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# Overview of Childhood Cancer- A cross-sectional study in Benghazi/Libya

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## Abstract

Child hood cancer which develop before 15 years of age are different from adult cancer in that it's not related to certain habits and environmental exposure that's why we conduct this study to get an overview of these cancers in Benghazi. Our study concluded that there was a late diagnoses and resultant in poor outcome of childhood cancers in Benghazi therefore a necessitate national awareness of early diagnosis and optimal treatment.

**Keywords:** Benghazi, cancer, Leukaemia, Tumors

**الملخص:-**

يختلف السرطان الذي يتطور قبل 15سنة من سرطان البالغين من حيث أنه لا يرتبط بعادات معينة والتعرض البيئي لهذا السبب نقوم بإجراء هذه الدراسة للحصول على لمحة عامة عن هذه السرطانات في بنغازي. وخلصت دراستنا إلى أن هناك تشخيصات متأخرة وينتج عنها نتائج ضعيفة لسرطانات الأطفال في بنغازي ، وبالتالي فإن الوعي الوطني يتطلب التشخيص المبكر والعلاج الأمثل .

**الكلمات المفتاحية:** بنغازي ، السرطان ، اللوكيميا ، الأورام

## 1. Introduction

Cancer remains the most common cause of death, after accidents, among children (Kmietowicz. 2015). An estimated 10,380 children younger than 15 years and about 5,000 adolescents aged diagnosed with cancer in the United States (US) in 2016 (American society of Clinical Oncology.2016). It is estimated that 1250 deaths from cancer occur in 2016 in children in this age group and 600 deaths from cancer in teens aged (American society of Clinical Oncology.2016). Although there was a number of published data regarding cancer among adult (El Mistiri et al.2007 &2010) and cancer registry in Eastern Libya, there was a lack of published data regarding childhood cancer in Benghazi city or Libya in general. According to population-based data from the National Cancer Institute's Surveillance, leukemia and brain tumors (glioma and meningiomas) are the most common childhood malignancies, accounting for 30% and 20% of newly diagnosed cases, respectively. For most childhood malignancies, incidence is highest between 0 and 4 years of age. Incidence rates for non-Hodgkin's lymphoma (NHL), Hodgkin's lymphoma, osteosarcoma, and Ewing's sarcoma, however, increase with age (American society of Clinical Oncology.2017). Cancer mortality among children has decreased over time due to dramatic improvements in treatment, particularly for acute leukemia and Hodgkin's disease (Saletta et al.2014). In general, most childhood cancers are unknown risk factors. About 5 % of all cancers in children are caused by an inherited mutation (a genetic mutation that can be passed from parents to their children). For example, 25 to 30 % of cases of retinoblastoma, a cancer of the eye that develops mainly in children, are caused by an inherited mutation in a gene called RB1.

## 2. Literature Review

Study stated that environmental risk factors, including parental exposure to cancer-causing chemicals, prenatal exposure to pesticides, childhood exposure to common infectious agents, and living near a nuclear power plant. Leukemia {acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML)} accounts for about 31% of childhood cancer cases (Ward et al.2014). While brain and CNS tumors account for 21%, including tumors of the spinal cord (Shirazi et al.2017). A number of studies have shown that exposure to ionizing radiation can damage DNA, which can lead to the development of childhood leukemia and possibly other cancers. For

example, children and adolescents who were exposed to radiation from the World War II atomic bomb blasts had an elevated risk of leukemia. Children who their mothers were exposed to x-rays during pregnancy and children who were exposed after birth to diagnostic medical radiation from computed tomography scans also have an increased risk of some cancers (Belson et al.2007; Shirazi et al.2017).

The main presented symptoms of childhood cancer is unexplained weight loss, headaches, often with early morning vomiting. increased swelling or persistent pain in the bones, joints, back, legs, lump or mass, especially in the abdomen, neck, chest, pelvis, development of excessive bruising, bleeding, or rash, Constant, frequent, or persistent infections, a whitish color behind the pupil, nausea that persists or vomiting without nausea, constant tiredness or noticeable paleness, eye or vision changes that occur suddenly and persist, recurring or persistent fevers of unknown origin (Ward et al.2014; American Cancer society.2016).

A routine blood tests such as hemoglobin, white blood cell. In addition, imaging techniques such as; ultrasound, computer tomography (CT scan), magnetic resonances imaging (MRI), positron emission tomography (PET) scan, radioisotope studies can help to identify the origin of tumor, nature of tumors and differentiate diagnosis of childhood cancer. Biopsy bone marrow aspiration or sample of (CSF) to look for cancer cells, blood, or tumor markers can confirm the diagnosis and make a definite diagnosis (American society of Clinical Oncology.2017).

