Chapter 7
General Oncology Care in Kuwait

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7.1 Kuwait Demographics

The State of Kuwait sits on the northeast corner of the Arabian Peninsula, sharing its borders with Saudi Arabia and Iraq. It is a part of West Asia. The total surface area of Kuwait is 17,818 km^2. Kuwait is a rapidly growing country; the current estimated population of 4.7 million has almost doubled over the last two decades [1]. Of those, one-third of the population is Kuwaiti nationals. Among Kuwaitis, there is a 1:1 ratio of male to female. However, in non-Kuwaitis, there is a 2.3:1 ratio of male to female. The median age among Kuwait's population is 29.3 years, and the country tends to have a younger population with fewer people above the age of 65 years (Fig. 7.1a, b) [2]. The life expectancy is 75.3 years.

Through a ministerial decree issued in 1984, Kuwait was divided into six health areas/regions, namely Capital, Hawalli, Ahmadi, Jahra, Farwania, and Al-Sabah. Each health region office supervises and manages at least one general hospital along with a few primary health centers and specialized clinics. The number of medical doctors increased from only 362 doctors in the country in 1962 to 3117 doctors in the governmental sector and 324 doctors in the private sector in 1998 and 7640 physicians in the governmental sector and 2149 physicians in the private sector in 2014 [3].

Kuwait has a petroleum-based economy; petroleum is the main export product of the country. The Kuwaiti dinar is the highest-valued unit of currency in the world with a high Gross Domestic Product (GDP) per capita as per a recent report from the World Bank [4], making it an attractive place for healthcare workers outside Kuwait.

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The first hospital for men was established in 1911, and the first hospital for women was established in 1919. In the 1950s, due to the increased oil revenues, free medical services were introduced to all Kuwaiti nationals. The expenditures on health ranked third in the national budget.

