1- Introduction

Cancer remains a leading cause of morbidity and mortality worldwide. Much of the burden falls on developing countries where the risks associated with tobacco, alcohol, diet, industrial exposure and lack of exercise were added to cancers caused by infectious diseases. Cancer incidence rates have significantly increased in Sudan to become one of the major killer diseases. The emergence of cancer as a major cause of death among children in developing countries is not well addressed. The developing countries bear the greatest burden of childhood cancers as over 90% of the children of the world live there. It was estimated that childhood cancer, malnutrition and lack of safe water and sanitation contribute to half of all children mortality. The patterns of childhood cancers in America and Europe were almost the same, with leukemia and central nervous system tumors accounting for over one-half of the new cases. In contrast, lymphoma is the most common prevailing cancer of this age group in Africa.(1)

Nobody knows the cause of cancer, although there are many theories. A great deal of research is currently underway studying a number of possible causes. Sometimes two or three children in the same school or village develop cancer, causing local concern. These cases are carefully investigated but at present they do seem to arise by chance.(1)

In general, cancer occurs when cells in the body become out of control and multiply. They stop working properly and, as their numbers increase, they form a lump or tumors. When cancer cells break away and spread to other parts of the body they may produce secondary tumors known as metastases. Leukemia is a type of cancer of the bone marrow, which occurs when too many white cells are produced.(2)

Cancers are not infectious, nor, for most cancers, is there any evidence that they are inherited. It is exceptionally rare for a second child in a family to develop cancer. Parents often worry that their child has a cancer because of something they did or did not do. This is not the case and parents should not feel guilty or take any sort of blame for their child developing cancer.(3)

Although the total number of children developing cancer has changed little in the last 40 years, the prospects for many have improved dramatically with advances in treatment. Over 8 out of 10 children with cancer are now cured, compared with fewer than 3 in 10 forty years ago.(2)

Two factors have contributed to the very significant improvements in survival for children with cancer in the United Kingdom and Ireland. First, almost all children aged 0-15 with cancer are now treated in one of a national network of specialist treatment centers, where care is given by a multidisciplinary team of experts. Second, a high proportion of children are also treated as part of clinical trials. (3)

As more children are cured of their cancer, longer term adverse effects of treatment may become apparent. Childhood Cancer and Leukemia Group (CCLG) members are seeking not only to improve survival rates, but also to ensure a normal future – both physically and emotionally – for children who then become adults. Nowadays, 1 in 1,000 adults is a survivor of childhood cancer.(3)

The health system in Sudan mainly focuses in communicable diseases with less attention given to non-communicable diseases and their prevention. Therefore, the burden of cancer in Sudan is not known. Reasons for that are many and include the facts that large proportions of the population never seek professional medical care and resource deficiencies that ranged from scarcity of trained health care workers, inadequate health care budget, insufficient diagnostic facilities, and until recently, lack of national population-based cancer registry.(5)

There are two sources of cancer data in Sudan; Radiation and Isotope Center in Khartoum (RICK) located in the national capital Khartoum, Khartoum State, and the National Cancer Institute of the University of Gezira (NCI-UG) in Wadmadani, capital of the Central State. Both centers are located in the densely populated areas of the Sudan. According to data published by Hamid in 2000, cancer is the third leading cause of death in Sudan hospitals after malaria and viral pneumonia. Cancer accounts for 5% of all deaths while malaria and viral pneumonia contribute 19.1% and 6.1%, respectively .The fact that data on cancer in Sudan is scarce and because of the lack of the national population- based cancer registry, age adjusted cancer incidence and mortality were not yet determined for the Sudanese population. Most of the published work was hospital-based and limited to certain institutions. This manuscript describes the cancer cases seen in RICK and at NCI of University of Gezira for the period 2000-2006. In addition, we will attempt to examine the types of cancer, gender and age distribution taking into account the limitations mentioned above regarding factors that may contribute to inaccurate reporting.(5)

1-1 Risk factors

A risk factor is anything that changes your chance of getting a disease such as cancer. Different cancers have different risk factors. (6)

Lifestyle-related risk factors play a major role in many types of cancer in adults. Examples include being overweight, eating an unhealthy diet, not getting enough exercise, and habits like smoking and drinking alcohol. But lifestyle factors usually take many years to influence cancer risk, and they are not thought to play much of a role in childhood cancers.(6)

A few environmental factors, such as radiation exposure, have been linked with some types of childhood cancers. But so far, most childhood cancers have not been shown to have outside causes.(8)

