

Trends and Characteristics of Childhood Cancer in Al-Najaf Governorate, 2012–2020

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Abstract

Cancer is a major health problem worldwide in terms of morbidity and mortality, but it is especially prevalent in developing countries. Cancer is considered the second cause of death around the world, especially in developed countries after cardiovascular diseases, and the third cause of death in less-developed countries after cardiovascular diseases and accidents. Childhood cancer remains the second greatest cause of mortality in children in developed countries, after accidents, and the third or fourth most prevalent cause of mortality among children in developing countries.

Objective of the Study:

- To estimate the trends of occurrence of childhood cancer in Al-Najaf governorate for the period between 2012 and 2020
- To study the characteristics of children newly diagnosed with childhood cancer in 2021

Materials and Methods: Study Design: The study was a biometric descriptive study that involves the treatment and processing of already available data depending on the data of childhood cancer already registered for the years 2012 to 2020.

- Data here include the total number of registered childhood cancer cases each year and dividing them into various types, with estimating the most common five cancers each year.
- Data also include the age of the patients (divided into three age groups [1–5, 6–10, and 11–15 years] and the gender of the patients.

Results: The total number of children with cancer who were newly diagnosed and registered during the years 2012–2020 was 802 (male=449, female=353, male: female ratio=1.2:1). The majority of cases were those of children aged younger than five years (327), than the other two groups (5–10 years and 10+ years). Brain / CNS cancer was the most common type of childhood cancer (170 cases), followed by lymphoma (150 cases: HL 110 cases and NHL 40 cases), and then leukemia (137 cases: ALL 117 and AML 20 cases); the greatest number of cases was observed in the center of Al-Najaf than others (Kufa, Manathera). **Conclusion:** The trend of childhood cancer in our study seems to be higher in children aged younger than five years in comparison with their older colleagues, with a high variation in the number of cases of childhood cancer between one year and another, which is suspected to emerge from imported cases from outside Al-Najaf; that became near plateau after exclusion of these cases. Brain / CNS cancer was the most common type of childhood cancer in our study in Al-Najaf, with a great number of cases in the Center of Al-Najaf governorate.

Keywords: Cancer, childhood, Najaf, trend

INTRODUCTION

Cancer is a major health problem worldwide in terms of morbidity and mortality, but it is especially prevalent in developing countries.^[1] Cancer is considered the second cause of death around the world, especially in developed countries after cardiovascular diseases,^[2] and

the third cause of death in less-developed countries after cardiovascular diseases and accidents.^[3]

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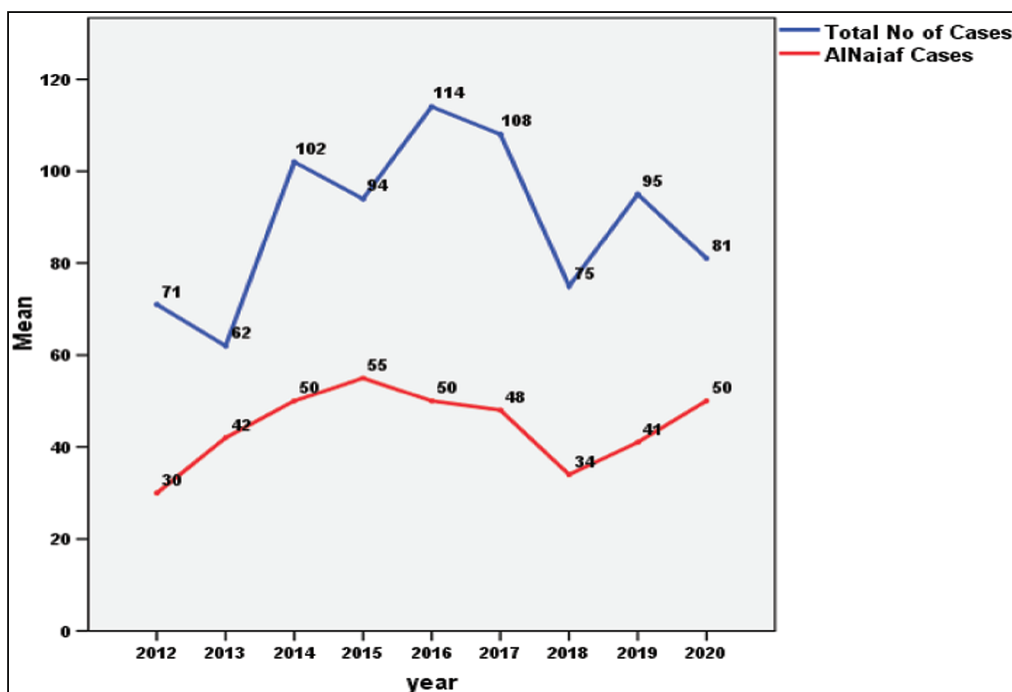