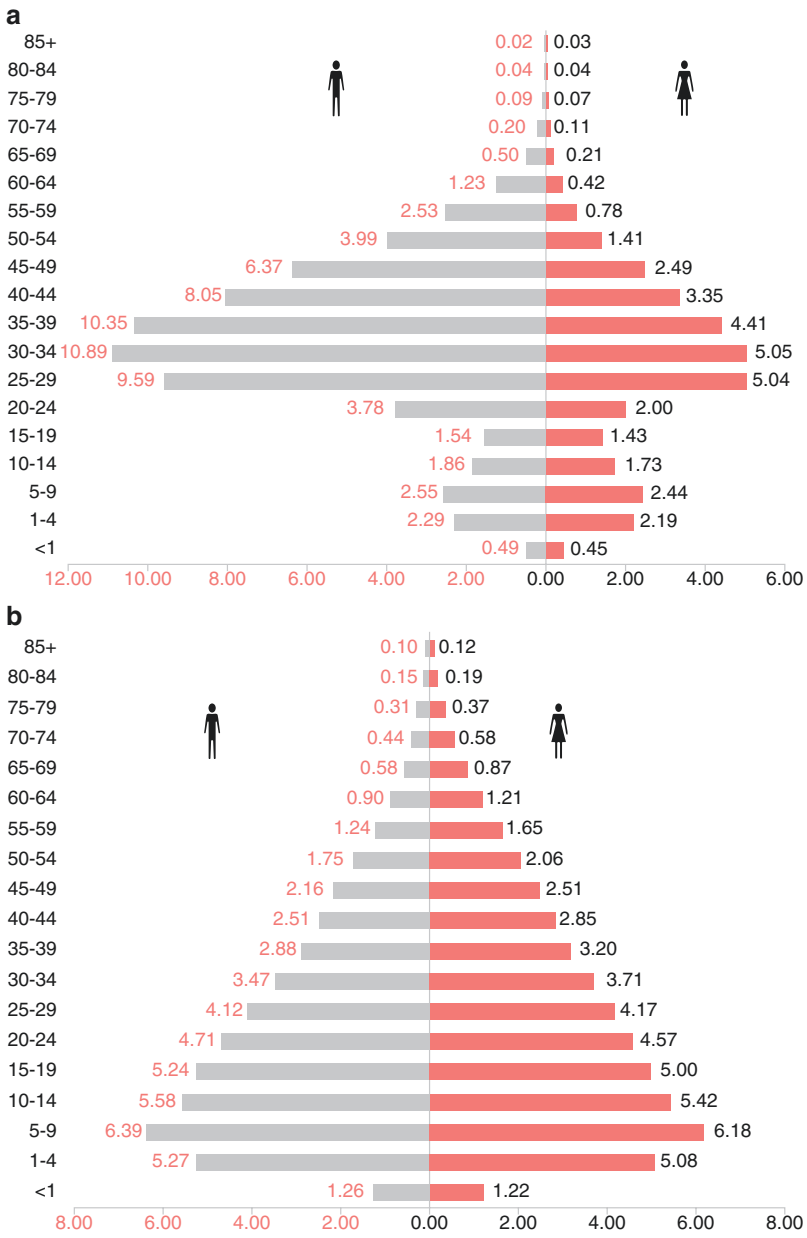

Fig. 7.1 (**a**) Non-Kuwaiti (male & female) age distribution [5]. (**b**) Kuwaiti (male & female) age distribution [5]

7.2 Cancer Statistics in Kuwait

Kuwait Cancer Control Center (KCCC) is the only cancer center in Kuwait, providing comprehensive care to oncology patients. Kuwait Cancer Registry (KCR) has, since 1971, systematically collected data of cancer cases occurring in Kuwait. It has a separate department at KCCC. Notification of cancer is compulsory through Ministerial decree 228/2014. The registry collects data from KCCC and other hospital notes, pathology reports and mortality reports from the health information system at the Ministry of Health (MOH). The cancer registry helps in defining the problem, monitoring the trends, prevention of cancer by identifying high-risk individuals, research, and education.

The cancer statistics have been stable over the last years, but there was a drop in 1990 that corresponds to the gulf war, which led to missed follow-up cases. Figure 7.2a, b shows the Age Standardized Incidence Rate (ASIR)/100,000 of females and males, respectively [5].

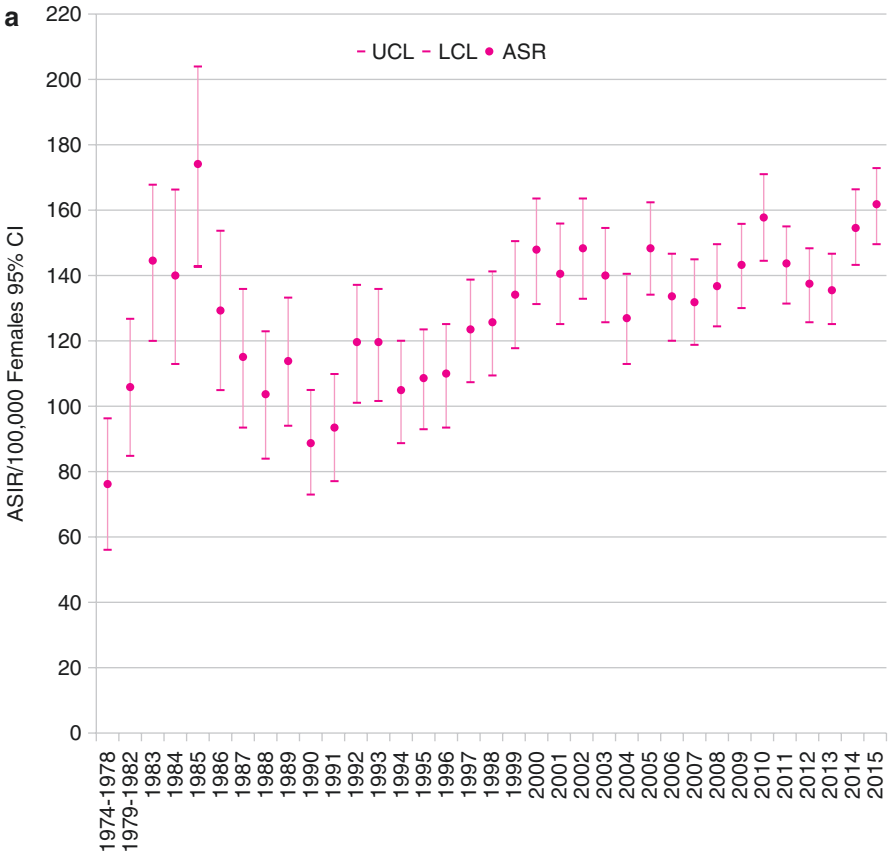

Fig. 7.2 (**a**) Age Standardized Incidence Rate (ASIR)/100,000 females [5]. (**b**) Age Standardized Incidence Rate (ASIR)/100,000 males [5]

