

## Single Center Retrospective Study: Prevalence of Different Cancer Types in Different Age Groups Reported to a Single Tertiary Care Hospital in Jeddah in 2018

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### Abstract

Cancer is a serious, life-threatening condition with social, economic and psychological implications for both the patient and the society. Statistical studies show a wide geographic variation in the causes of cancer, which may be attributed to socio-economic status, environmental factors, genetic predisposition, etc. A recent study published in the year 2018 showed around 18.1 million new cases of cancer worldwide and is the second most common cause of death worldwide. In our study, our goal is to determine the most prevalent types of cancers among different age groups and genders in a small sample size in comparison to broader studies conducted over the years.

**Keywords:** Cancer; Jeddah, Saudi Arabia, Single Center, Oncology; Neoplasms

### Introduction

Saudi Arabia has witnessed an enormous progress in the socioeconomic development over the past 30 years [1]. The government has committed vast of the resources to improving medical care. The country has earned the 26<sup>th</sup> position in the WHO ranking of the world's healthcare systems [2]. Cancer remains a priority for by the World Health Organization (WHO), the Regional Committee for the EMR, and national governments, including Saudi Arabia [3,4]. While cancer incident rates in Saudi Arabia are lower than in Western countries, they are dramatically increasing owing, in part, to changes in lifestyle and the increase tobacco use [5,6]. Cancer is ranked among the top four leading causes of death in the Eastern Mediterranean Region (EMR), with incidence expected to almost double by 2030 [7]. Worldwide, Parkin, *et al.* estimated that there were 10.9 million new cancer cases, 6.7 million deaths, and 24.6 million persons living with cancer in the year 2002 and the rates could further increase by 50% to 15 million new cases in the year 2020 [1,8].

Among Saudi patients, the age standardized rate (ASR) for incidence for all cancer sites excluding other skin cancers (International Classification of Disease version 10, C44) was 57.2 per 100 000 (55.8 and 59.1 for males and females, respectively). The median age at diagnosis was 54 and 49 years for men and women, respectively. While the ASR for cancer in Saudi Arabia is among the lowest in the world [1].

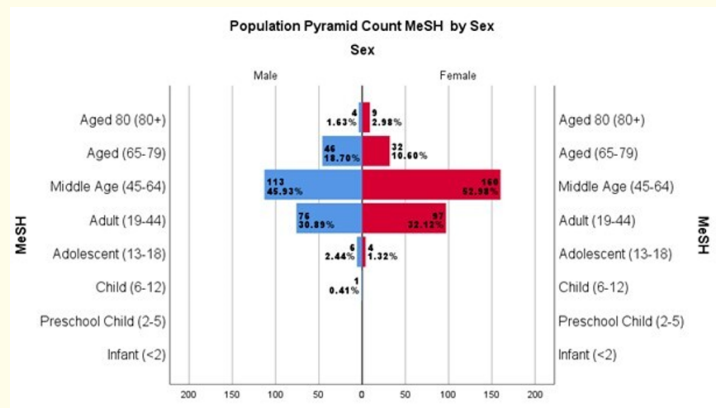
Cancer trends and projection of future new cases will be of particular use in Saudi Arabia for informing budgetary, policy and development plans in line with Vision 2030, which aims to achieve major transformations in the Kingdom in all sectors especially health care [7].

**Materials and Methods**

This study was a descriptive, non-probability convenience sampling one conducted in a single private center in the western region of the Kingdom of Saudi Arabia, Jeddah. Inclusion criteria included all the residents and citizens reporting to the oncology department who were diagnosed with a primary malignant tumor and had not received any prior treatment outside the country. Patients who came for follow up after an initial diagnosis in another country were omitted from the study due to variety in guidelines and basis of diagnosis among different parts of the world. The data were collected in a retrospective fashion using the local hospital system for medical records. Data were then analyzed using SPSS v22. Access to the system was based on a signed consent and an IRB approval (RES-2019-0004) from Batterjee Medical College, Jeddah, Saudi Arabia. No budgeting or any sponsorships were provided.

**Results**

A total of 548 patients reported to the oncology department in Saudi German Hospital, from January to December of 2018 of whom 246 (44.9%) were males and 302 (55.1%) were females. The mean age was 51.0 S.D. ± 14.5, with the range being 8 to 94, and the majority falling between 34 to 64 years of age. The prevalence of cancer among the different age groups and genders is shown in figure 1.



