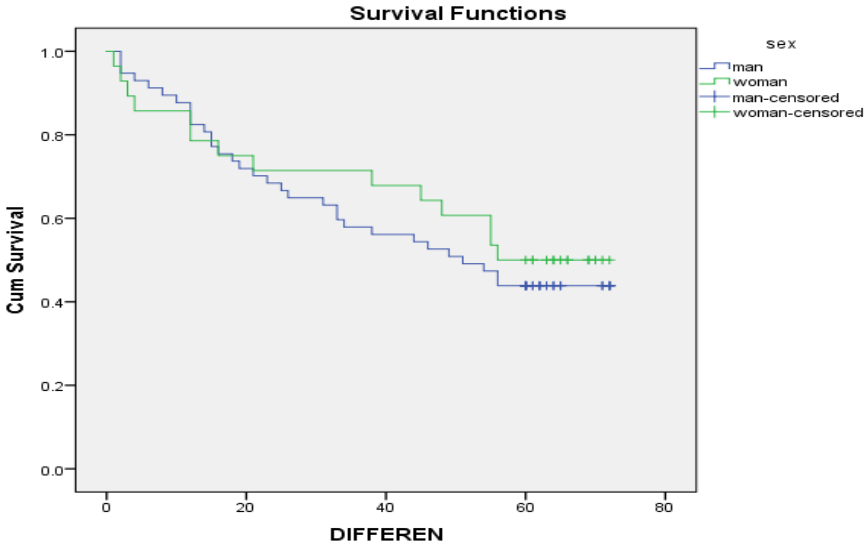

Figure 2. Five-year survival by sex in patients understudy in the oncology department

Discussion

In the study conducted by Ayremlou (19) in Tehran among the studied population, 59.6 % were male and 40.4 % were female; 55 % of patients had acute myeloid leukemia and 45 % had acute lymphocytic leukemia. In this study, the percentage of males was higher. In the study conducted by Akramipour in 2007 in Isfahan, on AMLin children, 60 % of the patients were male and 40 % female. 17.5 % of patients were aged less than one year, and the distribution of the age from 2 to 15 years old was nearly the same (20). In this study, the proportion of males and females with this study is similar.

The survival rate for patients with acute adult leukemia was totally 45.9 %.The 1,2,3,4 and 5-year survival of acute leukemia was respectively 87.1 %, 69.4 %, 62.4 %, 56.5 % and 45.9 %.

It was 47.8 % in AML and it was 43.6 % in ALL. The mean and median of survival in AML was respectively 50.6 and 56 months and in ALL 41.9 and 45 months.

Study shows that the survival rate of females was 50 % and it was 43.9 % in males. The median of survival was respectively 56 and 51 months.

In a systematic study conducted in 2018 on acute leukemia survival studies in Iran, the one-year survival rate of acute leukemia and five-year survival rate were reported 61 % and 48 % respectively by meta-analysis (21).

Allahyari (16) showed in a study conducted in Mashhad on 48 patients with acute lymphocytic leukemia that, the survival rates of 1, 2, 3, 4, and 5 years old were reported 62.2, 52.7, 40.6, 39.1, and 22 %. According to his study, there was a very clear difference in patient survival based on the age of diagnosis.

Allahyari, showed in another study conducted in Mashhad, on 96 patients with acute myeloid leukemia that the survival rates were reported 56 %, 42.8 %, 34.6 %, 32.5 %, and 26.6 %, respectively (17). The survival rate is slightly different from the present study. These differences may be due to different clinical manifestations.

Ashrafi in Isfahan examined 95 patients and reported a one-year and two-year survival rate of acute myeloid leukemia 51 % and 26 %, respectively (22). This rate is lower than in developed countries. Also, the survival rate was lower than the present study.

Mashhadi showed in a study conducted in Zahedan on 66 patients with acute lymphocytic leukemia that, one-year survival rate of 53 % and a survival rate of 7 years was 45.5 % (23). In the 2008 shadow study, 206 patients in Tehran had a 5-year survival rate of acute leukemia of 52 % (24). The one-year survival rate is much lower than

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the present study. On the other hand, in the Mashhadi study, the difference between one and seven-year survival is not significant.

Liu conducted a study in China on 125 patients with a two-year overall survival rate of acute myelogenous leukemia and showed that patients who had been subjected to two different routes were reported 74.1 % and 34.3 %, respectively (25). GU showed in a study of 42 patients in China that, the total two-year survival rate of acute myeloid leukemia was 36.9 % (26).

Siegel showed in the comprehensive American Cancer Report that, the mean five-year survival rate for leukemia among all races was 59 % (27).

The 5-year survival rate of patients with leukemia in the study conducted by Sankara Narayanan in Shanghai, China, was reported in 2011, 18.15 %, in Singapore, 32 %, and Turkey (41.8 %) (28,29). It is possible that the difference in the results of these studies to be related to the treatment and characteristics of the patients with a lower diagnostic age or lower stages of the disease in those studies compared to this study.

Since one of the limitations during conducting this study was the absence of information availability, it would be better to facilitate the research and applied research through strengthening cancer registry systems at the country level.

Conclusion

Improving the survival rate results in improved patient health and health is regarded as one of the most important factors in economic growth. Hence, improving the health indices is one of the important objectives of governments to develop. Iran's health system should plan to increase the survival rate of patients diagnosed with acute leukemia by promoting the methods and facilities to make diagnoses and treat this disease more quickly and effectively and increase the survival rate of the patients during treatment of this disease.

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Conflict of interests

There is no conflict of interests in this study.

Authors' contributions

Ranjbar M, Barouni M, Moazed V, Sheikholeslami Sh, and Fallahza deh H designed research; Fallahzadeh H and Barouni M analyzed data; and Ranjbar M, Moazed V, Sheikholeslami Sh, Barouni M wrote manuscript. All authors read and approved the final manuscript.

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