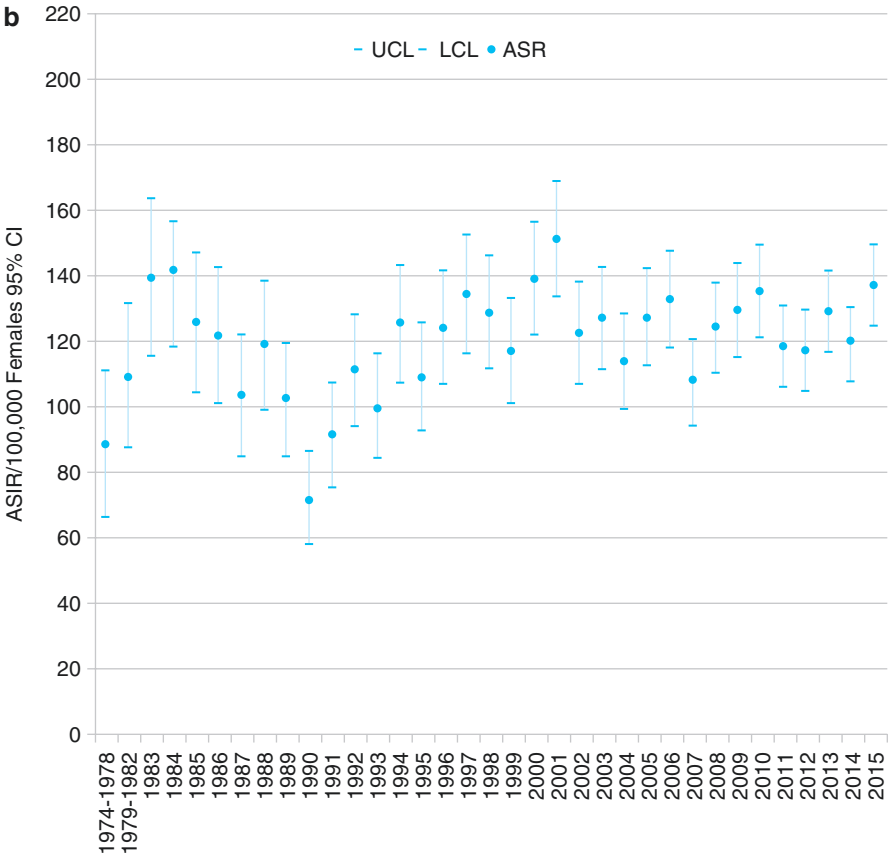

Fig. 7.2 (continued)

According to the most recent health statistics, cancer is recognized to be the second cause of death (21.7 per 100,000 population) in Kuwait, preceded only by cardiovascular diseases (58.6. per 100,000) [5]. There were 2700 new cases of cancer in Kuwait in 2015, of which 1319 cases occurred among Kuwaitis and 1381 among Non-Kuwaitis. The most common cancers among Kuwaiti and non-Kuwaiti males were colorectal followed by prostate cancers and among females were breast followed by thyroid cancer (Table 7.1).