**Figure 1:** Distribution of patients based on MeSH age groups and sex.

Most of the patients presenting to the oncology department were expats (414 (75.5%)) while (134 (24.5%)) were Saudis. Egyptians (95 (17.3%)) were the most diagnosed expats presenting with cancer, followed by Yemeni (88 (16.1%)). Moreover, there were a total of 39 nationalities presenting to the department. Most of the patients presenting with cancer are married (481 (85.8%)).

The most frequently diagnosed cancer was breast cancer (170 (30.9%)) followed by colon cancer (52 (9.4%)), lung (25 (4.5%)), non-Hodgkin lymphoma (24 (4.4%)), thyroid cancer (22 (4.0%)), Hodgkin lymphoma (19 (3.4%)), and prostatic cancer (19 (3.4%)).

Out of the 548 patients, 26 (4.7%) had a history of a previous different neoplasm (4.7%).

There were 3 cases with double primaries: non-Hodgkin lymphoma and prostatic cancer (male, aged (65 - 79)), breast and kidney (female, aged (65 - 79)), and colon and ovarian cancer (female, middle age (45 - 64)). This made 551 total number of diagnoses.

The tumors were classified according to ICD-10 codes [9] as shown in table 1.

ICD10	Frequency (%)
C50-C50 Malignant neoplasm of breast	170 (30.9)
C15-C26 Malignant neoplasms of digestive organs	136 (24.7)
C51-C58 Malignant neoplasms of female genital organs	36 (6.5)
C60-C63 Malignant neoplasms of male genital organs	36 (6.5)
C30-C39 Malignant neoplasms of respiratory and intrathoracic organs	29 (5.3)
C64-C68 Malignant neoplasms of urinary tract	24 (4.4)
C82-C85 Non-Hodgkin lymphoma	24 (4.4)
C73-C75 Malignant neoplasms of thyroid and other endocrine glands	23 (4.2)
C81 Hodgkin lymphoma	19 (3.4)
C00-C14 Malignant neoplasms of lip, oral cavity and pharynx	15 (2.7)
C45-C49 Malignant neoplasms of mesothelial and soft tissue	12 (2.2)
C40-C41 Malignant neoplasms of bone and articular cartilage	9 (1.6)
C69-C72 Malignant neoplasms of eye, brain and other parts of central nervous system	8 (1.5)
C88-C96 Leukemias and Multiple Myeloma	5 (0.9)
C43-C44 Melanoma and other malignant neoplasms of skin	5 (0.9)

**Table 1:** Patient diagnoses according to hospital database.

Breast cancer was the most frequent presenting in the female as compared to colon cancer in the males. The top 10 cancers among males, females and collectively are given in table 2.

Male		Female		Total	
Type	Frequency (%)	Type	Frequency (%)	Type	Frequency (%)
Colon Cancer	30 (12.1)	Breast Cancer	166 (54.6)	Breast Cancer	170 (30.9)
Lung Cancer	22 (8.9)	Colon Cancer	22 (7.2)	Colon Cancer	52 (9.4)
Prostatic Cancer	19 (7.7)	Thyroid Cancer	19 (6.3)	Lung Cancer	25 (4.5)
Non-Hodgkin Lymphoma	17 (6.9)	Ovarian Cancer	13 (4.3)	Non-Hodgkin Lymphoma	24 (4.4)
Testicular Cancer	17 (6.9)	Uterine (Endometrial) Cancer	12 (3.9)	Thyroid Cancer	22 (4.0)
Gastric Cancer	14 (5.7)	Cervical Cancer	10 (3.3)	Hodgkin Lymphoma	19 (3.4)
Hodgkin Lymphoma	14 (5.7)	Non-Hodgkin Lymphoma	7 (2.3)	Prostatic Cancer	19 (3.4)
Hepatocellular Cancer	10 (4.0)	Hepatocellular Cancer	6 (2.0)	Gastric Cancer	17 (3.1)
Bladder Cancer	10 (4.0)	Pancreatic Cancer	6 (2.0)	Testicular Cancer	17 (3.1)
Renal Cell Carcinoma	10 (4.0)	Hodgkin Lymphoma	5 (1.6)	Hepatocellular Cancer	16 (2.9)
Other	84 (34.0)	Other	38 (12.5)	Other	170 (30.9)

**Table 2:** List of top 10 cancer diagnoses among all patients.

Among the Saudi population, breast cancer was the most prevalent among the females while prostate cancer was mostly affecting males. The different cancer among males, females and collectively are shown in table 3.

