

Five Years Survival Of Common Childhood Cancers In Guilan, The North Province Of Iran During 2013-2018

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Abstract

Cancers are the second leading cause of death in children after accidents. There are several factors that affect the survival rate of cancer patients, and the sum of these factors causes a huge difference between the survival rate of patients in different geographical areas of the world. Determining the survival rate of cancers after diagnosis is one of the key studies needed to review educational protocols and prevention strategies. In this retrospective cohort study, which was conducted as a census, the survival status of all children aged 0-14 years with cancer in Guilan province in 2013-2018, which was registered in the format of the cancer registration software program and is currently at the disposal of the health department of the university was investigated. Life table analysis or Kaplan -Meier method, Log Rank test and was used to calculate survival or comparing the survival of groups. 31.2% of children had the result of treatment leading to death and 68.8% had recovery. By comparing the median survival time of children, it was found that there is no difference between boys and girls and it was found that there is no difference in terms of where children live. The lowest 5-year survival rate of malignancies in children with cancer, respectively was of "brain and spinal cord", "other", "bone", "blood and endothelial system" and then "lymphatic system" which is planned for Early diagnosis and timely treatment are recommended.

Keywords: Survival Rate, Cancer, Pediatrics.

INTRODUCTION

In recent decades, significant successes have been achieved in the field of infectious disease control by improving drinking water, vaccination against infectious diseases, antibiotics, etc., but changing consumption patterns and increasing consumption of tobacco and processed foods, changing people's lifestyles with a significant increase in risk Diseases such as cancer are associated.

The concern that raises cancer as a major health problem in the world today and puts the fight against it among the health care priorities is the uncontrollable growth and increase of people suffering from this disease at the global level, including in our country (1,2).

After accidents, cancers are the second cause of death in children (3), and the problem with children's tumors is that they cannot be prevented or diagnosed early by screening (1,2).

Recent advances in the treatment of tumors have led to a large improvement in the treatment and survival after the diagnosis of these cancers, and the most important point in the treatment of these cancers is that in all countries, regardless of their income, the cost is effective, but the survival rate depends on the country where the child lives. In high-income countries, the recovery rate is reported up to 80%, while this rate is about 15-45% in low-income countries. The most important factors in the low rate of recovery in developing countries are the delay in diagnosis and diagnosis in high-grade tumors, lack of access to appropriate treatment, death due to drug complications, and lack of proper follow-up for recurrence (1, 4, 3, 2).

Unlike adult cancers, the majority of children's cancers do not have a known risk factor. Many studies have been conducted so far, but environmental and lifestyle factors have been involved in a few cancers. Due to the lack of specific risk factors,

preventing these cancers is a difficult task (1,5,6).

In the studies conducted in England, based on the cancer registration system, the overall 1-year survival rate of childhood cancers was 92%, the 5-year survival rate was 84%, and the 10-year survival rate was 80% (7,8). In Europe, 79% is mentioned (9). In another study in England, the overall 5-year survival rate of children was 72.7% and the 15-year survival rate was 67.9% (10). Also, the survival rate of childhood cancers in Estonia has increased significantly between 1970-2016, from 24% in the 1970 cohort to the rate reached 73% in the 2016 cohort (11).

In Iran, limited studies have been conducted on the survival of children's cancers, and based on the type of tumor, different studies have been mentioned, for example, for leukemia, 53.3% survival in 5 years has been reported in Shiraz (12) and 44.5% (13) in Tehran. The two-year survival rate of Wilms tumor in Hamedan is 100% in patients with stages 1 and 2 and 83% in patients with stages 3 and 4 (14).

Since determining the survival rate of cancers after diagnosis is one of the key studies required to revise the educational protocols and prevention strategies at the primary, secondary and tertiary levels, as well as identifying the effectiveness of new treatments, in this research we decided to determine the 5-year survival rate of common childhood cancers in Guilan province.

