# Original Research Article

# Prevalence And Pattern of Cancer in The Northern Border Region of Saudi Arabia-Arar

**Running Title: Prevalence of cancer in northern region of Saudi Arabia**

## ABSTRACT

**Introduction**: There is a substantial rise in the incidence of cancer in Saudi Arabia. The aim of this study was conducted to determine the demographic, prevalence, and pattern of cancer in the Northern Border region of Saudi Arabia-Arar.

**Methods:** The record of 88 histologically confirmed cancer cases was retrieved and studied from files of the oncology department, Prince Abdul-Aziz Ibn Musaad hospital, Arar, Kingdom of Saudi Arabia (KSA).

**Results**: The most common cancers in the whole population irrespective of sex were carcinoma of the leukemia, breast, lymphoma and leukemia combined and colorectal cancer. The most common cancers in females in Northern Border region were those of the breast, thyroid, and lymphomas and leukemia combined. Comparative findings for males were lymphomas and leukemias combined, colorectal cancers.

**Conclusion**: The present study showed a high prevalence and pattern of cancer in Northern Border region, Saudi Arabia according to gender, age, frequency, and type of cancer.

**Keywords:** Cancer prevalence, frequency, Saudi cancer registry, malignant, risk factors, tumor.

# 1. INTRODUCTION

Worldwide, approximately 12% of deaths occur due to all forms of cancer. In developed countries around 21% of death, cases are due to cancer and become the second leading cause of mortality. The load of cancer is increasing due to the aging population and an embracing lifestyle including smoking, physical inactivity, and the western diet. In developing countries, approximately 10% of death cases are due to cancer-related problems and ranked 3rd for all death cases [1].

In 2018, globally 18 million cases of cancer were reported and in Saudi Arabia, approximately 25000 cases were accounted for with the mortality of 9.6 million and 10518 respectively [2-4]. The worldwide population can anticipate an increase in cancer cases of around 1% per year, with a big enhancement in China and Russia. In figures, the prevalence may be around 26 million with a mortality of 17 million. Worldwide cases of cancer doubled between 1975 and 2000 further doubled in the year 2020 and are expected to triple in the year 2030. The global load of cancer will produce pressure and challenges on the health sector. The number of cancer patients will continue to rise globally, exerting a terrific physical, emotional and financial strain on individuals, families, the public, and healthcare systems. Variations in the prevalence of cancer between countries might reflect the demographic risk factors. Various risk factors can be linked to cancer like smoking, obesity, long-term infections, race, familial genetic background, and reproductive and hormonal history. The well-built infrastructure of health systems decreases mortality of various types of cancers and further improves survival rate by early identification accessibility and superior treatment [5]. Cancer is a disappointing disease but it is mostly curable. Sufficient statistics about cancer patients produce an enormous force to decrease the worldwide load of cancer by pertaining suitable methods [6]. In Saudi Arabia, world-class cancer health facilities are created for the early detection of cancer, types of cancer, mortality and cure rate, etc. The prevalence, incidence, types of cancer, and mortality can be collected from Cancer registries. In 1992, Saudi Cancer Registry defined the population-based frequency of cancer in 13 administrative regions of Saudi Arabia. The second-largest administrative region is established in Arar, Northern Border province, Saudi Arabia. Based upon this a cross-sectional study was planned to determine the demographic patterns, prevalence, and pattern of cancer in the northern border region of Saudi Arabia-Arar.

## 2. METHODOLOGY

### 2.1 Patient selection

The present study was carried out in collaboration with the cancer registry center, Prince Abdul-Aziz Ibn Musaad hospital at Arar, Kingdom of Saudi Arabia. Cancer patients who are registered in the cancer registry center in Arar were screened in various divisions of the hospital and analyzed their symptoms of cancer. After analyzing their symptoms, patients were further diagnosed for the type - benign or malignant and then referred to the treatment and management division. These patients are included in our study as the sample. Detailed patient information was collected from the cancer registry division of the hospitals according to WHO guidelines.