Saudi					
Male		Female		Total	
Type	Frequency (%)	Type	Frequency (%)	Type	Frequency (%)
Prostatic Cancer	8 (15.7)	Breast Cancer	39 (45.3)	Breast Cancer	39 (28.5)
Colon Cancer	7 (13.7)	Colon Cancer	12 (14.0)	Colon Cancer	19 (13.9)
Lung Cancer	5 (9.8)	Thyroid Cancer	6 (7.0)	Prostatic Cancer	8 (5.8)
Non-Hodgkin Lymphoma	4 (7.8)	Hodgkin Lymphoma	4 (4.7)	Thyroid Cancer	8 (5.8)
Testicular Cancer	4 (7.8)	Ovarian Cancer	4 (4.7)	Non-Hodgkin Lymphoma	7 (5.1)
Pancreatic Cancer	3 (5.9)	Uterine (Endometrial) Cancer	4 (4.7)	Hodgkin Lymphoma	5 (3.6)
Thyroid Cancer	2 (3.9)	Non-Hodgkin Lymphoma	3 (3.5)	Lung Cancer	5 (3.6)
Oral Cavity Cancer	2 (3.9)	Hepatocellular Cancer	2 (2.3)	Hepatocellular Cancer	4 (2.9)
Gastric Cancer	2 (3.9)	Oral Cavity Cancer	2 (2.3)	Oral Cavity Cancer	4 (2.9)
Bone Cancer	2 (3.9)	Renal Cell Carcinoma	2 (2.3)	Ovarian Cancer	4 (2.9)
Other	12 (23.5)	Other	8 (9.3)	Other	34 (24.8)

Table 3: List of top 10 cancer diagnoses among Saudi patients.

The highest number of breast cancers among females and colon cancer among the males presented between the ages 45 - 65 years (middle age). For the purpose of defining the prevalence of types of cancer among different age groups, the MeSH system [10] of classification were used as shown in table 4.

Child (6-12)					
Male		Female		Total	
Type	Frequency (%)	Type	Frequency (%)	Type	Frequency (%)
Hodgkin Lymphoma	1 (100.0)			Hodgkin Lymphoma	1 (100.0)
Adolescent (13-18)					
Male		Female		Total	
Type	Frequency (%)	Type	Frequency (%)	Type	Frequency (%)
Bone Cancer	2 (33.3)	Ovarian Cancer	2 (50.0)	Bone Cancer	2 (20.0)
Soft Tissue Sarcoma	1 (16.7)	Hodgkin Lymphoma	1 (25.0)	Hodgkin Lymphoma	2 (20.0)
Hodgkin Lymphoma	1 (16.7)	Skin Cancer	1 (25.0)	Ovarian Cancer	2 (20.0)
Nasopharyngeal Cancer	1 (16.7)			Testicular Cancer	1 (10.0)
Testicular Cancer	1 (16.7)			Nasopharyngeal Cancer	1 (10.0)
				Skin Cancer	1 (10.0)
				Soft Tissue Sarcoma	1 (10.0)
Adult (19-44)					
Male		Female		Total	
Type	Frequency (%)	Type	Frequency (%)	Type	Frequency (%)
Testicular Cancer	15 (19.7)	Breast Cancer	56 (57.7)	Breast Cancer	58 (33.5)
Colon Cancer	9 (11.8)	Thyroid Cancer	14 (14.4)	Thyroid Cancer	16 (9.2)
Hodgkin Lymphoma	7 (9.2)	Cervical Cancer	5 (5.2)	Testicular Cancer	15 (8.7)