Table 7.1 Top ten cancers among Kuwaiti population (2015) [5]

Males (*N* = 515)*			**Females (*N* = 797)***		
Site	***N* (%)**	**ASIR****	**Site**	***N* (%)**	**ASIR****
Colorectum	72 (14.0)	20.2	Breast	325 (40.8)	66.6
Prostate	55 (10.7)	17.8	Thyroid	84 (10.5)	14.0
Lung	50 (9.7)	15.0	Colorectum	69 (8.7)	15.4
†NHL	39 (7.6)	8.9	Corpus uteri	54 (6.8)	12.2
Leukemia	39 (7.6)	7.4	NHL†	27 (3.4)	5.2
Pancreas	29 (5.6)	8.6	Leukemia	24 (3.0)	4.2
Bladder	25 (4.9)	7.3	Pancreas	23 (2.9)	5.1
Liver	24 (4.7)	6.8	Ovary	22 (2.8)	4.4
Kidney	21 (4.1)	5.5	Lung	18 (2.3)	3.7
Hodgkin's disease	21 (4.1)	3.1	Hodgkin's disease	17 (2.3)	2.7
Male (*N* = 678)			**Females (*N* = 689)***		
Site	***N* (%)**	**ASIR****	**Site**	***N* (%)**	**ASIR****
Colorectum	90 (13.3)	10.5	Breast	286 (41.5)	50.0
Prostate	67 (9.9)	13.2	Thyroid	70 (10.3)	7.5
Leukemia	61 (9.0)	4.9	Colorectum	51 (7.4)	10.4
Bladder	51 (7.5)	7.4	Cervix uteri	31 (4.5)	2.9
Lung	48 (7.1)	5.4	Corpus uteri	30 (4.4)	6.2
NHL†	47 (6.9)	4.3	Ovary	26 (3.8)	4.7
Liver	33 (4.9)	3.2	Leukemia	22 (3.1)	4.4
Hodgkin's disease	30 (4.4)	2.1	NHL†	19 (2.8)	3.5
Thyroid	28 (4.1)	2.1	Lung	19 (2.8)	4.0
Brain and nervous system	22 (3.2)	1.6	Hodgkin's disease	17 (2.5)	2.2

*Number of all sites but non melanoma skin cancers (NMSC)
**ASIR = Age Standardized Incidence Rate/100,000
† = Non-Hodgkin lymphoma

The estimated cases per 100,000 population is 140–150 cases in Kuwait. Fig. 7.3a, b represent the situation in Kuwait in comparison to the international data and the Middle East and North Africa (MENA region) [5].