Figure 1: Trend of cancer cases registered in Al-Najaf center for the period (2012–2020). The total number of children with cancer who were newly diagnosed and registered during the period between 2012 and 2020 were 802 (400 came from inside Al-Najaf, and 402 were from neighboring governorates)

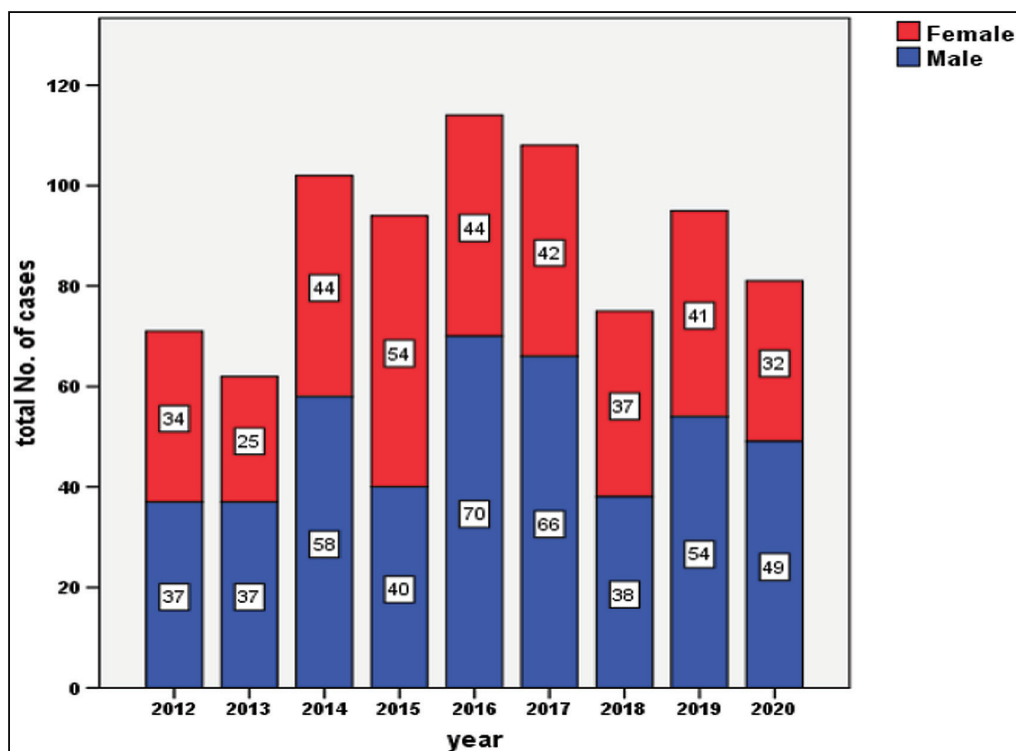


Figure 2: Distribution of the registered cases according to gender. Results showed that of the 802 registered cases, 449 were males and 353 were females, presenting a male to female ratio = 1.2:1

Cancer represents a growing threat to public health worldwide, with its incidence rates rising in most countries since 1990 due to population growth, aging, and the raised prevalence of unhealthy behaviors and certain risk factors, including smoking.^[4,5] The number

of cancer cases reached 17.5 million worldwide, and it increased by 33% since 2005.^[6,7] In 2015, 8.8 million people died of cancer (about 16% of all annual deaths), with 70% of these fatalities occurring in developing countries.^[1]