### 2.2 Sample size

The subjects (n=88) enrolled in this study were selected of both genders (male n=27 and female n=61) in-between age groups (5 to 83 years) with the weight of 15 kg to 162 kg and the type of cancer to which the patient is suffering (benign and malignant).

### 2.4 Study Parameters

After screening the eligibility of patients, various parameters were recorded like patient demographic characteristics and the type of cancer as benign or malignant. If malignant, which origin and body systems are involved. Also, the sites of cancer were recorded like the digestive, reproductive (male/female) system, respiratory, urinary, endocrine, skeletal, and nervous systems.

### 2.5 Inclusion and exclusion criteria:

Only those patients were included who are registered in the Arar cancer registry and willing to participate. Whereas, patients who are diagnosed with cancer but not registered in the Arar cancer registry are excluded.

### 2.5 Ethical consideration

All the patients which were incorporated in the research work were properly described and elucidated regarding the aim of the study to take the consent of the individual patient. If the patient is below 18 years of age, then consent was taken from the guardian. All information is collected on "cancer information leaflets" as per the WHO standards.

### 2.6 Statistical analysis

All data were generated, assembled, tabulated, and plotted using percentages and proportions. The collected data was analyzed by Microsoft Excel- 2021, and the statistical package for social science (SPSS version 28).

## 3. RESULTS

### 3.1 Demographic characteristics of study subjects

Demographic characteristics of cancer patients were chosen based on variables like gender, age, weight, height, and type of cancer. After assessment of 88 patients, male and female cancer patient percentages were found to be 31% and 69% respectively. Minimum and maximum percentage of cancer were found in young patients (8%) and older patients (27%) respectively. The minimum age of cancer patients was found to be 5 years and the maximum age was found to be 83 years which were included in the study. Minimum and maximum weight was found to be 15 kg and 162 kg respectively with a height of smallest 100 cm to longest 198 cm. Two main types of cancer were found to be benign and malignant with 7% and 93% respectively. (Table 1)

### 3.2 Assessment of benign neoplasms

Various types of benign neoplasm were found to be in study patients (n=6). Total five types of benign neoplasm were found like breast, lymph nodes, ovary, pancreas, and thyroid gland with 17%, 32%, 17%, 17%, 17% respectively. (Figure 1-A)

### 3.3 Assessment of types of malignant cancers according to the origin

The main two types of malignant cancers were recorded according to their origin (n=82). Prevalence of organ-related malignant cancer (72%) was found to be more than blood-related malignant cancer (28%). (Figure 1-B)

### 3.4 Assessment of types of malignant cancers in body systems

Several types were found to be of malignant cancer in body systems in study patients (n=82). Prevalence of blood cancer (28%) was found to be maximum and nervous system malignant cancer was found to be minimum (1%). (Figure 2)

### 3.5 Assessment of types of leukemia according to the origin

The two main types were found to be leukemia and lymphoma according to their origin in study patients (n=23). The prevalence of leukemia (74%) was found to be more than lymphoma (26%). Further, out of two types of leukemia chronic leukemia was (48%) which is found to be more prevalent than acute leukemia (26%). (Table 2)

### 3.6 Assessment of types of digestive system cancers according to site

Various types of digestive system cancers were recognized in study patients (n=16). Total eight types of malignant neoplasm were found in the digestive system like salivary gland, nasopharynx, esophagus, liver cell carcinoma, gall bladder and biliary tract, pancreas, colon and rectum/anus with 6%, 6%, 6%, 13%, 13%, 6%, 25%, and 25% respectively. More prevalence of colon and rectum/anus malignant neoplasm was found (25%). (Figure 3)

**3.7 Assessment of types of female reproductive system cancers according to site**

The three main types were found to be female reproductive system cancers according to the site in study patients (n=21). Prevalence of breast malignant neoplasm (72%) was found to be more than uterus (14%) and ovary (14%) malignant neoplasm. (Figure 4-A)