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Lung Cancer	6 (7.9)	Non-Hodgkin Lymphoma	4 (4.1)	Colon Cancer	12 (6.9)
Non-Hodgkin Lymphoma	6 (7.9)	Colon Cancer	3 (3.1)	Non-Hodgkin Lymphoma	10 (5.8)
Gastric Cancer	4 (5.3)	Hodgkin Lymphoma	2 (2.1)	Hodgkin Lymphoma	9 (5.2)
Nasopharyngeal Cancer	3 (3.9)	Brain Cancer	2 (2.1)	Lung Cancer	7 (4.0)
Brain Cancer	3 (3.9)	Pancreatic Cancer	2 (2.1)	Brain Cancer	5 (2.9)
Rectal Cancer	3 (3.9)	Soft Tissue Sarcoma	2 (2.1)	Cervical Cancer	5 (2.9)
Hepatocellular Cancer	2 (2.6)	Other	7 (7.2)	Gastric Cancer	4 (2.3)
Other	18 (23.7)			Other	32 (18.5)
<b>Middle Age (45-64)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Colon Cancer	17 (15.0)	Breast Cancer	92 (57.1)	Breast Cancer	94 (33.9)
Lung Cancer	12 (10.6)	Colon Cancer	14 (8.7)	Colon Cancer	31 (11.2)
Gastric Cancer	9 (8.0)	Uterine (Endometrial) Cancer	9 (5.6)	Lung Cancer	13 (4.7)
Non-Hodgkin Lymphoma	8 (7.1)	Ovarian Cancer	7 (4.3)	Gastric Cancer	11 (4.0)
Pancreatic Cancer	8 (7.1)	Cervical Cancer	5 (3.1)	Non-Hodgkin Lymphoma	11 (4.0)
Bladder Cancer	6 (5.3)	Thyroid Cancer	5 (3.1)	Pancreatic Cancer	11 (4.0)
Renal Cell Carcinoma	6 (5.3)	Hepatocellular Cancer	4 (2.5)	Hepatocellular Cancer	9 (3.2)
Hepatocellular Cancer	5 (4.4)	Non-Hodgkin Lymphoma	3 (1.9)	Uterine (Endometrial) Cancer	9 (3.2)
Hodgkin Lymphoma	5 (4.4)	Pancreatic Cancer	3 (1.9)	Ovarian Cancer	8 (2.9)
Prostatic Cancer	4 (3.5)	Hodgkin Lymphoma	2 (1.2)	Bladder Cancer	7 (2.5)
Other	33 (29.2)	Other	17 (10.6)	Other	73 (26.4)
<b>Aged (65-79)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Prostatic Cancer	14 (29.8)	Breast Cancer	16 (48.5)	Breast Cancer	16 (19.8)
Lung Cancer	4 (8.5)	Ovarian Cancer	3 (9.1)	Prostatic Cancer	14 (17.3)
Colon Cancer	4 (8.5)	Colon Cancer	2 (6.1)	Colon Cancer	6 (7.4)
Renal Cell Carcinoma	3 (6.4)	Hepatocellular Cancer	2 (6.1)	Bladder Cancer	4 (4.9)
Non-Hodgkin Lymphoma	3 (6.4)	Uterine (Endometrial) Cancer	2 (6.1)	Hepatocellular Cancer	4 (4.9)
Bladder Cancer	3 (6.4)	Other	8 (24.2)	Lung Cancer	4 (4.9)
Esophageal Cancer	3 (6.4)			Renal Cell Carcinoma	4 (4.9)
Hepatocellular Cancer	2 (4.3)			Esophageal Cancer	3 (3.7)
Mesothelioma of Pleura	2 (4.3)			Mesothelioma of Pleura	3 (3.7)

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Other	9 (19.1)			Non-Hodgkin Lymphoma	3 (3.7)
Prostatic Cancer	14 (29.8)			Other	20 (24.7)
<b>Aged 80 (80+)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Rectal Cancer	1 (25.0)	Colon Cancer	3 (33.3)	Colon Cancer	3 (23.1)
Hepatocellular Cancer	1 (25.0)	Breast Cancer	2 (22.2)	Breast Cancer	2 (15.4)
Prostatic Cancer	1 (25.0)	Pharyngeal Cancer	1 (11.1)	Rectosigmoid Cancer	1 (7.7)
Rectosigmoid Cancer	1 (25.0)	Gastric Cancer	1 (11.1)	Gastric Cancer	1 (7.7)
		Oral Cavity Cancer	1 (11.1)	Hepatocellular Cancer	1 (7.7)
		Lung Cancer	1 (11.1)	Lung Cancer	1 (7.7)
				Oral Cavity Cancer	1 (7.7)
				Pharyngeal Cancer	1 (7.7)
				Prostatic Cancer	1 (7.7)
				Rectal Cancer	1 (7.7)

**Table 4:** Most common cancer types based on the age groups.

Regarding the Saudi patient age groups, there were 3 adolescents (13 - 18), 33 adults (19 - 44), 55 middle aged (45 - 64), 36 aged (65 - 79) and 10 aged 80 (80+) (Table 5).