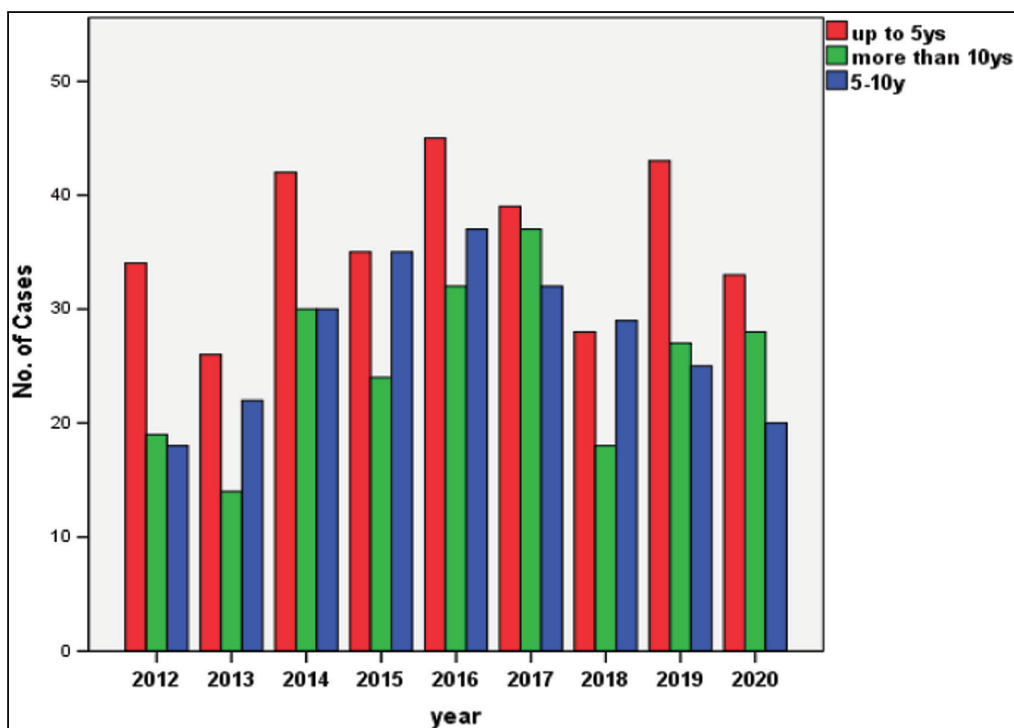


Figure 3: Distribution of the registered cases according to age group. The majority of cases were those of children aged younger than five years (327 cases), than the other two groups (5–10 years and 10+ years)

Iraq has been engulfed in repeated wars for the past four decades, and this has caused great damage to the country's health-care system.^[8] In Iraq, the prevalence of various cancer risk factors (obesity, smoking, poor diet, diabetes) has been lately altered, resulting in a condition associated with a lack of adequate preventive efforts.^[8] This condition seems to be shared by most of the middle and underdeveloped countries that witnessed a high prevalence of overweight and obesity, which was associated with a clear lack of physical activity.^[9] Breast, lung, and bladder cancers all have significant incidence rates in Iraq.^[7]

A precise and quantitative assessment of the cancer burden trend allows policy makers and health managers to better prioritize diseases and allocate resources, deduce what caused a decrease or increase in the rate of cancer occurrence, and, if it denotes the timing of the implementation of a control measure, it shows the impact on the disease rate.^[10]

Worldwide, childhood cancer is rare with a great variation in the distribution of both incidence and type being reported among countries for some specific tumor.^[11] Some of these geographical aspects are attributed to environmental factors, whereas others seem to be related to genetic predisposition.^[12] Although less prevalent, cancer among children accounts for a growing and larger share of newly diagnosed cancer cases worldwide.^[13] In most populations of the world, the incidence of childhood cancer ranges from 50 up to 200 per million children per year.^[14] This variation could be related to the difference in the demographic structure among the communities,

among other things, besides the great variation in the facilities pertaining to the diagnosis and registration of new cases.^[15] Approximately 80% to 85% of pediatric cancer cases are believed to occur in underdeveloped countries.^[16] In Iraq, children younger than the age of 15 account for 40% of the entire population.^[17]

The likelihood of surviving a diagnosis of childhood cancer depends on the country in which the child lives: In high-income countries, more than 80% of children with cancer are cured; however, in many lower-moderate income countries (LMICs) only 15–45% are cured.^[18]

The reasons for lower survival rates in LMICs include: delay in diagnosis and advanced disease, an inability to obtain an accurate diagnosis, inaccessible therapy, abandonment of treatment, death from toxicity (side effects), and avoidable relapse. Improving access to childhood cancer care, including to essential medicines and technologies, is highly cost-effective, feasible and can improve survival in all settings.^[19]

Describing the epidemiology of childhood cancer in terms of estimating its incidence and outcome, and understanding the time trend, will allow for a crucial evaluation of current protocols for cancer prevention and control focusing on combating the common and modifiable risk factors by using effective inexpensive strategies.

