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Epidemiological Characteristics of Cancer in the Aljufra Region, Libya: A reference Analytical Study for the Period 2020-2025

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الخصائص الوبائية للسرطان في منطقة الجفرة، ليبيا: دراسة تحليلية مرجعية للفترة 2020-2025

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Abstract:
Cancer is a growing global health challenge, and accurate epidemiological data is essential for developing prevention and treatment strategies. The Aljufra region of Libya is one of the Libyan cities that suffers from a scarcity of statistical data on cancer. This study aimed to analyze the temporal, geographical, and demographic distribution of registered cancer cases attending the oncology department at Al-Afia Hospital in Hun, Aljufra region, during the period 2020–2025, and to identify the most common types and the most vulnerable groups. Methodology: The study employed a descriptive retrospective design to analyze the medical records of oncology patients at Al-Afia Hospital in Hun. All registered cancer cases recorded between January 2020 and December 2025. The data categorized by year, sex, age, city, and cancer type. Statistical analysis then performed using Microsoft Excel. 101 cases registered during the selected period. The results showed annual fluctuations, with the highest incidence in 2022 and the lowest in 2020. Females more frequently affected than males. The 50-60 age group had the highest incidence. Breast cancer was the most common, followed by colon cancer and then prostate cancer. Hun had the highest number of cases, followed by Sukna. Cancer in the Aljufra region exhibits an epidemiological pattern characterized by a predominance of breast cancer and a high incidence among women and the 50-60 age group. The study recommends strengthening early breast cancer screening programs, establishing a regional database, and developing the oncology department services at Afia Hospital.

Keywords: Cancer, epidemiological characteristics, breast cancer, AlJufra region, Libya, early detection.

الملخص
يُعدّ السرطان تحديًا صحيًا عالميًا متزايدًا، وتُعدّ البيانات الوبائية الدقيقة ضرورية لوضع استراتيجيات الوقاية والعلاج. وتُعتبر منطقة الجفرة في ليبيا من بين المدن الليبية التي تعاني من نقص في البيانات الإحصائية المتعلقة بالسرطان. الهدف: هدفت هذه الدراسة إلى تحليل التوزيع الزمني والجغرافي والديموغرافي لحالات السرطان المسجلة في قسم الأورام بمستشفى العافية في مدينة هون، بمنطقة الجفرة،

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خلال الفترة 2020-2025، وتحديد أكثر أنواع السرطان شيوعًا والفئات الأكثر عرضة للإصابة. استخدمت الدراسة تصميمًا وصفيًا استرجاعيًا لتحليل السجلات الطبية لمرضى الأورام في مستشفى العافية بمدينة هون. وشملت جميع حالات السرطان المسجلة بين يناير 2020 وديسمبر 2025. وصُنّفت البيانات حسب السنة والجنس والعمر والمدينة ونوع السرطان. ثم أُجري التحليل الإحصائي باستخدام برنامج مايكروسوفت إكسل. سُجّلت 101 حالة خلال الفترة المحددة. أظهرت النتائج تقلبات سنوية، حيث سُجِّل أعلى معدل إصابة في عام 2022 وأدناه في عام 2020. وكانت الإناث أكثر عرضة للإصابة من الذكور. وسُجِّل أعلى معدل إصابة في الفئة العمرية من 50 إلى 60 عامًا. وكان سرطان الثدي هو الأكثر شيوعًا، يليه سرطان القولون ثم سرطان البروستاتا. وسُجِّل أعلى عدد من الحالات في منطقة هون، تليها منطقة سوكنة يُظهر السرطان في منطقة الجفرة نمطًا وبائيًا يتميز بانتشار سرطان الثدي وارتفاع معدل الإصابة بين النساء والفئة العمرية من 50 إلى 60 عامًا. وتوصي الدراسة بتعزيز برامج الكشف المبكر عن سرطان الثدي، وإنشاء قاعدة بيانات إقليمية، وتطوير خدمات قسم الأورام في مستشفى عافية.

الكلمات المفتاحية: السرطان، الخصائص الوبائية، سرطان الثدي، منطقة الجفرة، ليبيا، الكشف المبكر.

Introduction

Globally, cancer is a leading cause of death and disability. The International Agency for Research on Cancer (IARC, 2024) estimates that the global burden of this disease continues to increase, particularly in low- and middle-income countries. In many countries in the region, especially in Libya, public health systems face significant challenges in providing accurate and up-to-date epidemiological data, which is essential for health service planning and resource allocation.