<b>Adolescent (13 - 18)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
		Ovarian Cancer	2 (66.7)	Ovarian Cancer	2 (66.7)
		Hodgkin Lymphoma	1 (33.3)	Hodgkin Lymphoma	1 (33.3)
<b>Adult (19-44)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Testicular Cancer	4 (40.0)	Breast Cancer	11 (47.8)	Breast Cancer	11 (33.3)
Soft Tissue Sarcoma	1 (10.0)	Thyroid Cancer	6 (26.1)	Thyroid Cancer	7 (21.2)
Chondrosarcoma	1 (10.0)	Colon Cancer	2 (8.7)	Testicular Cancer	4 (12.1)
Colon Cancer	1 (10.0)	Hodgkin Lymphoma	2 (8.7)	Colon Cancer	3 (9.1)
Lung Cancer	1 (10.0)	Appendix Cancer	1 (4.3)	Non-Hodgkin Lymphoma	2 (6.1)
Non-Hodgkin Lymphoma	1 (10.0)	Non-Hodgkin Lymphoma	1 (4.3)	Hodgkin Lymphoma	2 (6.1)
Thyroid Cancer	1 (10.0)			Soft Tissue Sarcoma	1 (3.0)
				Appendix Cancer	1 (3.0)
				Lung Cancer	1 (3.0)
				Chondrosarcoma	1 (3.0)
<b>Middle Age (45-64)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Colon Cancer	4 (20.0)	Breast Cancer	17 (48.6)	Breast Cancer	17 (30.9)
Lung Cancer	3 (15.0)	Colon Cancer	5 (14.3)	Colon Cancer	9 (16.4)
Gastric Cancer	2 (10.0)	Uterine (Endometrial) Cancer	3 (8.6)	Lung Cancer	3 (5.5)

Pancreatic Cancer	2 (10.0)	Non-Hodgkin Lymphoma	2 (5.7)	Non-Hodgkin Lymphoma	3 (5.5)
Thyroid Cancer	1 (5.0)	Ovarian Cancer	2 (5.7)	Uterine (Endometrial) Cancer	3 (5.5)
Oral Cavity Cancer	1 (5.0)	Renal Cell Carcinoma	1 (2.9)	Oral Cavity Cancer	2 (3.6)
Bladder Cancer	1 (5.0)	Hodgkin Lymphoma	1 (2.9)	Hodgkin Lymphoma	2 (3.6)
Rectosigmoid Cancer	1 (5.0)	Oral Cavity Cancer	1 (2.9)	Gastric Cancer	2 (3.6)
Non-Hodgkin Lymphoma	1 (5.0)	Cervical Cancer	1 (2.9)	Ovarian Cancer	2 (3.6)
Hodgkin Lymphoma	1 (5.0)	Skin Cancer	1 (2.9)	Pancreatic Cancer	2 (3.6)
Other	3 (15.0)	Multiple Myeloma	1 (2.9)	Other	10 (18.2)
<b>Aged (65-79)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Prostatic Cancer	8 (44.4)	Breast Cancer	9 (50.0)	Breast Cancer	9 (25.0)
Colon Cancer	2 (11.1)	Colon Cancer	2 (11.1)	Prostatic Cancer	8 (22.2)
Non-Hodgkin Lymphoma	2 (11.1)	Hepatocellular Cancer	2 (11.1)	Colon Cancer	4 (11.1)
Renal Cell Carcinoma	1 (5.6)	Renal Cell Carcinoma	1 (5.6)	Hepatocellular Cancer	3 (8.3)
Bone Cancer	1 (5.6)	Brain Cancer	1 (5.6)	Renal Cell Carcinoma	2 (5.6)
Lung Cancer	1 (5.6)	Uterine (Endometrial) Cancer	1 (5.6)	Non-Hodgkin Lymphoma	2 (5.6)
Oral Cavity Cancer	1 (5.6)	Gallbladder Cancer	1 (5.6)	Brain Cancer	1 (2.8)
Hepatocellular Cancer	1 (5.6)	Mesothelioma of Pleura	1 (5.6)	Gallbladder Cancer	1 (2.8)
Pancreatic Cancer	1 (5.6)			Uterine (Endometrial) Cancer	1 (2.8)
				Lung Cancer	1 (2.8)
				Other	4 (11.1)
<b>Aged 80 (80+)</b>					
<b>Male</b>		<b>Female</b>		<b>Total</b>	
<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>	<b>Type</b>	<b>Frequency (%)</b>
Rectal Cancer	1 (33.3)	Colon Cancer	3 (42.9)	Colon Cancer	3 (30.0)
Hepatocellular Cancer	1 (33.3)	Breast Cancer	2 (28.6)	Breast Cancer	2 (20.0)
Rectosigmoid Cancer	1 (33.3)	Pharyngeal Cancer	1 (14.3)	Rectal Cancer	1 (10.0)
		Oral Cavity Cancer	1 (14.3)	Hepatocellular Cancer	1 (10.0)
				Oral Cavity Cancer	1 (10.0)
				Pharyngeal Cancer	1 (10.0)
				Rectosigmoid Cancer	1 (10.0)

**Table 5:** Most common cancer types based on the age groups in Saudi patients.

Metastasis was present in 153 (27.9%) patients. Mostly metastasis was to the bones (43 (21.0%)), followed by liver (37 (18.0%)), lymph nodes (35 (17.1%)) and lung (33 (16.1%)), respectively.