The most common type of treatment is chemotherapy usually consists of a specific number of cycles given over a set period of time. Also, surgery, radiation therapy and immunotherapy or biologic therapy; like cancer vaccines, monoclonal antibodies, and interferon according to type of tumours and stages .Additionally, a significant improve survival rates with stem cell transplantation/bone marrow transplantation (Emens and Middleton., 2015).Reducing or prevention of childhood cancer can be through improve environment and avoid factors that increase risk of cancers such as exposed to radiation. Additionally, child might inherit gene changes that make them very likely to get a certain kind of cancer (Sloan and Gelband., 2007). Furthermore, ante natal care and follow-up ,good nutrition and sanitation , early detection , screening for disease, health education remain the best measures for prevention (World Health Organization, 2016).

## 3. Methodology

Our study is a cross-sectional study that examined the pattern of childhood malignancies in Benghazi/ Libya 2012-2016. It included for all patients admitted to Hematology Department /pediatric hospital in Benghazi during the this period. socio-demographic information and clinical data like histo-pathological diagnosis/ stage/ laterality of tumor /date of diagnosis /treatment and outcome were collected from records of patients. The data was analyzed using SPSS program version 22 and the results of the study presented and summarized in figure and table.

## 4. Data and Results

A total of 73 files of Libyan patients were reviewed regarding socio-demographic and clinical data and the result summarized as the following: The average age of patients was 5.5 years± 3,63, ranged between 2 weeks -15 years. Most of the patients were males (63%), Figure 1. Most of patients was residence outside Benghazi (Eastern of Libya), such as Darnah, Al bidya, and Al Marj, Figure 2. More than half of the patients (about 52%) were diagnosed to have Acute Lymphocytic leukemia ( ALL) while about (11%) were designed to have Acute Myeloid Leukemia (AML) and brain tumors, other tumors like Lymphoma, Bone tumors, Wilm's tumor and Hepatoblastoma were less common. Most of the cases in this study were diagnosed in 2015 (35.6%), Figure 4.

About (86%) of the patients do not have staging to their disease during the diagnosis, while about (8%) were diagnosed at stage IV, (4.11%) were diagnosed at stage III and only (1.4%) were diagnosed at stage II of their disease, Figure 5. About (85%) of the patients received chemotherapy and about ( 2.7%) undergone surgical treatment, while (12.3%) received combined treatment, Figure 6. Eighty eight percentage of the patients still alive; they either have been cured or still receiving their treatment, while mortality rate was 12.3 %, Figure 7.