MATERIAL AND METHODS

In this retrospective cohort study, which was conducted as a census, the survival status of all children aged 0-14 years with cancer in Guilan province in 2013-2018, which was registered in the format of the cancer registration software program and is currently at the disposal of the health department of the university, was investigated.

First, the list of patients, including the age at the time of diagnosis, tumor histology, city of residence, was extracted from the cancer registration program, and if the patient died, the exact date of death was entered. Given that the date of definitive cancer diagnosis based on the pathology laboratory certificate is available in the cancer registration software, the survival rate from Detection was calculated.

Then, for data analysis, people's information was analyzed anonymously and coded. The data was entered into SPSS Version 18 software, descriptive statistics were used to show quantitative data, and life tables were used to calculate the survival rate and the Kaplan-Meier method, Log Rank (Mantel-Cox) test was used to comparing the groups.

RESULTS

Table 1: Distribution of the frequency of deaths in children with the types of malignancy

The result of the treatment	Number	Percent
Death	99	31/2
Continued treatment/recovery	218	68/8
Total	317	100

31.2% of the children suffering from malignancy researched had the result of treatment leading to death and 68.8% had the result of treatment leading to recovery.

Table 2: Survival time of children

Time period (month)	Number of people present in the study	Number of people who experienced an event (death)	Ratio of people to deceased people	Ratio of people to surviving	people Survival rate (Percentage)
0	317	58	0/18	0/82	82%
12	259	13	0/05	0/95	78%
24	246	14	0/06	0/94	73%
36	232	5	0/02	0/98	72%
48	213	5	0/03	0/97	70%
60	158	3	0/02	0/98	68%
72	116	1	0/01	0/99	67%
84	53	0	0	1	67%
96	15	0	0	1	67%

Based on the life table presented for children with various types of malignancy, the 5-year survival rate of cancers was determined to be 68%.

Table 3: Survival time by gender of children

Sex	Time period(month)	Number of people present in the study	Number of people who experienced an event (death)	Ratio of people to deceased people	Ratio of people to surviving	People Survival rate (Percentage)
male	0	166	28	0/17	0/83	83%
	12	138	7	0/05	0/95	79%
	24	131	6	0/05	0/95	75%
	36	125	2	0/02	0/98	74%
	48	114	5	0/05	0/95	70%
	60	86	1	0/01	0/99	70%
	72	65	1	0/02	0/98	68%
	84	27	0	0	1	68%
	96	7	0	0	1	68%
female	0	151	30	0/2	0/8	80%
	12	121	6	0/05	0/95	76%
	24	115	8	0/07	0/93	71%
	36	107	3	0/03	0/97	69%
	48	99	0	0	1	69%
	60	72	2	0/03	0/97	67%
	72	51	0	0	1	67%
	84	26	0	0	1	67%
	96	8	0	0	1	67%

Based on the life table presented for children with different types of malignancy, by gender, it was determined that the 5-year survival rate in boys and girls with various cancers was 70% and 67%, respectively.

under investigation by Kaplan-Meier method and Log Rank (Mantel-Cox) test to comparing the median survival time of children diagnosed with cancer, it was determined that there is no difference between boys and girls ($P=0.617$).

Table 4: Survival time of by age groups (time of death or until now)