So, the objectives of our study are

1. Sketching the trends of childhood cancer occurrence in Al-Najaf governorate in the past eight years.

- Knowing some of the characteristics that may determine the occurrence of childhood cancer.

MATERIALS AND METHODS

Study design

The study was a biometric descriptive study that involved the treatment and processing of already available data depending on the data of childhood cancer already registered for the years 2012 to 2020.

Sources of data and data collection

Data about sociodemographic characteristics, such as age, sex, age at diagnosis, residence, and type of cancer, were extracted from records of the aforementioned sources of data according to a special form designed for the purpose of the study. Recorded data were summarized in a data sheet excel program. To ensure completeness and accuracy, the data were checked and reviewed several times both manually and electronically. In case of incompleteness or doubt about medical records, additional data were searched for by using cancer registration reports of the Ministry of Health.

- The research started with estimating the total number of incident cases registered at the three centers year by year and then dividing them into those from inside the governorate and those from outside, trying to estimate the trend of these cases over the nine-year period (2012–2020).
- Then, the data that involve the age of the patients was registered as between younger than 1 year and up to 15 years old. These were divided into three age groups with a five-year interval (1–5, 6–10, and 11–15 y), estimating the most risky age group that presented with the highest incidence rate. Then, the gender of the patients was divided as male and female.
- Also, data include the type of the cancer and these were conjugated into the main official types according to the affected organ and/or system. Then, the top five types of cancers for each year were estimated to assess the highest burden groups.
- SPSS (statistical package of social sciences) version 23 was used to manage the data. Linear regression and line graphing were used to draw the line of the trend of cases confronted by time year.
- The outcome was dependent on the picture of the slope, whether downward, upward, flat, or unpredictable to assess the incidence (or prevalence) and sketch the trend of cancer occurrence.
- The second part of the study was done in the child cancer clinic to assess the cross-sectional nature of the study.

Ethical consideration

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of

Table 1: Distribution of the registered cases according to district

	Al-Najaf districts	Center	Kufa	Al-Manathera
Year	2012	15	10	5
	2013	20	17	5
	2014	29	14	7
	2015	33	17	5
	2016	30	15	5
	2017	35	10	3
	2018	16	11	7
	2019	15	25	1
	2020	24	20	6

Helsinki. It was carried out with patients verbal and analytical approval before sample was taken. The study protocol and the subject information and consent form were reviewed and approved by a local ethics committee according to the document number 250908, date 7/7/2021

RESULT

Results summarized at Figures 1-3; also, the greatest number of patients with childhood cancer emerged from the center (Al-Najaf district) than other districts (Kufa, Al-Manathera), as shown in Table 1.

Brain /CNS cancer was the most common type of childhood (170 cases) cancer, followed by lymphoma (150 cases: HL 110 cases and NHL 40 cases) and then leukemia (137 cases: ALL 117 and AML 20 cases). The other kinds of cancer were bone, kidney, and soft tissue tumors in a less frequent presentation [Table 2].

Studying the characteristics of the newly diagnosed patients showed that the majority were from urban areas, medium socioeconomic, states and many of them came from families with a positive family history of cancer. This is presented in Table 3.

DISCUSSION

Childhood cancer is rare everywhere in the world, with a great variation between countries for some specific tumors. Some of these geographical variations are attributed to environmental factors whereas others seem to be related to genetic predisposition.^[11]

The total number of cases of childhood cancer in this study was 802, with a high variation between one year and another (range between 62 and 114 case per year), which was suspected to emerge from imported cases from outside Al-Najaf that became near plateau after exclusion of these cases. This mirrored the relative stable incidence rate of occurrence of childhood cancers, which is clear in other studies.^[8]

Regarding gender distribution, childhood cancer is slightly more common among males than females with a