The Aljufra region, located in central Libya, has an estimated population of 80,000 and includes five main cities: Hun (the administrative center and the most densely populated area), Waddan, Sukna, Zillah, and Al-Fuqaha. Afia Hospital in Hun is the largest healthcare facility providing oncology services in the region, with its oncology department having opened in 2022. However, comprehensive epidemiological studies clarifying the nature and causes of cancer prevalence in this region are still lacking, hindering the development of effective, evidence-based prevention and treatment programs. Therefore, this study came to fill this knowledge gap by analyzing real data on cancer cases recorded during the selected period in the Aljufra region, and to provide a scientific basis for health decision-makers.

Research Hypotheses

- The number of cases expected to have gradually increased from 2020 to 2022 and then begin to decline.
- Breast cancer expected to be the most prevalent type.
- The city of Hon has the highest number of reported cases due to its high population density.
- The 50-60 age group is the most affected.
- The number of affected females is higher than the number of affected males.
- There is a correlation between age, geographic distribution, and the type of cancer.

Previous Studies

- Some studies have shown that the survival rate for cancer patients in Libya, particularly those with a modern, high-risk condition, was the most influential factor in improving survival rates. The highest survival rates recorded for patients who underwent surgery and were able to perform the procedure [1].
- It was noted that leukemia is the most common type of cancer among children, representing approximately 32% of the studied cases, with acute lymphoblastic leukemia (ALL) being the most prevalent at approximately 89%. Furthermore, higher

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incidence rates found among males and younger children, highlighting the importance of early diagnosis and continuous follow-up [2]. It is essential to emphasize the importance of early intervention and the need to improve health surveillance systems [7, 8].

- Childhood leukemia can affect males approximately twice as often as females, in addition to the difference in the mean age of onset between the sexes (5.6 years for males vs. 8.3 years for females). The study concluded that age and sex are important factors in determining the prevalence of the disease [3, 5].
- Medical geography confirmed the existence of disparities in incidence rates depending on location, with a gradual increase in the number of cases over the years. The most prevalent types of cancer are breast cancer, colon cancer, lung cancer, and leukemia, with a clear increase in cases among women diagnosed with breast cancer. Moreover, understanding the geographical distribution is essential due to its significant impact on the disease, in order to improve health planning [4, 6].
- Some current studies have confirmed a mixed inverse relationship between social support, family and individual resilience, and fear of cancer recurrence among breast cancer patients. Resilience had a significant and powerful effect in reducing this fear. The researchers conducting these studies recommended enhancing the psychological resilience of those affected and encouraging families and social support institutions to adopt strategies for managing fear of disease recurrence [9, 10].

RESULTS

A. **Annual distribution of cases:** Figure 1 observed a clear fluctuation in the number of cases registered annually. The highest number of hospital admissions recorded in 2022, with 28 cases, representing 27.7% of the total number of cases. In contrast, fewer cases admitted in 2020, representing a percentage of 9.9%. Furthermore, other years recorded fluctuating and inconsistent rates of increase or decrease.

B.