Regarding treatment, 240 (43.8%) patients had surgery to remove the tumor, 266 (48.5%) patients underwent chemotherapy, 122 (22.3%) underwent radiotherapy, 69 (12.6%) underwent hormonal therapy, and 20 (3.6%) underwent immunotherapy (Table 6).



Treatment	Frequency
Surgery+Chemotherapy	97 (24.3%)
Chemotherapy	90 (22.5%)
Surgery	64 (16.0%)
Surgery+Chemotherapy+Radiotherapy	32 (8.0%)
Radiotherapy	19 (4.8%)
Surgery+Radiotherapy	13 (3.3%)
Surgery+Hormonal	13 (3.3%)
Surgery+Chemotherapy+Radiotherapy+Hormonal	12 (3.0%)
Surgery+Chemotherapy+Hormonal	11 (2.8%)
Hormonal	9 (2.3%)
Surgery+Radiotherapy+Hormonal	7 (1.8%)
Chemotherapy+Hormonal	6 (1.5%)
Surgery+Chemotherapy+Immunotherapy	5 (1.3%)
Chemotherapy+Radiotherapy+Hormonal	4 (1.0%)
Surgery+Chemotherapy+Radiotherapy+Immunotherapy	4 (1.0%)
Radiotherapy+Hormonal	3 (0.8%)
Surgery+Immunotherapy	3 (0.8%)
Surgery+Chemotherapy+Radiotherapy+Hormonal+Immunotherapy	2 (0.5%)
Chemotherapy+Immunotherapy	2 (0.5%)
Chemotherapy+Radiotherapy+Hormonal+Immunotherapy	1 (0.3%)
Surgery+Radiotherapy+Immunotherapy	1 (0.3%)
Hormonal+Immunotherapy	1 (0.3%)
Immunotherapy	1 (0.3%)

**Table 6:** Frequency of different treatment combinations used.

## Discussion

The worldwide cancer burden was estimated to be 18.1 million new cases in the year 2018 with cancer being the second leading cause of death globally, responsible for around 9.6 million deaths, with a rate of 1 in 6 deaths [11,12].

According to International Agency for Research on Cancer (IARC), the overall cancer incidence in Saudi Arabia in 2012 was much lower than the global cancer prevalence. However, this IARC data was based on incidence projections rather than exact number of cases within 2012 [13]. A CDC report published in 2016 report that noncommunicable elements are the major healthcare burden of Saudi Arabia and cancer contributes to this burden apart from accidents and chronic elements [14], and the future burden of cancer in Saudi Arabia is expected to increase to 350% by the year 2025 according to Al-Amri, *et al* (2015) [15].

This increase may be due to the changing lifestyle which adopts a western model, lack of cancer awareness, screening and early detection programs and social barriers. Obesity, genetics, sedentary lifestyle, tobacco use, viral infection, and iodine and Vit-D deficiency also represent some risk factors [16].



A Saudi study published by Althubiti, *et al.* (2018) reported that from the year 1990 to 2016, there was a 26-fold increase in thyroid cancer cases; 10-fold in breast, colon, bladder and uterine cancers; 8-fold for prostate cancer; in addition to increases in other types of cancer as well as their mortality rates [17].

According to the demographic study published by Statista Research Department, the mid-year population estimate in Saudi Arabia in 2018 was 33.4 million, with Saudis making up approximately 20.7 million (62.2%) [18]. In our study, however, Saudis made up 24.5% of our total sample which is a great deviation from the results obtained from the Saudi Cancer Registry in 2015 which showed 77.5% of those afflicted by cancer were Saudi nationals while 22.5% were Non-Saudi [19]. One explanation to this may be that Saudis prefer being admitted into governmental hospitals rather than private ones like SGH, particularly those who belong to lower income group, as the treatment is given free of fees [20].

According to Statista, 57.6% of the Saudi population were males [18], in contrast to our study sample where 44.9% of the cancer patients were males. The latter mirrors the findings in the Saudi Cancer Registry 2015, where more women (52.8%) were affected than men (47.2%) [19].