Table 2: Top five childhood cancers

2012			2013			2014			2015			2016		
1	Brain	11	ALL	9	ALL	27	Brain	24	Brain	32		Brain	32	
2	Bone	10	AML	9	H.L	16	ALL	15	H.L	20		H.L	20	
3	H.L	9	HL	9	Brain	13	Kidney	9	ALL	18		ALL	18	
4	Kidney	7	bone	7	NHL	10	HL	8	Bone	11		Bone	11	
5	Soft tissue	6	NHL	6	AML	6	NHL	7	Kidney	5		Kidney	5	
	Other	28	Other	22	Other	30	Other	31	Other	28		Other	28	
Total		71		62		102		94		114				
	2017		2018		2019		2020		2021					
1	Brain	31	Brain	18	Brain	26	ALL	18	ALL	8		ALL	8	
2	Kidney	13	Bone	11	HL	16	Brain	11	HL	6		HL	6	
3	Bone	10	HL	8	ALL	13	HL	9	AML	5		AML	5	
4	ALL	9	NHL	8	Bone	11	Bone	7	Brain	4		Brain	4	
5	HL	9	Kidney	6	Eye	4	NHL	5	NHL	4		NHL	4	
	Other	36	Other	24	Other	25	Other	31	Other	12		Other	12	
Total		108		75		95		81						

Table 3: Description of the characteristics of newly diagnosed patients

Characteristic		
1	Age group	
	Under 5	9
	5–10	21
	More than 10	9
2	Gender	
	Male	21
	Female	18
3	Residence	
	Urban	33
	Rural	6
4	Socioeconomic state	
	Low	4
	medium	35
5	Father's occupation	
	No work	0
	Free work	15
	employer	24
6	Mother's occupation	
	Housewife	30
	worker	9
7	Consanguinity	
	Positive	21
	Negative	18
8	Family Hx of childhood cancer	
	Positive	25
	Negative	14
9	Hx of smoking during pregnancy	
	Positive	2
	Negative	37
10	Hx of drug usage during pregnancy	
	Positive	3
	Negative	36

male to female ratio of 1.2:1, which seems to be a common presentation in childhood cancer; this could be seen also in Shanghai, China, where the male to female ratio was 1.2:1^[20] and in Saudi Arabia, where it was 1.3:1.^[21] However, in Northwest Iran, the male to female ratio was reported to be 1.6:1.^[22] Genetic differences in immune function or behavioral related factors might be responsible for such differences between boys and girls.^[22]

The trend of childhood cancer in our study seems to be higher in children aged younger than five years in

comparison with their older colleagues. Such age-specific findings seem to be the role as most of the causes of childhood cancers are of genetic origin and may start at time of pregnancy or early in the childhood. these findings goes with what found in Basrah.^[17] and in other studies elsewhere in the world.^[21,22]

On studying the type of cancers, data showed that the three most common types were brain/CNS cancers, lymphoma, and leukemia; then, bone, kidney, and soft tissue cancers are the latter three common types. This pattern of distribution related to cancer types is similar to that reported in Saudi Arabia,^[21] Turkey,^[23] Tunisia,^[24] Iran,^[25] and Indonesia,^[26] where leukemia was the most common type followed by lymphoma and then brain cancer. In other parts of the world, particularly developed countries, such as France^[27] and China,^[20] leukemia is the most common type of cancer followed by CNS tumors and lymphoma ranked as the third most common cancer type. Different environments, lifestyles, dietary habits, hygienic conditions, and genetic predisposition are the main reasons for those differences.^[28]

In Africa, lymphomas, neuroblastoma, and Kaposi sarcoma were the most frequent childhood cancers,^[13] which may be due to an increased incidence of Epstein Bar Virus (EBV) infection.

The majority of childhood cancer cases were in the center district followed by those from Al-Kufa and Al-Manathera last of all, which seems to be proportional with the population density of these regions.

Regarding description of the characteristics of newly diagnosed patients in 2021, 39 cases were recorded.

The highest percentage of cases was in the age group 5–10 years and was higher in the cases of male children. It was evident in the present study that the relative predominance of urban in the studied cases, regarding

socioeconomic status most of the patients are of middle income and social state. The study showed that the majority of the fathers of such children were employers and their mothers were housewives. The frequency of cases seems to be higher in families with a positive family history of cancer but not consanguinity of the parents.

CONCLUSION

It can be concluded from this study that almost childhood cancer cases inside Al-Najaf approximately in stable trend in all year of study. This mirrored the relative stable incidence rate of occurrence of childhood cancer, the high variation between one year to another suspected to come from imported cases from the outside AlNajaf. The trend of childhood cancer in our study seems to be higher in children aged younger than five years in comparison with their older colleagues and it is predominant among males. On studying the type of cancers, data showed that the three most common types were brain/CNS cancers, lymphoma, and leukemia; then, bone, kidney, and soft tissue cancers represent the latter three common types. The majority of childhood cancer cases were found in the center district, which seems to be proportional with the population density of these regions.

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Conflicts of interest

There are no conflicts of interest.

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