In recent years, scientists have made great progress in understanding how certain changes in our DNA can cause cells to become cancerous. DNA is the chemical in each of our cells that makes up our genes – the instructions for nearly everything our cells do. We usually look like our parents because they are the source of our DNA. But DNA affects more than just how we look. It also influences our risks for developing certain diseases, including some kinds of cancer.(9)

Some genes (parts of our DNA) contain instructions for controlling when our cells grow, divide into new cells, and die. Genes that help cells grow, divide, or stay alive are called oncogenes. Others that slow down cell division or cause cells to die at the right time are called tumor suppressor genes. Cancers can be caused by DNA changes that turn on oncogenes or turn off tumor suppressor genes.(13)

Some children inherit DNA changes (mutations) from a parent that increase their risk of cancer. These changes are present in every cell of the child's body. This means the changes can often be found by testing the DNA of blood cells or other body cells.(13)

1-2 problem of the study

A marked increase in the incidence of childhood cancers in Sudan during the previous years.

1-3 Objectives

1-3-1General objective

The main objective of this study is to give overview knowledge of childhood malignancy in Sudan

1-3-2Specific objectives

To give Knowledge about the common types of childhood cancers.

To identify the affected age group.

To evaluate the correlation between the disease and the relation between child parents

1-4 Methodology

This study is a retrospective analytical study. A sample of patients who were 15 years or younger at the time of first presentation to NCI and who were diagnosed as cancer patients. The study covered a period of one year (2013). The variables include gender, age, type of cancer and the relationship between child parents. These variables were then analyzed and discussed.

1-5 limitation of the study

To get the data concerning childhood malignancy in Sudan, the researchers were faced by many difficulties.

In obtaining data concerning childhood malignancy in sudan, great efforts were provided and much time was wasted due to loss of cooperation of institutions.

2-Literature review

2-1Lecture notes on clinical oncology (Barry W Hancock)

After accidents tumors are the commonest cause of death in childhood. In a population of million children (0-14 years of age) there will be about 100 new cases of malignancy. Each year Haemopoietic tumors form the largest group of childhood malignancies, particularly acute lymphatic leukaemia HistocytosisX..(7)

Neural tumors are the commonest of the solid tumors .In the central nervous system the majority of childhood tumors tend to be infratentorial ,whereas in the adult most are supratentorial.(1)

2-2 Childhood leukemia:

This is most frequently of the acute form and of the lymphoblastic, type Chronic and acute myeloid leukaemia, account for less than 5%of childhood leukaemia.

2-3 Neuroblastoma:

This is one the commonest solid tumors of childhood with approximately the same incidence as nephroblastoma, mostly occur below the age of 5 years with half in the first 2 years of life .The tumor may be present at birth.It arises from sympathetic nervous tissue, particularly in adrenal medulla, but also in the neck, mediastinum and pelvis.

2-4 Nephroblastoma (wilm'stumours)

The presentation of this tumor is most commonly as an intra-abdominal tumor, arising from the renal cortex in a young child. Bilateral tumors are found in about 5% of cases.

2-5 Retinoblastoma:

Retinoblastoma occurs almost exclusively in children under the age of 5 and are bilateral in 30% of cases .Hereditary factors are undoubtedly important in the a etiology.

2-6 Histiocytosis X:

Histiocytosis X is a disease of unknown an etiology characterized by the development of granulomatous lesions with abnormal proliferation of histiocytes. It is commonly believed to be a neoplastic disorder.

2-7 Eosinopilic Granuloma:

Is present usually with bone lesion alone, in the age group 5-10 years. The prognosis is excellent and spontaneous regressions are seen.

2-8 Central Nervous Systems:

Primary tumors of the central nervous system account for 2%of all tumors in man. The incidence is higher in white races than in Negroes .There is difference in sex incidence. They can arise at all ages, but the peak incidence of glial tumors in childhood are the commonest of solid tumors

2-9 Lymphoma

These cancers starts in certain cells of the immune system cells, lymphocytes. They most often grow in lymph nodes and other organs, and can cause different symptoms depending on where the cancer is. There are two main types of lymphoma: Hodgkin lymphoma and non-Hodgkin lymphoma. Both types occur in children and adult.

2-10 Rhabdomyosarcoma

Rhabdomyosarcoma starts in cells that normally develop into skeletal muscles.

2-11 Bone Cancers

Primary bone cancer occurs most often in older children and teens, but they can develop at any age. They account for about 4% of childhood cancers .Two main types of primary bone cancers occur in children: Osteosarcoma and Ewing sarcoma.