Age at the time of death or until now	time period (month)	Number of people present in the study	Number of people who experienced the event (death)	The ratio of people to deceased people	The ratio of people to surviving people	Survival rate (Percentage)
0-5	0	45	45	0/67	0/33	33%
	12	15	15	0/2	0/8	27%
	24	12	12	0/67	0/33	9%
	36	4	3/5	0/29	0/71	6%
	48	2	1	0	1	6%
6-10	0	111	111	0/13	0/87	87%
	12	97	97	0/03	0/97	85%
	24	94	94	0/03	0/97	82%
	36	91	88	0/02	0/98	80%
	48	84	72/5	0/04	0/96	77%
	60	58	48	0/02	0/98	75%
	72	37	23/5	0	1	75%
	84	10	6	0	1	75%
	96	2	1	0	1	75%
11-15	0	101	101	0/14	0/86	86%
	12	87	87	0/08	0/92	79%
	24	80	80	0/04	0/96	76%
	36	77	74	0/01	0/99	75%
	48	71	63	0/03	0/97	73%
	60	53	48	0/04	0/96	70%
	72	42	33	0/03	0/97	68%
	84	23	16	0	1	68%
	96	9	4/5	0	1	68%
>15	0	59	59	0	1	100%
	12	59	59	0	1	100%
	24	59	59	0	1	100%
	36	59	57/5	0	1	100%
	48	56	51/5	0	1	100%
	60	47	42	0	1	100%
	72	37	28/5	0	1	100%
	84	20	12	0	1	100%
	96	4	2	0	1	100%

Based on the life table provided for children with various types of malignancy by age group of children (time of death or until now), it was determined that survival rate of malignancies in children 0-5 years of age will be 6%.

It was also determined that the 5-year survival rate of malignancies in children aged 6-10 years will be 75%.

It was also determined that the 5-year survival rate of malignancies in children aged 11-15 will be 70%.

By using the Kaplan-Meier method, Log Rank (Mantel-Cox) test to compare the median survival time of children diagnosed with cancer, it was determined that there is a difference between the age groups of children (at the time of death or until now) ($P=0.0001$).

Table 5: Survival time of children by the most common primary origin

Primary origin of cancer	Time period (month)	Number of people in the study	Number of people who experienced the event (death)	Ratio of people to deceased people	Ratio of people to surviving people	Survival rate (Percentage)
Blood and endothelial system	0	138	23	0/17	0/83	83%
	12	115	4	0/03	0/97	80%
	24	111	2	0/02	0/98	79%
	36	109	3	0/03	0/97	77%
	48	99	1	0/01	0/99	76%
	60	72	2	0/03	0/97	74%
	72	58	1	0/02	0/98	72%
	84	26	0	0	1	72%
Brain and spinal cord	0	49	16	0/33	0/67	67%
	12	33	5	0/15	0/85	57%
	24	28	2	0/07	0/93	53%
	36	26	1	0/04	0/96	51%
	48	23	3	0/15	0/85	43%
	60	15	0	0	1	43%
	72	11	0	0	1	43%
	84	4	0	0	1	43%
bone	0	27	2	0/07	0/93	93%
	12	25	2	0/08	0/92	85%
	24	23	2	0/09	0/91	78%
	36	21	1	0/05	0/95	74%
	48	20	1	0/06	0/94	70%
	60	14	0	0	1	70%
	72	14	0	0	1	70%
	84	3	0	0	1	70%
Lymph nodes/lymphatic system	0	26	1	0/04	0/96	96%
	12	25	1	0/04	0/96	92%
	24	24	0	0	1	92%
	36	24	0	0	1	92%
	48	23	0	0	1	92%
	60	15	0	0	1	92%
	72	10	0	0	1	92%
	84	6	0	0	1	92%
96	2	0	0	1	92%	

Based on the life table provided for children with different types of malignancies, separated by the origin and location of the most common cancers, it was determined that the 5-year survival rate of malignancies in children with cancer of "blood and endothelial system" origin will be 74%. The 5-year survival rate of malignancy in children with brain and spinal cord cancer

will be 43%. The 5-year survival rate of malignancies in children with bone cancer will be 70%. The 5-year survival rate of malignancies in children with cancer originating from the "lymphatic system" will be 92%.

Thus, the lowest 5-year survival rate of malignancies in children with cancer of origin was "brain and spinal cord" (43%), "other" (57%), "bone" (70%), "blood and "endothelial system" (74%) and then "lymphatic system" (92%).