Globally, cancers of the lung, female breast and colorectal are the three most common types in terms of incidence and ranked within the top five in terms of mortality (first, fifth and second, respectively), and are collectively responsible for one third of the cancer incidence and mortality worldwide [11,12]. Noncommunicable diseases, among which is cancer, account for 73% of all deaths in Saudi Arabia [21], with colorectal cancer being the 1<sup>st</sup> in males and 3<sup>rd</sup> in females among people in Jeddah while breast cancer is the first among females in Saudi Arabia [19,22]. In our study, we found breast cancer to be the cancer of highest incidence among both males and females, followed by colon and lung cancer, which further supports the previous data. Among males, both Saudi and Non-Saudi nationals, colon cancer is the first most common, followed by lung and prostate cancer, while breast, colon and thyroid cancer were the three cancers of highest incidence in females. This supports the finding by Alzahrani, *et al.* (2017) which reported the most common endocrine malignancy in Saudi Arabia to be thyroid cancer [23], and whose incidence has been increasing in both sexes according to studies performed from 2000 to 2017 [24].

In our study, the highest number of cases were reported at the age group of 45 - 64 years (middle age) in both males and females, followed by the Adult age group (19 - 44) and Aged group (65 - 79). According to White, *et al.* (2015), cancer is age-related disease with its incidence rising more rapidly beginning in midlife [25].

Our sample does not include any patients below 6 years of age, but there are 11 cases for children and adolescents ages between 6 and 18. Although cancer in children is rare, it is the leading cause of death by disease past infancy among children in the United States, with the three most common cancers in both children and adolescents being leukemias, brain and central nervous system tumors, and lymphomas [26]. According to the Saudi Cancer Registry, childhood cancers account for 6.0% of all cancer among Saudis, the most common ones being leukemia, followed by brain and CNS tumors, non-Hodgkin's lymphoma and Hodgkin's lymphoma [19].

Our data included 5 (0.9%) cases of skin cancer, and according to the Saudi Cancer Registry, non-melanoma skin cancer, which includes basal cell carcinoma and squamous cell carcinoma, was ranked 9<sup>th</sup> among both sexes accounting for 3.2% of all newly diagnosed cases worldwide for 2010 [27]. There were also 24 (4.4%) cases of urinary tract cancers, including renal cell carcinoma, and also according to a cancer registry report, kidney cancer accounts for 2.3% of all the cancers and incidence has been increased by 13% [28].

The most commonly diagnosed nationality among the expatriate was Egyptian with breast, colon and thyroid cancer being the most common among females and Hodgkin's lymphoma, non-Hodgkin's lymphoma, lung and testicular cancer in males.

To further our focus on cancer in the Saudi nationals, we conducted a separate analysis on the data for the Saudi patients at SGH. Breast cancer was the most prevalent among the females while prostate cancer was mostly affecting males. Arafa et. al reported that the incidence and the number of deaths from prostate cancer is expected to increase in Saudi Arabia and the Arab world as two screening trials attempted in 2001 and 2009 yielded an incidence rate of 1.17% and 2.5% respectively [29]. Colon cancer is the second most common cancer overall in Saudis and is slightly more prevalent in females than in males in our study. Regarding age groups, it mirrored a similar trend pattern as that of the total inclusive sample with middle age being the most common and breast, colon, and lung cancer being the top three common cancers among this age group.

There were no cases of male breast cancer among Saudis in our sample. Though the prevalence of breast cancer mortality among men is lower than that of women, men have a higher risk of death [30].

The most common treatment modality for the cancer patients in SGH is surgery and chemotherapy.

## **Conclusion**

In our study we concluded that the most commonly used modality of treatment was chemotherapy, followed by a combination of chemotherapy and surgery. In terms of diagnosed conditions, the most commonly was breast cancer, an isolated view on data of the male gender only showed colorectal cancer to be the condition of highest frequency.

## **Conflict of Interest**

There is no conflict of interest.

## **Bibliography**

1. Ibrahim, Ezzeldin., *et al.* "Current and Future Cancer Burden in Saudi Arabia: Meeting the Challenge". *Hematology/Oncology and Stem Cell Therapy* 1.4 (2008): 210-215.
2. "The World Health Organization's Ranking of the World's Health Systems, by Rank" (2021).
3. WHO Regional Office for the Eastern Mediterranean. Regional Meeting on Cancer Control and Research Priorities - Doha, Qatar 20-22 October 2013 (2014).
4. World Health Organization. Global Status Report on Noncommunicable Diseases (2010).
5. Alshammari Fawaz Dabea., *et al.* "Population Insight of the Relationship between Lifestyle and Cancer: A Population-Based Survey". *AIMS Public Health* 6.1 (2019): 34-48.
6. Jazieh Abdul Rahman., *et al.* "Saudi Lung Cancer Prevention and Screening Guidelines". *Annals of Thoracic Medicine* 13.4 (2018): 198-204.
7. Jazieh Abdul Rahman., *et al.* "Cancer Incidence Trends from 1999 to 2015 and Contributions of Various Cancer Types to the Overall Burden: Projections to 2030 and Extrapolation of Economic Burden in Saudi Arabia". *Cancer Management and Research* 11 (2019): 9665-9674.
8. Parkin D Max., *et al.* "Global Cancer Statistics, 2002". *CA: A Cancer Journal for Clinicians* 55.2 (2005): 74-108.