2-12 previous study

Doumil, et al. (2003)there were 40 newly diagnosed childhood cancer patients during the study period. Males were 29 patients (72.5%). The age ranged three months to 14 years. Leukemia's were the most common malignancy in both sexes, followed by bone tumors and then nephroblastoma. Cancers in children were seen at Western Sudan, and cases admitted to hospital only reflect the tip of the iceberg as many cases were directly referred to Oncology Hospitals. Establishment of a local radiation and isotopes center is needed in this part of the country to provide oncology services and to integrate preventive programs. (13)

Elhaj, et al. (2010)During the study period there were17 patients (3.7% of all childhood malignancies) presented with one of the brain tumors. Male: female ratio was approximately 0.9: 1, the majority of them were between 5 and 10 years of age (47%) and most of them came from rural origins (59%). Glioma was the predominant diagnosis. Unfortunately 7 patients (41 %) died during this period, 8 (47.1 %) alive, and 2 (11.8%) escaped from the hospital. A surgical attempt for excision was only performed in 5 patients (29%). The study reflects the overall poor referral rate of childhood brain tumors and the inadequate surgical management which led to high mortality rate reported. The study also showed that, Gezira region pattern is similar to other African. Region where brain tumors do not predominate. (14)

A study was carried out by Dr. Bella Ahmad Elsherif in Khartoum. One hundred children with malignant neoplasms were seen during the period July 1982-May 1983. The age distribution was similar to other works for all forms of cancer, apart from a peak incidence of leukemia which was above the age of 4 years in that study. (15)

3- Materials and Methods

3-1 Material

This data was taken from the patient records.

3-2 Method

3-2-1Duration and Location of the study

Study was start from January-2012 to December-2013 in Radiation Isotopes Canter of Khartoum.

3-2-2 Population

This study was done for all patients with pediatric cancer in Radiation Isotopes Canter of Khartoum.

3-2-3study variables

Type of cancers, age, gender, patients parents relative.

3-2-4 study sample

This study included 300 patients of pediatric cancers

.

3-2-5 Method of data collection

The data was collected through master data sheet which contains;

Table3:1 Master data sheet

Type of cancer	No.of cases	Gender	First class parent relation

3-2-6 Data analysis

The data was analyzed by Excel

Table 3:2 show statistics of the study

Age groups	**No. of cancer**	Gender

4- Results

Table 4:1 Osteosarcoma

Osteosarcoma			
Age groups	No.of cancer	Gender	
		F	M
1 _ 5	0	0	0
5 _ 10	3	2	1
10 _ 15	10	1	8

Fig.4:1Osteosarcoma

Table 4:2 Rhabdomysaroma

Rhabdomysaroma			
Age groups	**No.of cancer**	Gender	
		F	**M**
1 _ 5	**8**	**6**	**2**
5 _ 10	**1**	**0**	**1**
10 _ 15	**0**	**0**	**0**

Fig.4:2Rhabdomysaroma

Table 4:3 Neurablastoma

Neurablastoma			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**8**	**1**	**7**
5 _ 10	**2**	**1**	**1**
10 _ 15	**1**	**0**	**1**

Fig.4:3Neurablastoma

Table 4:4 Ovary

Ovary			
Age groups	**No. of cancer**	Gender	
		F	**-**
1 _ 5	**0**	**0**	**-**
5 _ 10	**3**	**3**	**-**
10 _ 15	**6**	**6**	**-**

Fig.4:4Ovary

Table 4:5 Brain cancer

Brain cancer			
Age groups	**No.of cancer**	Gender	
		F	**M**
1 _ 5	**7**	**2**	**5**
5 _ 10	**5**	**2**	**3**
10 _ 15	**20**	**8**	**12**

Fig.4:5 Brain cancer

Table 4:6 Retinoblastoma

Retinoblastoma			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**24**	**11**	**14**
5 _ 10	**1**	**0**	**1**
10 _ 15	**1**	**0**	**1**

Fig.4:6Retinoblastoma

Table 4:7 Acute Myeloid Leukemia

Acute Myeloid Leukemia			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**6**	**3**	**3**
5 _ 10	**14**	**2**	**12**
10 _ 15	**10**	**5**	**5**

Fig.4:7Acute Myeloid Leukemia

Table 4:8 Hodgkin Lymphoma

Hodgkin Lymphoma			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**6**	**1**	**5**
5 _ 10	**3**	**2**	**1**
10 _ 15	**4**	**0**	**4**