Table 6: Survival time of children, according to the most common place of residence

Place of residence	time period (month)	number of people present in the study	number of people who experienced the event (death)	ratio of people to deceased people	ratio of people to surviving people	survival rate (Percentage)
Rasht	0	129	28	0/22	0/78	78%
	12	101	6	0/06	0/94	74%
	24	95	9	0/09	0/91	67%
	36	86	1	0/01	0/99	66%
	48	79	3	0/04	0/96	63%
	60	59	0	0	1	63%
	72	44	0	0	1	63%
	84	24	0	0	1	63%
	96	8	0	0	1	63%
Talesh	0	30	3	0/1	0/9	90%
	12	27	0	0	1	90%
	24	27	1	0/04	0/96	87%
	36	26	2	0/08	0/92	80%
	48	22	0	0	1	80%
	60	13	0	0	1	80%
	72	9	0	0	1	80%
	84	5	0	0	1	80%
	96	2	0	0	1	80%
Astara	0	17	4	0/24	0/76	76%
	12	13	1	0/08	0/92	71%
	24	12	0	0	1	71%
	36	12	0	0	1	71%
	48	111	0	0	1	71%
	60	7	0	0	1	71%
	72	5	0	0	1	71%
	84	2	0	0	1	71%
	96	1	0	0	1	71%
Lahijan	0	17	3	0/18	0/82	82%
	12	14	0	0	1	82%
	24	14	0	0	1	82%
	36	14	1	0/07	0/93	76%
	48	13	1	0/08	0/92	70%
	60	10	1	0/11	0/89	62%
	72	7	1	0	1	62%
	84	2	0	0	1	62%
	96					
Some Sara	0	15	4	0/27	0/73	73%
	12	11	0	0	1	73%
	24	11	1	0/09	0/91	67%
	36	10	0	0	1	67%
	48	8	0	0	1	67%
	60	6	0	0	1	67%
	72	4	0	0	1	67%
	84	3	0	0	1	67%
	96					

Omnibus Tests of Model Coefficients^a

-2 Log Likelihood	Overall (score)			Change From Previous Step			Change From Previous Block		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
941.815	215.384	28	.000	159.312	28	.000	159.312	28	.000

a. Beginning Block Number 1. Method = Enter

Based on the life table presented for children with different types of malignancy, by the location, it was determined that the 5-year survival rate of malignancies in children with cancer living in Rasht is 63%, in Talash is 80%, in Astara is 71%, in Lahijan is 62% and 67% in Some Sara. In this way, the lowest 5-year survival rate of malignancies was in children with cancer living in Lahijan (62%), followed by residents in Rasht (63%), Soumesara (67%), Astara (71%) And then Talash (80%).

By using the Kaplan-Meier method, Log Rank (Mantel-Cox) test, comparing the median survival time of children diagnosed with cancer, it was determined that there is no difference according to the place of residence of the children ($P=0.632$).

By using Cox regression analysis to predict the probability of survival with the presence of variables such as, gender/age groups/type of tumor / children's residence, into the model using the Enter method, the results of the -2logLikelihood value of the model was 941/81 and it shows that the comparison of the model results without the presence of covariates with the results of the model with the presence of covariates is significant ($P<0.0001$) (Fig1-4).

Variables in the Equation								
	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
Gender	-.200	.206	.938	1	.333	.819	.547	1.227
True_age	-.260	.029	80.027	1	.000	.771	.728	.816

The overall adjusted survival curve for the studied children is presented in the graph below.