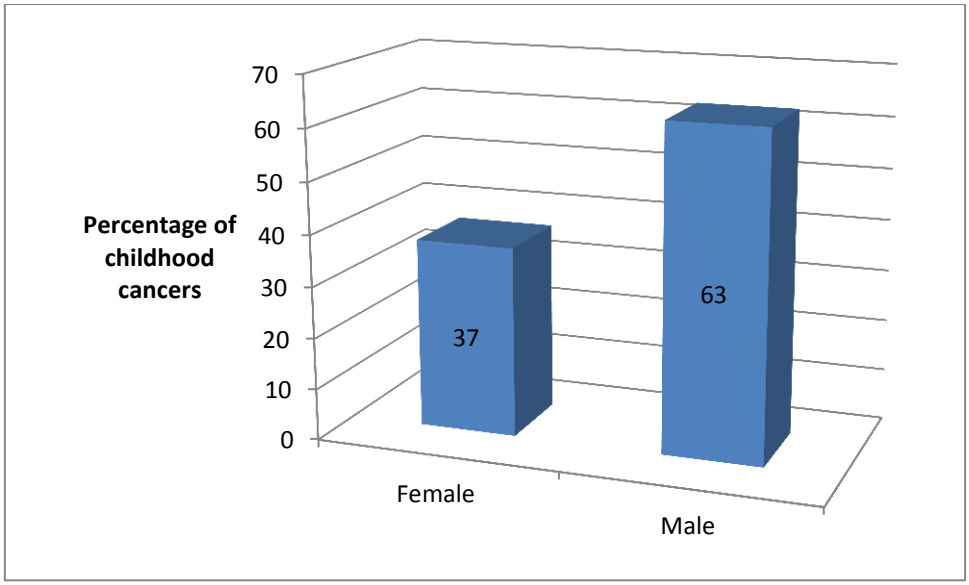



**Figure 1: Distribution of childhood cancer patients according to gender**

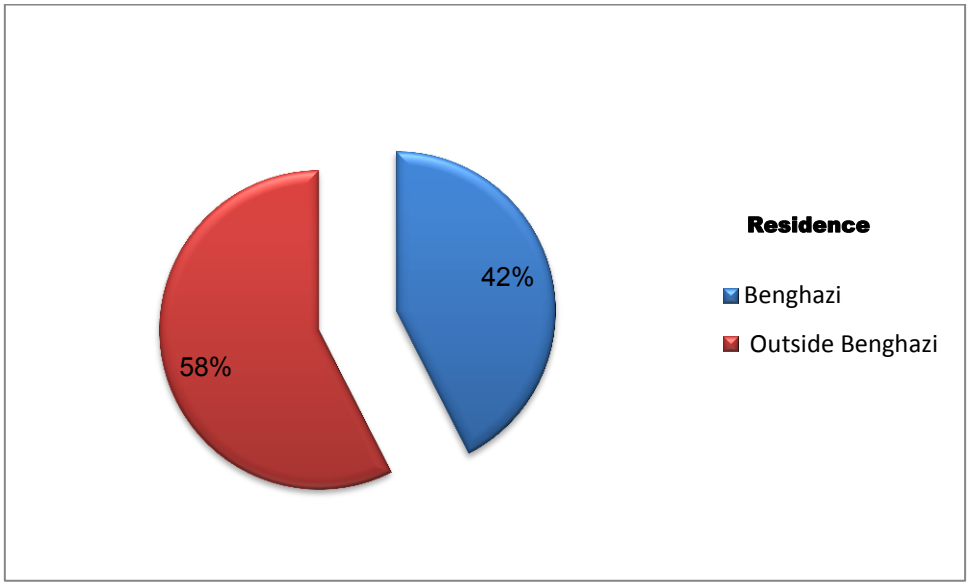



**Figure 2: Distribution of childhood cancer patients according to residence**

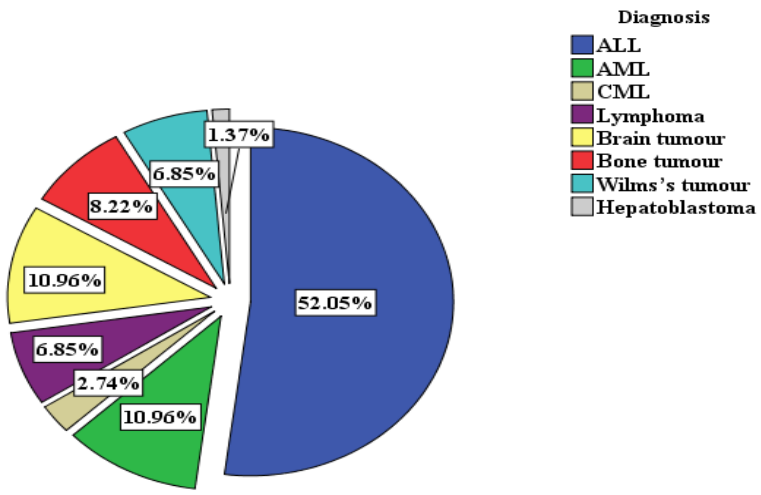



**Fig.3:Distribution of patients accorrding to histopathological diagnosis**

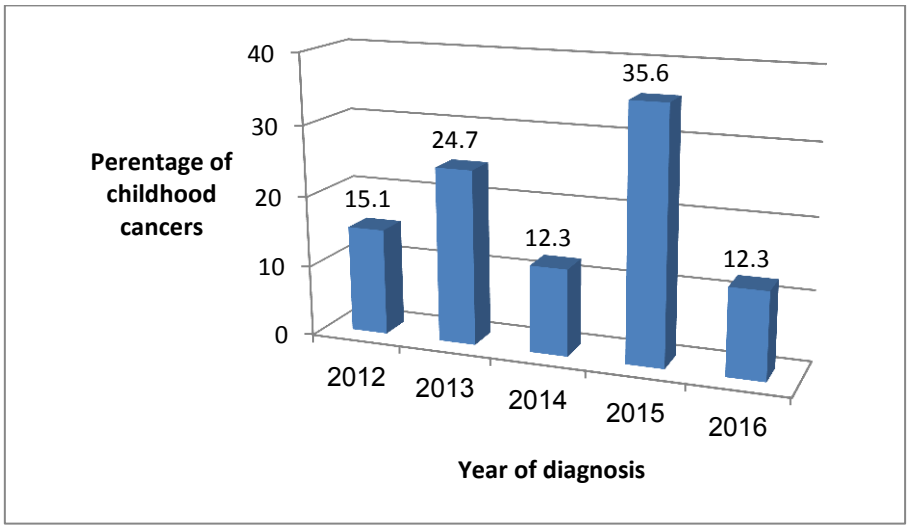



**Figure 4: Distribution of childhood cancer patients according to year of diagnosis**

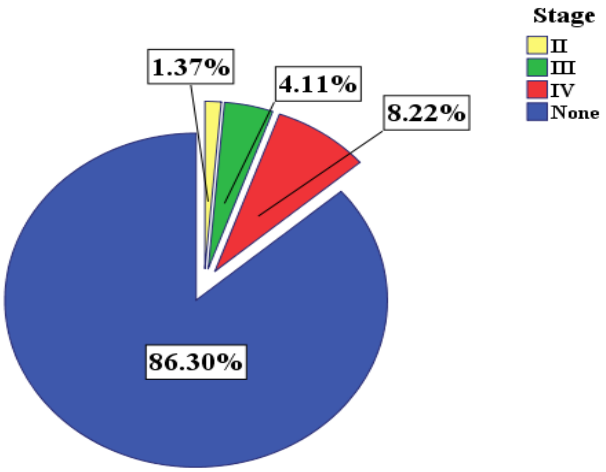



**Fig.5:Distribution of patients according to staging**

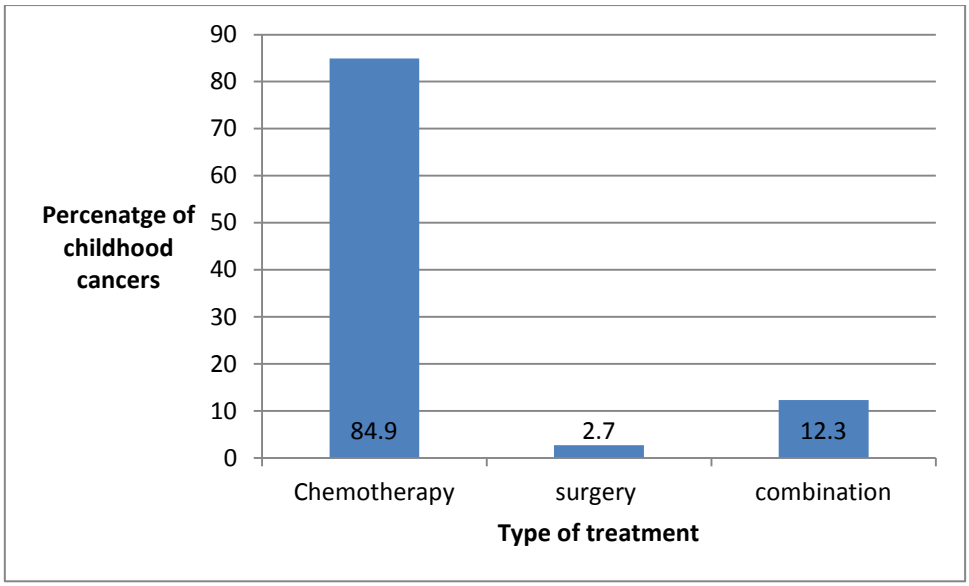



**Figure 6: Distribution of childhood cancer patients according to treatment**

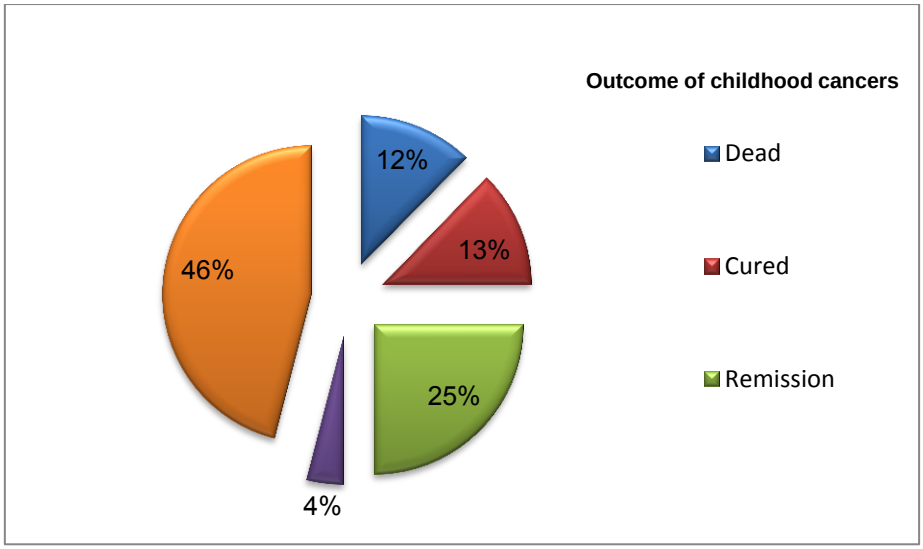



**Figure 7: Distribution of childhood cancer patients according to outcome**

## 4- Discussion

Measuring the distribution of different cancers in community and also the magnitude of the problems is important. In order to ensure well informed policies on cancer care and prioritizing resource allocation. This can be happened by robust data that help to identify the magnitude of the problems and also gives highest level of evidence to authorized health services. Therefore, cancer registration is considered the fundamental of cancer management globally. The magnitude of childhood cancer in Benghazi are poorly reported therefore this study was conducted. In general study our findings is consistent with other studies conducted by Muzaffar, et.al in Kashmir, India 2010-2011 and Hesham, et.al.(2014). Our data suggest that Leukemia was the most common type of cancer constituting (65.75%) of all cases followed by Brain tumors (10.96%) and Hepatoblastoma was the rarest one (1.37%). This study reported that there is male predominance.

The mean age of our study was 5.5 ± 3,63 years however in a study of Mehrvar et al.(2015), the average age was slightly older than our study 6.5 ± 4.3 years. In addition, in contrast to our study Mehrvar et al.(2015) was reported 42.3% died during or after therapy, however in our study only 12% of childhood cancer was died. This may be explained by there was no cancer registry among childhood cancer in Benghazi, it might not represent the actual figures.