**3.8 Assessment of types of male reproductive system cancers according to site**

The two main types were found to be male reproductive system cancers according to the site in study patients (n=4). Prevalence of prostate malignant neoplasm (75%) was found to be more than testis (25%) malignant neoplasm. (Figure 4-B)

**3.9 Assessment of types of other body system cancers according to site**

The main two types were found to be respiratory system cancers according to the site in study patients (n=2). Prevalence of bronchus or lung malignant neoplasm (50%) was found to be equal to the larynx (50%) malignant neoplasm. Further prevalence of only malignant neoplasm of the kidney (100%) was found to be in urinary system cancers. Regarding endocrine system cancer, two main types of malignant neoplasm of thyroid and parathyroid with the prevalence of 75% and 25% respectively. In skeletal system cancers, malignant neoplasm of bone and articular cartilage (60%) was found to be more prevalent than malignant neoplasm of connective and soft tissue (40%). Finally in nervous system cancers only a single type of malignant neoplasm of the brain. (Table 3)

## 4. DISCUSSION

Cancer is a major alarming challenge for health professionals. Cancer treatment includes various assessment and check systems for care like risk factors, control, screening, diagnosis, and treatment. False belief and misunderstanding about the tumor in society have a negative impact to treat and manage [7,8].

Knowledge of information regarding active cases of cancer in any country makes the health professional make a better future approach to understand the cause and treatment of cancer. So, proper data of active cases of cancer can be obtained from the cancer registration data of any hospital [9].

The current study's demographic data shows the prevalence of cancer occurs in both genders and ages which is similar to the previous studies [10]. Our study indicated more prevalence of cancer in females (69%) than males (31%) and this is similar to the National Saudi Cancer registry data where the females (53.8%) while the males (46.2%) [11]. Further older age is having more prevalence than comparing to young age and which is also align with the previous study reported in Saudi Arabia [12]. Benign neoplasm of lymph nodes (32%) has more prevalence than another benign neoplasm of the breast, ovary, pancreas, and thyroid. Our result was consistent with similar previous study reports [13,14]. Organ-related malignancy is higher (72%) as compared to blood-related cancer according to the current study which is similar to previous reports done in Saudi Arabia [15].

Previous studies focus on the frequency of gastric cancer in the Southern region of Saudi Arabia, accounted by malignant lymphomas and diffuse adenocarcinoma at the occurrence of 14% and 11% respectively. Further documented that gastric antrum involvement at 47% and followed gastric corpus, cardia, and fundus at 27%, 14%, and 12% respectively [16]. Further study indicated gastric lymphomas (5–10% of all the stomach cancer) [17]. Likewise with the same line of matter our study also has shown various types of digestive system cancer and out of which colon and rectum (25%) were found to be with the highest prevalence.

Breast cancer showed a quick sharp increase during screening and shown early diagnosis symptoms of breast cancer. A study in Saudi Arabia was found to be 89% of the participants had not had a clinical exam for breast cancer in the past year [18]. Prostate cancer also has shown high prevalence and mortality in Saudi Arabia according to a previous study which is also similar to our research work [19].

## 5. CONCLUSION

In the current study prevalence and pattern of cancer which was investigated in the northern border region of Saudi Arabia-Arar by giving details on demographic characters like females has a higher prevalence of cancer than male, likewise older age persons are having a high incidence of cancer than compared to young ones. Further lymph nodes and blood-related cancer have a higher prevalence. Colon and rectum malignant cancer has more incidences than other types of digestive system cancers. In females, breast cancer and males, prostate cancer has a higher prevalence.

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**Table 1:** Demographic characteristics of study patient

| Variable | Categories | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 27 | 31% |
| | Female | 61 | 69% |
| Age | 5-15 years | 7 | 8% |
| | <15-25 years | 6 | 7% |
| | <25-35 years | 12 | 14% |
| | <35-45 years | 10 | 11% |
| | <45-55 years | 15 | 17% |
| | <55-65 years | 14 | 16% |
| | <65 years | 24 | 27% |
| | Maximum: 83 years Minimum: 5 years Mean (SD): 48.6 (19.8) years | | |
| Weight | Maximum: 162 kg Minimum: 15 kg Mean (SD): 65 (27.2) kg | | |
| Height | Maximum: 198 cm Minimum: 100 cm Mean (SD): 147 (46) | | |
| Type of cancer | Benign | 6 | 7% |
| | Malignant | 82 | 93% |

Demographic characteristics study samples ($n = 88$) included with variables. Data is presented in percentage (%).