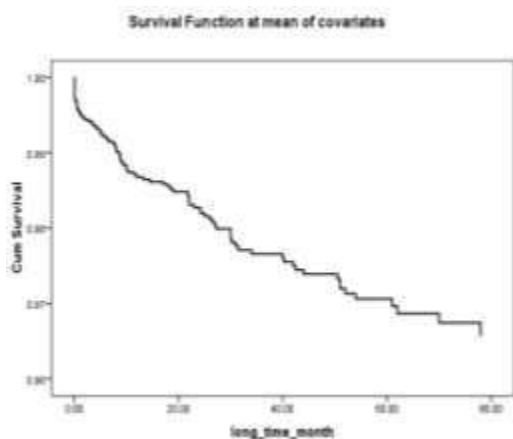


Fig 1: Overall adjusted survival curve

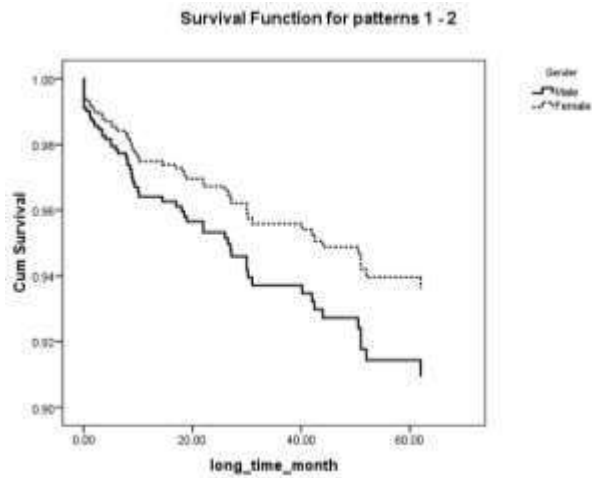


Fig 2: Adjusted survival curve by gender of children

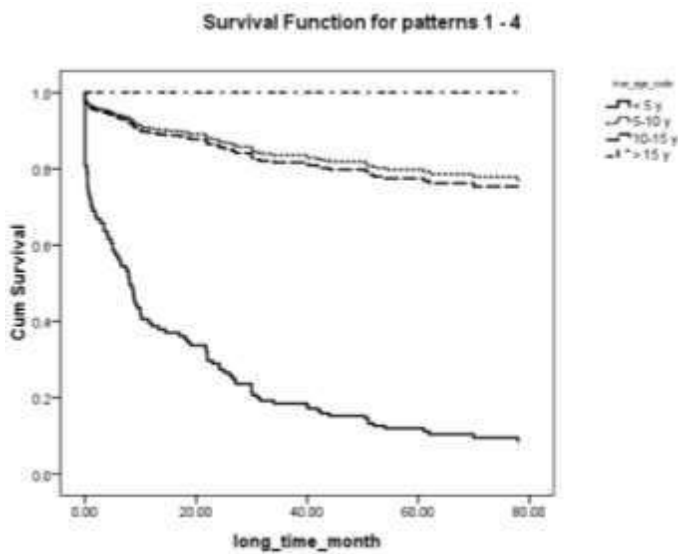


Fig 3: Adjusted survival curve by age groups

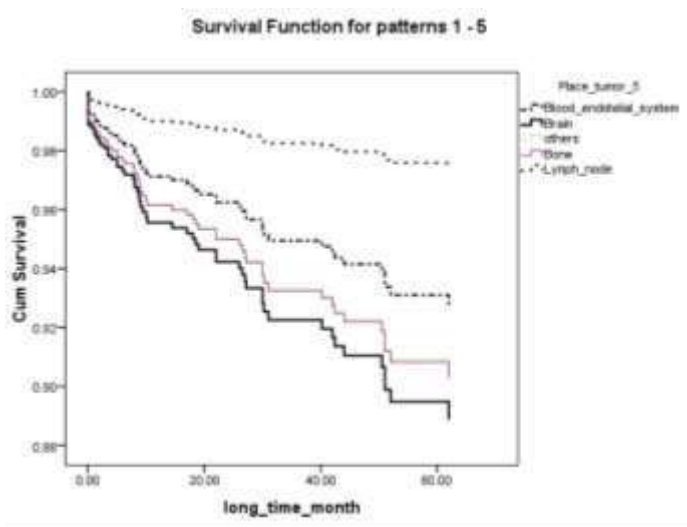


Fig 4: Adjusted survival curve according to the location of the tumor

DISCUSSION

In this study, 317 children aged 0-14 years old, whose information was registered in the cancer registration system of Guilan Health Vice-Chancellor between 2013 - 2018, were investigated, 166 of them were boys and 151 were girls. Unfortunately, 31.2% of the children were died, and 68.8% had a cure, and based on the life table presented for children with malignancies, the 5-year survival rate of cancers was determined to be 68%.