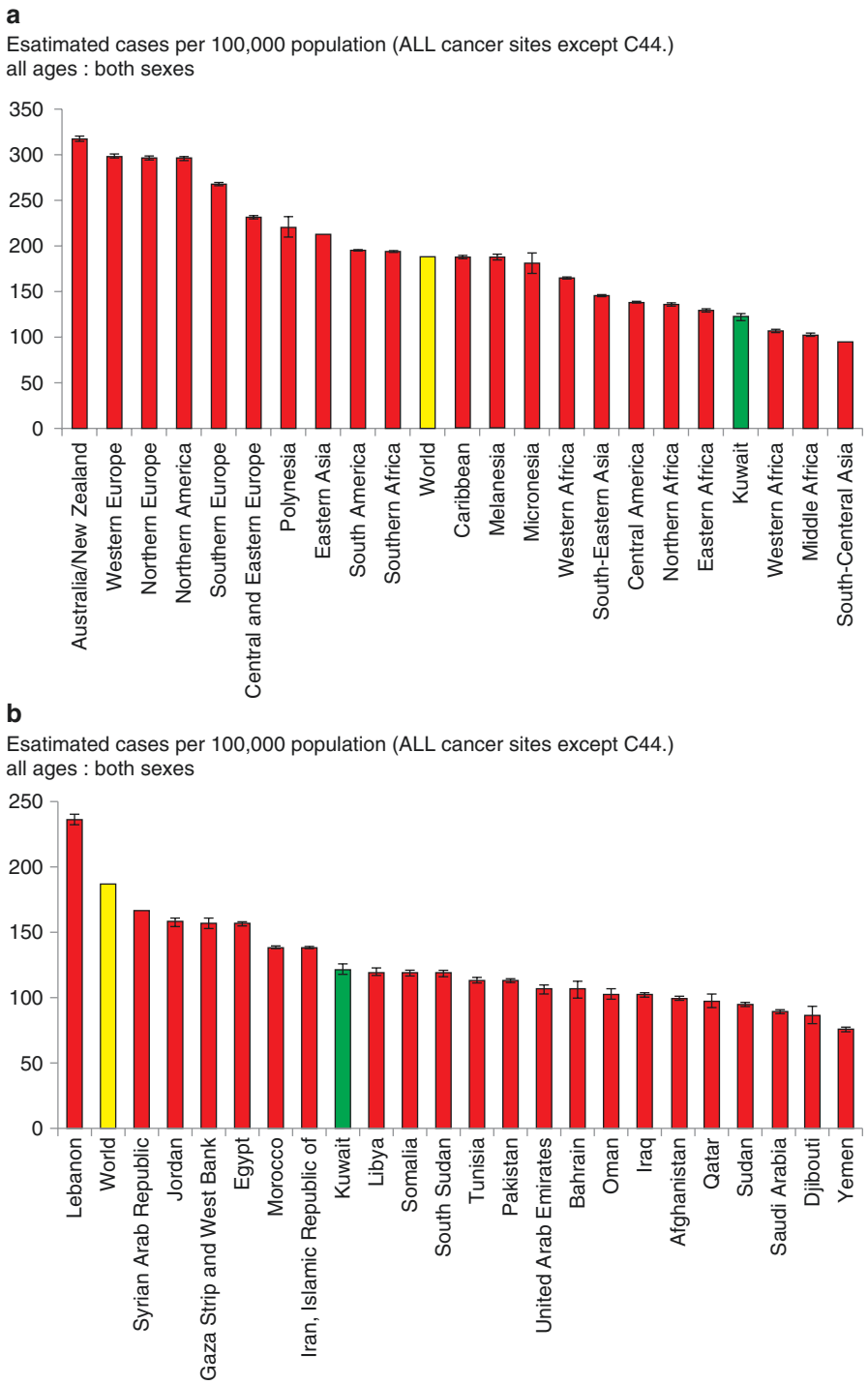

Fig. 7.3 (**a**) Age Standardized Incidence Rate (ASIR) in comparison to the international ASIR [5]. (**b**) Age Standardized Incidence Rate (ASIR) in comparison to the MENA region ASIR [5]

7.3 Cancer Risk Factors

The aim of this section is to describe the risk factors in Kuwait. It will thus be divided into two sections. First, we will state about ubiquitous cancer risk factors such as smoking and alcohol.

7.3.1 Part 1: Ubiquitous Risk Factors: Where Does Kuwait Stand?

Tobacco: According to Alzalabani [6], tobacco usage was as high as 40% in 2005 in Kuwait. In 2014, World Health Organization (WHO) data shows low figures of only 19% in 2014. It is not clear whether Hookah/shisha is included in Alzalabani et al's report. Either way, tobacco has been attributed to 16% of all cancer cases in the GCC countries, which includes Kuwait [6].

Alcohol: Alcohol is not a major cause of cancer in Kuwait. According to the WHO report 2014, almost 0.1% of the Kuwaiti population consumes alcohol. It is worth noting that drinking is stigmatized in Kuwait, and the actual figures may be higher than officially documented. As reported by WHO in 2018, the official recorded alcohol consumption in Kuwait in 2016 was almost zero. However, the alcohol-attributable fraction of cancer deaths is 10 per 100,000 people. Therefore, the official figures of alcohol consumption do not represent reality.

Infection: Vaccination against Hepatitis B virus (HBV) is mandatory in Kuwait for the prevention of HBV infection and ultimately Hepatocellular carcinoma (HCC). However, the HPV vaccine against cervical cancer is not obligatory in Kuwait as this disease is socially and ethically stigmatized. The second part of this section will go more into depth regarding risk factors for cervical cancer.

7.3.2 Part 2: Other Kuwait-Specific Risk Factors

Inactivity and Obesity: Obesity is common among the Kuwaiti population, and it seems to be a main reason for the higher incidence of cancer. The total number of motor vehicles in Kuwait has increased by 162% between 2005 and 2014 [7]. This has led to two things: a decrease in physical activity and an increase in air pollution. According to the World Health Organization report (WHO) 2014, 53% of the Kuwaiti population is considered inactive and 38% are obese [8]. This, along with the importation of the Western diet, can explain the rising cases of colorectal cancer. Elbasmi et al. have already shown similar results. In this study, a fivefold increase in colorectal cancer cases in Kuwait, between 2003 and 2007, was attributed to diet and lack of physical activity [9]. Decreased activity and obesity did not explain the rise in breast cancers. However, among nine retrospective registry data, only one showed an association between breast cancer and obesity, with an odds ratio of 2.29. Note that most included cases were premenopausal women who could have affected the results [10].