Fig.4:8Hodgkin Lymphoma

Table 4:9 Kidney

Kidney			
Age groups	**No. of cancer**	Gender	
		F	**M**

1 _ 5	**2**	**1**	**2**
5 _ 10	**1**	**0**	**1**
10 _ 15	**2**	**0**	**2**

Fig.4:9Kidney

Table 4:10 Nepharblastoma

Nepharblastoma			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**5**	**3**	**2**
5 _ 10	**1**	**0**	**1**
10 _ 15	**0**	**0**	**0**

Fig.4:10Nepharblastoma

Table 4:11 Acute Lymphoblastic leukemia

Acute Lymphoblastic leukemia			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**26**	**10**	**15**
5 _ 10	**14**	**3**	**11**
10 _ 15	**15**	**7**	**8**

Fig.4:11Acute Lymphoblastic leukemia

Table 4:12 Nesopharynx

Nesopharynx			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**2**	**0**	**2**
5 _ 10	**5**	**4**	**1**
10 _ 15	**11**	**4**	**7**

Fig.4:12Nesopharynx

Table 4:13 Non Hodgkin Lymphoma

Non Hodgkin Lymphoma			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**7**	**3**	**4**
5 _ 10	**5**	**0**	**5**
10 _ 15	**9**	**1**	**9**

Fig.4:13Non Hodgkin Lymphoma

Table 4:14 Others

Others			
Age groups	**No. of cancer**	Gender	
		F	**M**
1 _ 5	**12**	**8**	**4**
5 _ 10	**25**	**14**	**16**
10 _ 15	**11**	**5**	**6**

Fig.4:14Others

Results

The most common childhood cancers are acute lymphoblastic leukemia, brain cancer, acute myeloid leukemia and retinoblastoma.

In most of the studied cases, there is a close familial relation between their parents.

The rate of incidence of most childhood cancers is greater in males children compared to females 4:3.

5- Discussion and Conclusion

5-1 Discussion

During the period of study, there were 300 childhood cancers patient admitted in Borg Al-Amal Hospital in Khartoum, during the year (2013). The age of children ranges from 1 to 15 years. In most cases the patients parents are relative of first class. The majority of cancer cases are: acute lymphoblastic leukemia, Brain cancer,

acute myeloid leukemia and retinoblastoma, and their numbers are (55, 32, 30 and 26 respectively). The incidence ratio is 4:3 males to females. In Sudan marriage between relatives is a common traditional, which reflects the cause behind the increase in the incidence of the familial disease.

5-2Conclusions

The proportion of cancers of children in the Borg Al-Amal Hospital is growing from year to year. And this result in the excessive increase of childhood cancer and questions about the reasons for this increase and spread in our society may be raised. Strategic plans and service centers for the treatment of tumors by radiation therapy that should be provided in the localities for the detection and early treatment of cancer to reduce the increasing of incidence rate. During the study period there were 300 patients admitted with cancer to the Borg Al-Amal Hospital in Khartoum city in one year. The age ranged from 15 years and below. One of the most common cause of cancers is the First class parent relation. The common cases of cancers are acute lymphoblastic leukemia, brain cancer, acute myeloid leukemia and retinoblastom(55, 32, 30 and 26 respectively) The incidence of cancers higher in male than female. The researchers provide some recommendation, concerning management of childhood malignances in Sudan.

5-3 Recommendations

1- Marriage between first class relatives should be avoided.

2- Early diagnosis of childhood cancers is important to make easy treatment in the early stages of malignancies.

3- Follow-up of cancer patients is necessary after complication of the treatment course.

4- Traditional management of cancer e.g herbal treatment should be avoided.

5- Public awareness of childhood malignances is important.

6- Contras of cancer treatment must be increased in number and geographical distribution is important.

7- Good diet is important in both prevention and treatment of childhood malignances.

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Appendix

Types of Childhood Cancer

Type of cancer	No. of cases		Gender	First class parent relation	
				Yes	No
Nesopharynx	18	10 8	M F	18	0
Non Hodgkin Lymphoma	21	18 4	M F	18	3
Osteosarcoma	13	9 3	M F	9	4
Rhabdomysarcoma	9	3 6	M F	9	0
Neurablastoma	11	9 2	M F	11	0
Ovary	9	0 9	M F	9	0
Brain cancer	32	20 12	M F	32	0
Retinoblastom	26	16 11	M F	26	0

Acute Myeloid Leukemia	30	20 10	M F	30	0
Hodgkin Lymphoma	13	10 3	M F	13	0
Kidney and renal	5	4 1	M F	5	0
Nepharblastom	6	3 3	M F	6	0
Acute Lymphoblastic leukemia	55	20 35	M F	44	10
Others	49	24 25	M F	42	7

M= males, F= females