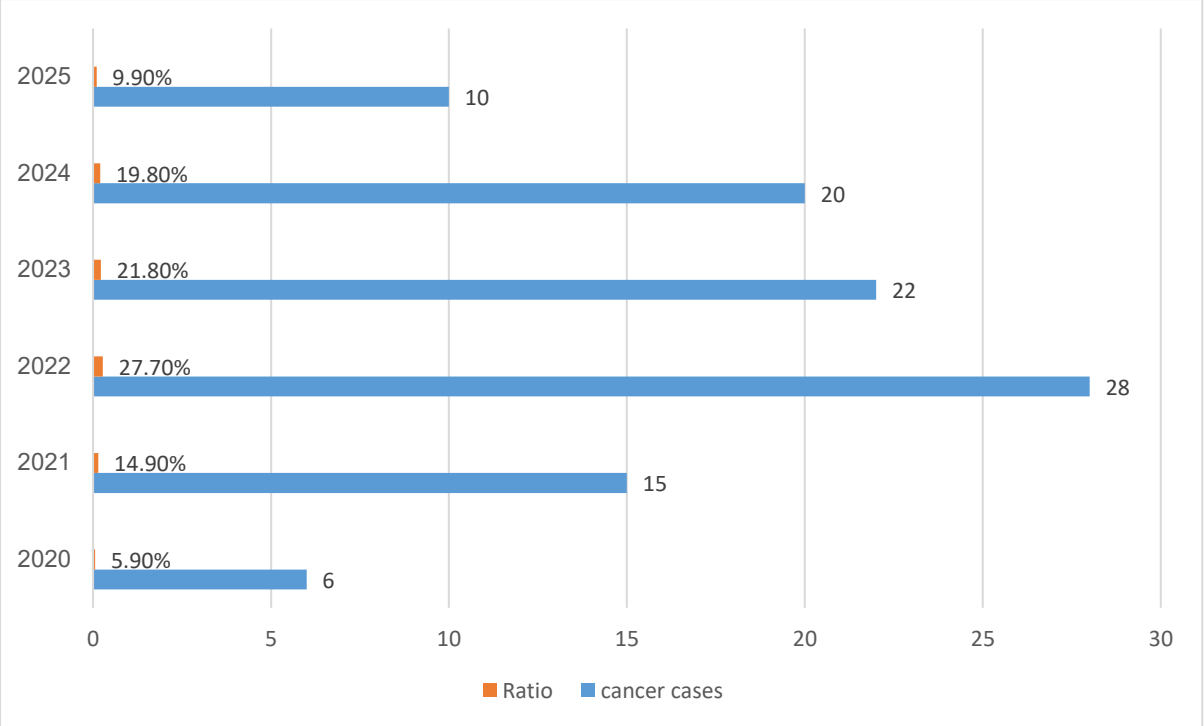


Figure 1: Annual distribution of cancer cases registered at Al-Afia Hospital in Houn during the years 2020 and 2025

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C. **Distribution by gender and age group:** The table below shows the different age groups of cancer patients, categorized by gender, who visited the relevant department at the hospital. A close examination of the lists in the table reveals that the age group of patients aged 50 to 60 years comprised 24 cases, representing a larger percentage of the total number of cases (101 cases), or approximately 23.8%. The 40-50 and 60-70 age groups were relatively similar. Therefore, the 40-70 age group considered the most affected compared to the older and younger age groups.

Table 1: Distribution of cancer cases by gender and age group

Age (years)	Male	Female	Total	Ratio
Less than 20	01	10	20	2.0%0
20-30	01	20	30	3.0%0
30-40	50	70	12	11.9%
40-50	70	12	19	18.8%
50-60	10	14	24	23.8%
60-70	90	10	19	18.8%
70-80	50	80	13	12.9%
80-90	20	70	90	8.9%0
Total	40	61	101	100%

D. **Common types of cancer:** The data presented in Table 2 indicates that breast cancer was the most common cancer among cases seen in the specialized department, accounting for 37% of the total number of cases during the study period, when compared to all other recorded cases. This confirms previous studies indicating a high and increasing incidence of breast cancer among women [4, 6]. On the other hand, other cancers, including leukemia, rectal cancer, ovarian cancer, endometrial cancer, and cervical cancer, ranked second only to breast cancer in prevalence among the cases seen.

Table 2: The most common types of cancer for cases registered in the hospital department during the years 2020 and 2025

Type of cancer	Number of cases	Ratio
Breast	37	36.6%
Colon	15	14.9%
Prostate	13	12.9%
Other types	20	19.8%
lung	6	5.9%
Bone marrow	5	5.0%
lymph node	5	5.0%
TOTAL	101	100%

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E. Geographical distribution of cases: The results of the data in Figure 2 show that the geographical distribution of cases differed from what recorded in the relevant department. The city of Hun had the highest percentage (36%) as it is the most densely populated compared to other areas, followed by the cities of Sukna and Waddan, and then the cities of Zillah and Al-Fuqaha respectively.