**Table 2:** Assessment of types of leukemia according to the origin

| Type of cancer | Classification | | Frequency | Percentage |
|---|---|---|---|---|
| Leukemia | Acute leukemias | Acute lymphoblastic leukemia | 4 | 17 |
| | | Acute myeloid leukemia | 2 | 9 |
| | Chronic leukemia | Chronic lymphocytic leukemia | 2 | 9 |
| | | Chronic myeloproliferative | 6 | 26 |
| | | Multiple myeloma | 2 | 9 |
| | | Hairy-cell leukemia | 1 | 4 |
| Lymphoma | Non-Hodgkin lymphoma | | 4 | 17 |
| | Hodgkin lymphoma | | 2 | 9 |

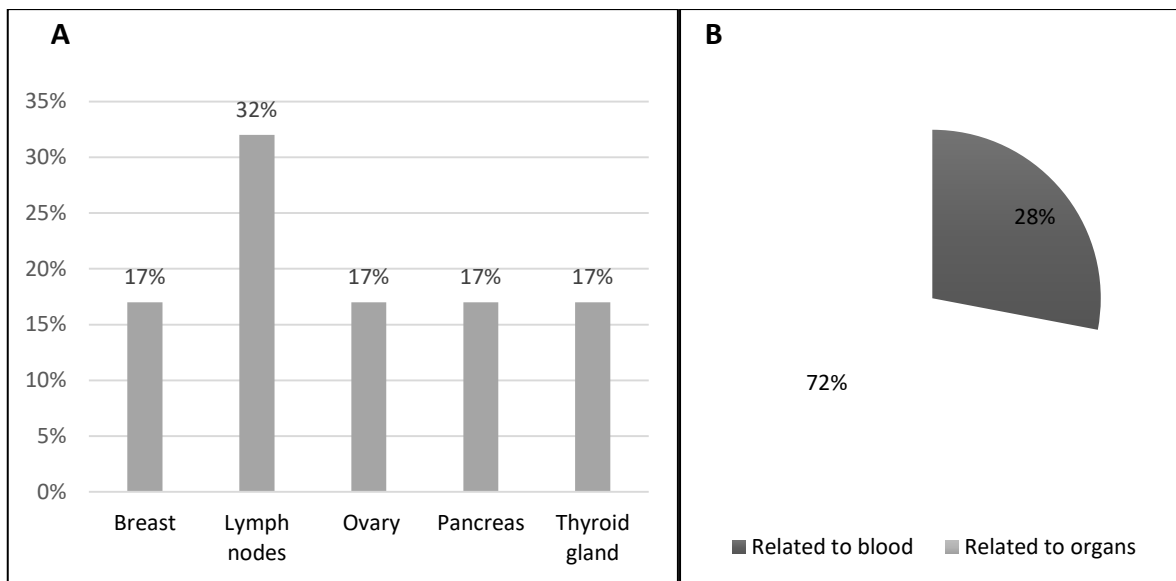Patients ($n = 23$) included for assessment of types of leukemia according to origin.

Data is presented in percentage (%).