9. Khera Rohan., *et al.* "Transition to the ICD-10 in the United States: An Emerging Data Chasm". *JAMA: The Journal of the American Medical Association* 320.2 (2018): 133.
10. Kastner Monika., *et al.* "Age-Specific Search Strategies for Medline". *Journal of Medical Internet Research* 8.4 (2006): e25.
11. Bray Freddie., *et al.* "Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries". *CA: A Cancer Journal for Clinicians* 68.6 (2018): 394-424.
12. "Latest Global Cancer Data: Cancer Burden Rises to 18.1 Million New Cases and 9.6 Million Cancer Deaths in 2018". *International Agency for Research on Cancer* (2018).
13. Bazarbashi Shouki., *et al.* "Cancer Incidence in Saudi Arabia: 2012 Data from the Saudi Cancer Registry". *Asian Pacific Journal of Cancer Prevention: APJCP* 18.9 (2017): 2437-2444.
14. Abuderman Abdulwahab Ali. "Gastric Cancer and Prospects of Cancer in Saudi Arabia Peninsula". *Saudi Journal of Biological Sciences* 26.6 (2019): 1095-1100.
15. Al-Amri Fahad A., *et al.* "Breast Cancer Correlates in a Cohort of Breast Screening Program Participants in Riyadh, KSA". *Journal of the Egyptian National Cancer Institute* 27.2 (2015): 77-82.
16. Alqahtani Wedad Saeed., *et al.* "Epidemiology of Cancer in Saudi Arabia Thru 2010-2019: A Systematic Review with Constrained Meta-Analysis". *AIMS Public Health* 7.3 (2020): 679-696.
17. Althubiti Mohammad A and Mohamed M Nour Eldein. "Trends in the Incidence and Mortality of Cancer in Saudi Arabia". *Saudi Medical Journal* 39.12 (2018): 1259-1262.
18. "Population in Saudi Arabia by Nationality and Gender 2018" (2021).
19. Alrawaji Ahmed., *et al.* "Saudi Cancer Registry: Cancer Incidence Report" (2015).
20. Mohamed Waleed S., *et al.* "Patient Satisfaction: A Comparison between Governmental and Private out Patient Clinics in Taif, Saudi Arabia". *Madridge Journal of Case Reports and Studies* 1.1 (2017): 1-6.
21. "Noncommunicable diseases country profiles 2018". *World Health Organization* (2018).
22. Azzeh Firas S., *et al.* "Healthy Dietary Patterns Decrease the Risk of Colorectal Cancer in the Mecca Region, Saudi Arabia: A Case-Control Study". *BMC Public Health* 17.1 (2017): 607.
23. Alzahrani, Ali S., *et al.* "Thyroid Cancer in Saudi Arabia: A Histopathological and Outcome Study". *International Journal of Endocrinology* 2017 (2017): 8423147.
24. Aljabri Khalid S., *et al.* "An 18-Year Study of Thyroid Carcinoma in the Western Region of Saudi Arabia: A Retrospective Single-Center Study in a Community Hospital". *Annals of Saudi Medicine* 38.5 (2018): 336-343.
25. White Mary C., *et al.* "Age and Cancer Risk". *American Journal of Preventive Medicine* 46.3 (2014): S7-S15.
26. Siegel Rebecca L., *et al.* "Cancer Statistics, 2018". *CA: A Cancer Journal for Clinicians* 68.1 (2018): 7-30.

27. AlSalman Sarah Abdullah, *et al.* "Nonmelanoma Skin Cancer in Saudi Arabia: Single Center Experience". *Annals of Saudi Medicine* 38.1 (2018): 42-45.
28. Alkhateeb Sultan S., *et al.* "Kidney Cancer in Saudi Arabia. A 25-Year Analysis of Epidemiology and Risk Factors in a Tertiary Center". *Saudi Medical Journal* 39.5 (2018): 459-463.
29. Arafa Mostafa A and Danny M Rabah. "With Increasing Trends of Prostate Cancer in the Saudi Arabia and Arab World: Should We Start Screening Programs?" *World Journal of Clinical Oncology* 8.6 (2017): 447-449.
30. Alotaibi Refah Mohammed, *et al.* "Breast Cancer Mortality in Saudi Arabia: Modelling Observed and Unobserved Factors". *Plos One* 13.10 (2018): e0206148.

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