Most of the cases presented at late stage III – I, Chemotherapy was the most commonly used method of treatment. This may be due to the fact that poor antenatal

care in Eastern Libya and lack of health services of child. It is well-established fact in the literature that environmental risk factor as ionizing radiation has been significantly related to ALL or AML. A number of evidence (Wiemels , 2012; Wen et .al. 2000, Belson et. al.,2006) have been examined the association between childhood leukemia and paternal ionizing radiation exposure preconception.

The nearness to Sellafield nuclear plant in the West Cumbria /United Kingdom from 1950 to 1985 was a risk for excess child hood leukemia . The relative risk for leukemia in children who born near to Sellafield and those whose fathers worked at the plant during time of conception was high [relative risk (RR) = 2.4; 95% confidence interval (CI), 1.04–5.7]. A additionally, it was high in children whose fathers exposed to ionizing radiation dose of 100 mSv (RR = 6.4; 95% CI, 1.57–26.3) pre conception Furthermore, increase incidence of leukemia among male children atomic bomb survivors. In our study, it noted that the risk of childhood cancer was doubling at 2013 and triple in 2015 however it return back at 2016 but still lower than 2012. This findings might related to Libyan war however further study is needed in order to compare the prevalence and incidence of childhood cancer pre and post war. Indeed, it has been reported that there was a significant rise in the incidence rate of childhood cancer in Iraq after war, the average number of leukemia incidence cases diagnosed each year during (1980-2010) increased from (0.326) to (8.82) (AL-Hashimi et al.2013).