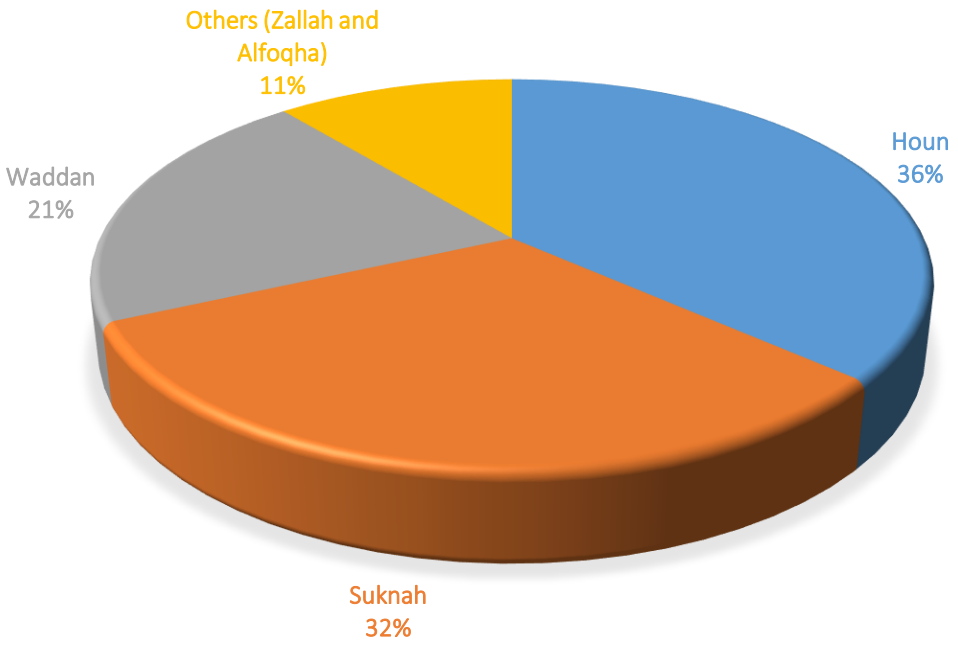


Figure 2: Distribution of cancer cases by city in the Aljufra region

DISCUSSION

In general, the results of this study, the first of its kind in the Jufra region, largely align with the epidemiological pattern of cancer at the national and Arab levels. Like the Misrata study (2013–2019) and the Gaza study (Karsou, 2012), this study demonstrated that breast cancer is the most common type, with women being the most affected group. This underscores the urgent need for national breast cancer early detection programs. Between 2018 and 2022, the Misrata Cancer Center confirmed that breast cancer was the most common type of cancer in Libya, with annual rates ranging between 21.45% and 24.9% [13]. Similarly, the CanScreen5 project, using GLOBOCAN 2022 data, indicated that breast cancer was the most common type of cancer among women in Libya, with incidence rates of 31.0 per 100,000 [14].

The high incidence in the 50–60 age group is consistent with studies linking aging to the accumulation of genetic mutations [5]. This result is consistent with another study conducted in Benghazi, in eastern Libya, which indicated that women aged 45-54 are the most vulnerable group to breast cancer. This highlights the consistency of this at-risk population across different regions of Libya [15]. The significantly higher number of cases in Houn, in the Aljufra region, attributed to its high population density and the presence of a referral hospital, which facilitates case registration and comparison with more remote areas.

The marked annual fluctuation, characterized by a sharp increase in 2022 followed by a subsequent decline, is likely attributable to the opening of the specialized oncology department in the region during that year. This, in turn, led to a backlog of previously unreported cases, followed by a possible improvement in health awareness or changes in referral patterns. This study supports the findings of a similar earlier study conducted across a wider geographical area in northwestern Libya, which confirmed an increase in cases up to 2009, followed by a

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decline during 2010 and 2011, attributed to similar dynamics in registration and reporting [12]. Furthermore, reports indicate that cancer incidence rates in Libya are 71.7 per 100,000 population in the central region, a figure significantly lower than the reported global rate of 201.0 [16]. This suggests a possible underreporting of cases, exacerbated by political and administrative divisions within the country, which hinder the collection of comprehensive data [17]. This underscores the importance of continuing annual epidemiological surveillance to monitor real-time trends.

The numerical superiority of cases in the city of Hun explained by its high population density and the presence of a referral hospital, which facilitates case registration compared to more remote cities.

The observed annual fluctuation (a sharp increase in 2022 followed by a decrease) attributed to the opening of the oncology department in the same year, leading to a backlog of cases, followed by improved health awareness or changes in referral patterns. This underscores the importance of continuing annual epidemiological surveillance to understand the true trends.

The burden of breast cancer in the Jufra region extends beyond incidence rates to include the challenges of both treatment and diagnosis. A recent cross-sectional study conducted in the Jufra municipality evaluated the feasibility of using the CA15-3 serological tumor markers and CEA for early breast cancer detection, demonstrating a significant increase in these markers among patients compared to control groups [10]. This highlights the potential role of these supportive tools in breast cancer management in resource-limited settings like the Jufra region [10]. The need to improve data frameworks is a pressing national concern, as a policy study on breast cancer in Libya emphasized the urgent need for a standardized data framework to enhance diagnosis, treatment, and research efforts across the country [11].

CONCLUSION

1. Breast cancer represents the largest cancer burden in the Jufra region, with women and those aged 50-60 being the most vulnerable groups.
2. There is a geographical variation in the distribution of cases, with a higher concentration in the city of Hun.
3. Recorded data show annual fluctuations, necessitating the establishment of an accurate and sustainable registration system.

RECOMMENDATIONS

1. For healthcare authorities: Implement a national program for early breast cancer detection in the region, provide mammogram machines, and train staff. Establish a regional cancer registry at Afia Hospital.
2. For researchers: Conduct prospective analytical studies (case-control or cohort studies) to identify local risk factors (environmental, genetic, and dietary). Study the psychological and social factors affecting patients.
3. For the medical community: Intensify awareness campaigns about cancer symptoms and early warning signs, especially for breast cancer, and correct misconceptions about the disease.

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