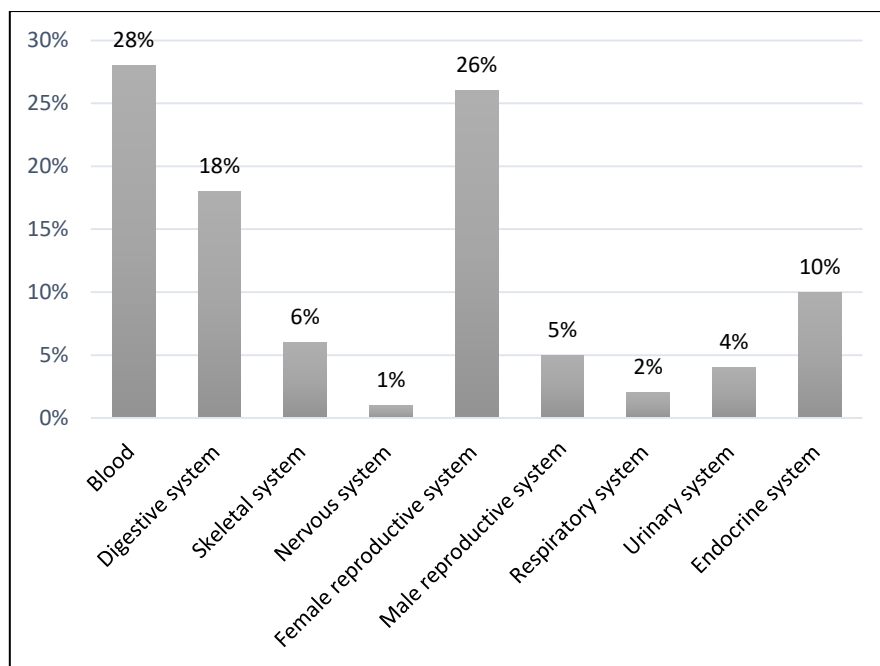**Table 3:** Assessment of types of other body system cancers according to site

| Type of cancer in the respiratory system (n=2) | Frequency | Percentage |
|---|---|---|
| Malignant neoplasm of bronchus or lung | 1 | 50 |
| Neoplasm of larynx | 1 | 50 |
| Type of cancer in the urinary system (n=3) | Frequency | Percentage |
| Malignant neoplasm of kidney | 3 | 100 |
| Type of cancer in the endocrine system (n=8) | Frequency | Percentage |
| Malignant neoplasm of the thyroid gland | 6 | 75 |
| Malignant neoplasm of the parathyroid gland | 2 | 25% |
| Type of cancer in the skeletal system (n=5) | Frequency | Percentage |
| Malignant neoplasm of bone and articular cartilage | 3 | 60 |
| Malignant neoplasm of connective and soft tissue | 2 | 40 |
| Type of cancer in the nervous system (n=1) | Frequency | Percentage |
| Malignant neoplasm of brain | 1 | 100 |

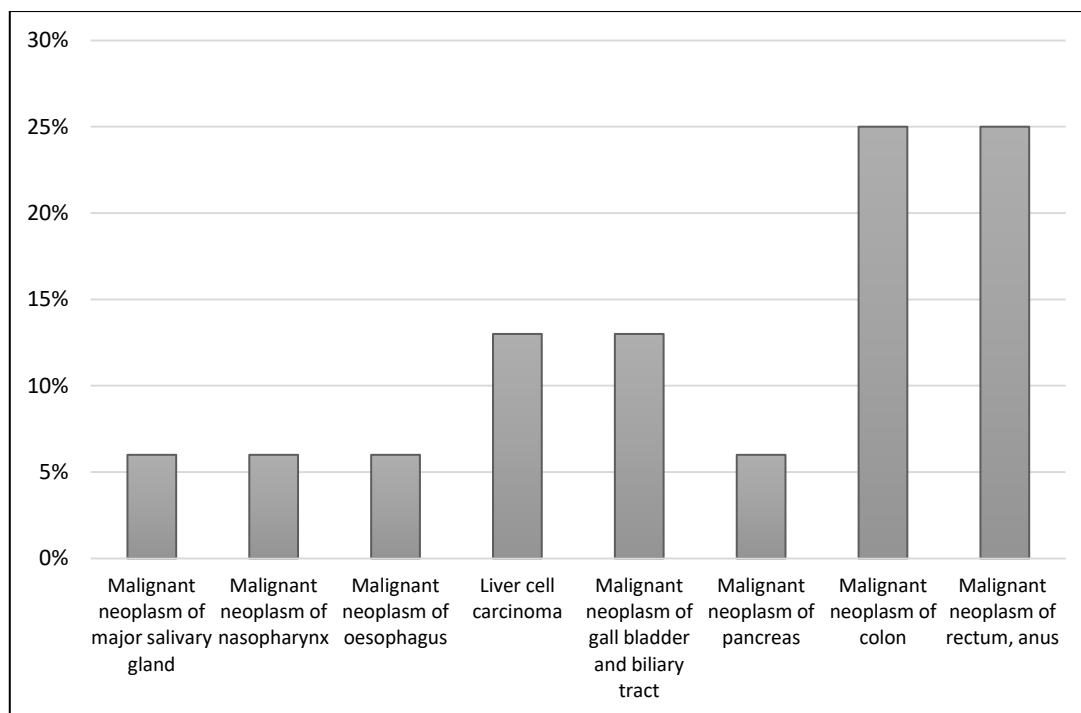Patients included for assessment of types of other body system cancers according to site.