An implementation of national strategies for prevention, early detection, diagnosis, treatment and palliation and set programs are most cost effective and beneficial for the largest part of population (World Health Organization.2018). Preventive measures such as genetic testing, life style modification, vaccination and infection control is important in order to reduce the risk of childhood cancer or that helps to early diagnosis and treatment. In addition, avoid of environmental pollution, carcinogenic chemicals exposure and avoid exposure to radiation is recommended (World Health Organization. 2018). Furthermore, high risk group population should have access to appropriate genetic counseling , screening, surveillance and all related medical and surgical intervention is important in order to identify the prevalence of childhood cancer, that helps identify the gap and to improve the health service (Ilbawi and Anderson,.2015).

This study as any other studies encountered a number of limitation such as incomplete information and defect in fileing system, lack of cooperation and interest of some medical and non medical staff. Therefore, further clinical studies with larger samples to address guideline implementation and refinement is recommended. Despite these limitations, results from epidemiologic research that identifies pattern for childhood cancer in Benghazi and Eastern Libya can support the evidence regarding the magnitude of the problem and the outcome of childhood cancer . This can help to make attention regarding the cancer in children, lack of services and help to reduce the risk this condition.

## 5- Conclusion

Keeping in view the cancer among children in Libya, it would be worthwhile to study the pattern of cancers particularly after Libyan war in addition of poor health services among children and lack of treatment. For this a reliable and a valid population based cancer registration system should be established in Benghazi additionally improve health care services in general. Children is a vulnerable group, and cancer is a devastating condition therefore health care services among children should have special attention.

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Author contributions: Both authors approved the final version of this paper for publication.

Data sharing statement: All available data and material can be obtained by contacting the corresponding author*.

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