7.4 Cancer Screening Programs

Screening programs are evolving in Kuwait, and it is challenging to establish other screening programs for lung, prostate, and cervical cancers, which will reflect positively on preventing such serious illnesses.

In Kuwait, the public awareness of colorectal cancer and screening is higher than comparable countries [11], which can be attributed to the small community in Kuwait with early interchangeable knowledge and available access to information. The colorectal cancer screening program started in 2016, which adapted the recommendations of Northern American societies due to paucity of data and underutilization of the Kuwait Cancer Registry. Yet, the program helped in detecting early-stage cancers, according to a news report. However, the full impact of such screening programs is yet to be studied. On the other hand, The Kuwait National Mammography Screening Program (KNMSP), launched in 2014, provides annual screening mammograms for women between 40 and 69. In 2016, the KNMSP screened 4.2% of all Kuwaiti ladies eligible for screening, and the incidence of cancer was 1.2% of total screened ladies found to have breast cancer [12].

7.5 Cancer Prevention Programs

Prevention and early detection of cancer are still one of the most valuable tools in improving cancer outcomes. Nearly 30–50% of cancers are preventable and avoidable cancers [13], in addition to that, the predictions of a 75% increase in the global burden of newly diagnosed cancers and a 40% increase in the number of mortality related to cancer by year 2030 [14]. With such odds, early detection of cancer by well-implemented screening programs will play a major role in improving cancer care in the upcoming near future.

In Kuwait, the healthcare system provides a comprehensive vaccination program for all residents of Kuwait. It is mandatory to get vaccinated according to the MOH program, which includes the HBV vaccine, as mentioned earlier. There are some vaccines that are not mandatory, such as the Herpes Simplex Virus (HSV) vaccine, yet it is widely available in the private sector. It is understandable that the screening and prevention of cervical cancer by implementing a national screening and vaccination program will be a challenge in the coming years. Using social media with scientific advertisements will help the public to be convinced to participate actively in such programs.

Smoking is the leading preventable cause of cancer. According to The International Agency for Research on Cancer (IARC), smoking is linked to 20 cancer sites or subtypes. In the state of Kuwait, smoking is considered a serious health issue with around 25% prevalence among the young population in 2001, according to WHO, and it is expected to increase with the introduction of E-cigarettes and its popularity among the young population. Such a challenge was faced by multiple awareness campaigns from both the government and the civil society. On the same

page, the Ministry of Health provides a free service for smokers who wish to quit smoking via smoking cessation clinics in MOH polyclinics throughout the country. The authorities believe stressing on such interventions by expanding the campaigns and enforcing laws to prevent smoking in public areas will help in fighting this hazardous habit.

7.6 Cancer Diagnosis

The state of Kuwait provides a high standard of healthcare to all residents of Kuwait. With easy access to seven general government hospitals that are equipped with state-of-the-art diagnostic facilities, not to mention more than the number of Sabah centers, specialized centers. Cancer diagnosis and treatment was and still one of the top priorities in Kuwait's Health system. Kuwait Cancer Control Center (KCCC) is one of the oldest specialized centers in the region. It was established in 1968, and since then, the center has been providing its services to Kuwait residents and nearby countries. With time, the center expanded to a multicenter compound that includes Sheikha Badria Alahmad Chemotherapy Center, Husain Makki Al Juma Center for Specialized Surgery, Faisal Sultan Center for Diagnosis and Radiation Therapy, Yacob Behbehani Center for Specialized Laboratories and Bone Marrow Transplantation and The Palliative Care Center. Since the establishment, it has the main center for treating all cancer patients in the state of Kuwait, along with one center for pediatric hematology and oncology patients (National Bank of Kuwait Specialized Hospital for Children).