The survival rate of childhood cancers in Switzerland between 2004-2013 has been estimated at 88% (15) and according to the report of the American Cancer Society, this rate has reached 84% of the survival of children with cancer in general, although it depends on the type of cancer and Other factors will vary the survival rate (3).

In the study of Gatta et al., the 5-year survival of children's cancers in 20 European countries between 1990-1994 varied from 45% in Estonia to 90% in Iceland, and in general it was 60-70% in Eastern Europe and more than 75% in Western Europe, in Switzerland, Germany and Scandinavian countries. The most important reason for the disparity in survival between different European countries is access to diagnostic services and modern treatments (16).

Another study by Gatta et al. showed the survival rate of childhood cancers between 2002-1995 in 23 European countries with 83 cancer registry centers, and the average 5-year survival of all childhood cancers from all countries under investigation was 81% (17).

The study conducted by Paapsi et al. in the period of 1970-2016 showed that the overall 5-year survival rate increased from 24% in 1970-79 to 73% in 2010-2016, which was a significant difference. The reason for this is social changes and access to health care during these years. Even the increase in the number of cancers has been attributed to the progress in their diagnosis, but this study showed that the survival rate of children's cancers in this country is still large compared to Western Europe, and there is a need to improve access to advanced services and equipment in treatment (11).

The study conducted by Madanat-Harjuoja et al. in Finland in the period of 1953-2010 regarding the survival rate of childhood cancers showed that the overall survival rate in recent decades was about 82.1%, and the greatest jump in the survival rate occurred in the period of 1961-1990. There has been a slight improvement in the period of 1991-2000 and not much has changed since then. This study showed that although there has been a general improvement in the survival rate of cancers, more treatment efforts are needed, focusing on bone cancers, soft tissue sarcoma, neuroblastoma, and malignant brain cancers (18).

In our study according to the life table, it was found that the 5-year survival rate of malignancies in children with cancer of "blood and endothelial system" origin was 74%, in children with cancer of "bone" origin was 70% and in children with cancer of "brain" origin and spinal cord" was 43%. Also, the 5-year survival rate of malignancies in children with cancer originating from the "lymphatic system" was estimated at 92%; In this way, the lowest 5-year survival rate of malignancies was found in children with cancer of "brain and spinal cord" origin.

In a study that took place between 1968-2005 in the North of England, the overall survival rate of children's cancers was 75% and the survival rate of bone tumors was reported to be 75% and CNS tumors to 73% (19).

In this research, by examining the survival time of children diagnosed with cancer, it was found that there is no difference between boys and girls. However, there is a difference in survival between the age groups of children, such that the age group of children 0- 5 years has the lowest probability of survival. (6%), in the age group of 11-15 years, the probability of 5-year survival is 70%, and in the age group of 6-10, the probability of 5-year survival is 75%, while in the research by Karametian et al. Between the years 2007 and 2016, based on the children referred to Mehek Hospital, the highest survival in children 1-5 were seen (20).

CONCLUSION

Regarding children with different types of malignancy, according to the place of residence, the lowest 5-year survival rate of malignancies was seen in children with cancer, living in Lahijan city, followed by Rasht, Soumesara, Astara and Talash cities. However, in this study, it was found that the survival time of the investigated children with cancer does not differ according to the place of residence of the children. According to the results of the above research, it is suggested that diagnostic protocols and comprehensive plans should be made for the follow-up of children with central nervous system, bone and blood system and endothelial cancers, especially in children who were diagnosed 0-5 years old.

CONFLICT OF INTEREST

None.

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AUTHOR CONTRIBUTIONS

AH and GHS Consultation in study design, ZM and LK designed the study and Proposal writing, ZA data analysis. LK wrote the manuscript.

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