Data is presented in percentage (%).

**Figure 1: A**- Types of benign neoplasms ($n = 6$) included for assessment. **B**- Types of malignant cancers according to origin ($n = 82$) included for assessment. Data is represented in the form of a percentage (%).

**Figure 2:** Assessment of types of malignant cancers in body systems. Patients ($n = 82$) were included for assessment of types of malignant cancers in body systems. Data is represented in the form of a percentage (%).

**Figure 3:** Assessment of types of digestive system cancers according to the site. Patients ($n = 16$) included for assessment of types of digestive system cancers according to site. Data represented in the form of a percentage (%).]
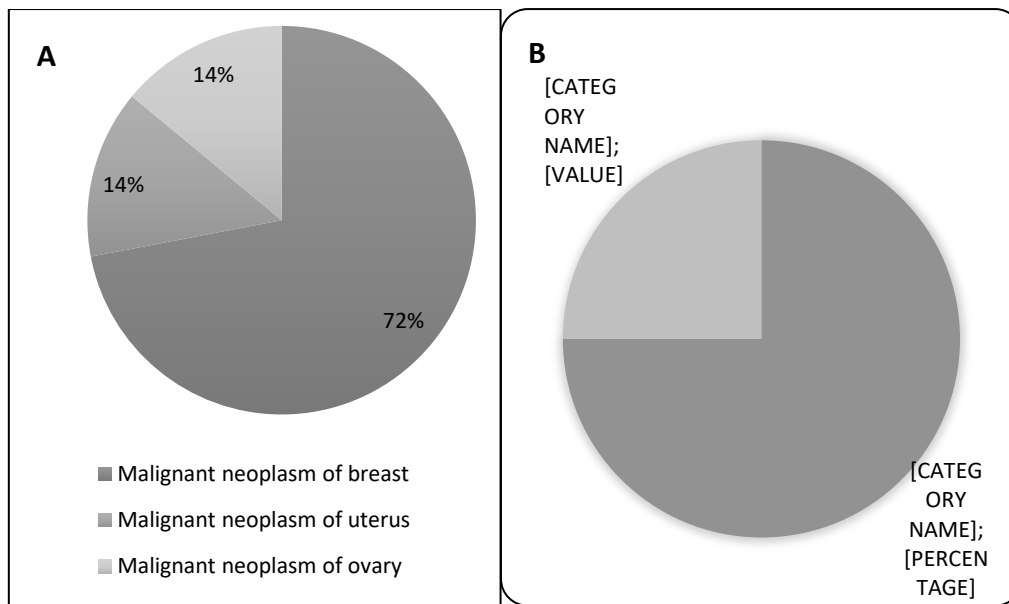
**Figure 4: A**- Female reproductive system cancers according to the site ($n = 21$) included for assessment of types of female reproductive system cancers. **B**- Male reproductive system cancers according to the site ($n = 4$) included for assessment of types of male reproductive system cancers. Data is represented in the form of a percentage (%).