In Kuwait, all the general hospitals are equipped with a diagnostic radiology department along with molecular imaging and nuclear medicine such as Positron Emission Tomography (PET) scans, which is also available in specialized centers like KCCC and Kuwait Center for Molecular Imaging (along with the chest hospital).

Moreover, all the general government hospitals have fully equipped laboratory services that conduct the needed investigations to help in diagnosing patients with access to reference laboratories such as Yacob Behbehani Center for Specialized Laboratories and Bone Marrow Transplantation, which is a part of KCCC. Since its opening in 2017, the center has played a crucial part in diagnosing and treating cancer by providing specialized laboratories for cytogenetics, Fluorescence in situ Hybridization (FISH), qualitative and quantitative Polymerase Chain Reaction (PCR) and more recently, Next Generation Sequencing (NGS) along with molecular testing. KCCC is now able to provide genetic testing and counseling clinics in parallel with Ghanima Ahmed Alghanim Center for Premature and genetic in the Alsabah health region, which provides genetic testing and counseling for non-oncological inherited diseases.

It is widely known that 'Interventional Radiology' plays an integral part in diagnosing oncological conditions. This service is available in all government hospitals under the umbrella of the Ministry of Health. The interventional radiology

departments provide a wide range of diagnostic and therapeutic interventions, which help in diagnosing and treating oncological conditions and their complications.

With the rapidly progressing environment in the region, GCC countries have adapted long-term strategies to ensure the prosperity and development of their communities and countries. Kuwait launched its vision for 2030, which includes a massive expansion in the infrastructure of the healthcare system. This vision brought KCCC to an ambitious project intended to be the largest cancer center in the Middle East with more than 680 beds; dedicated to diagnosing and treating cancer in a state-of-the-art institute. For that purpose, this project will need well-trained staff. The Kuwait Institute for Medical Specialties (KIMS) established a 3-year fellowship program for medical oncology in 2014, where the fellow will be exposed and trained in the facilities of KCCC and the Ministry of Health. On the other hand, training abroad is one of the valuable opportunities for Kuwaiti physicians to gain experience and to explore the full spectrum of this rapidly growing medical subspecialty. The Kuwaiti fellows enrolled in multiple fellowship programs in Northern America, Europe, and nearby countries.

7.6.1 Specialized Laboratory Services

Fortunately, KCCC has access to in-house cytogenetic and molecular studies. The department can send for conventional cytogenetic, Fluorescence in Situ Hybridization (FISH) studies for hematological and solid tumors. The Next Generation Sequencing (NGS) tests use different panels for different disease entities. This helped in risk stratifying the cases in a more efficient way to deliver the best care to the patients. One of the advantages of having such services in-house is the rapid turnaround time for these tests, which most of the time is between 10 and 14 days. KCCC also has a flow cytometry machine which is used extensively in hematological malignancies using 8-color and 10-color machines.

7.7 Treatment

7.7.1 Medical Oncology

Sheikha Badriya Al Ahmad Al Jaber Al-Sabah Medical Oncology Center is a member of the Kuwait Cancer Control Center (KCCC), established in 2010. It accommodates the medical oncology department and its ancillary services. The medical oncology department contains 13 specialized medical oncologists and 19 registrars and senior registrars. Members function within tumor site-based treating units. Patient care provided includes but not limited to offering anti-cancer treatment, genetic counseling, survivorship programs and supportive care.

Medical oncology practice guidelines are updated frequently to incorporate high-quality evidence and advancements in patient care. Anti-cancer medical

treatments offered include cytotoxic chemotherapy, hormonal therapy, targeted therapy, and immunotherapy. Treatment protocols are updated and accessed through the KCCC website: https://kuwaitcancercenter.net/. KCCC has established a Compassionate Drug Access Program through the affiliation and cooperation with charities and non-profit organizations. The Compassionate Drug Access Program aims to alleviate the financial concerns for few expatriate patients and present state-of-the-art cancer treatment options. Hundreds of patients enjoy the benefits of this program annually and it helps in organizing the efforts among all charities to maximize access to expensive modern cancer treatments.

7.7.1.1 Malignant Hematology and Bone Marrow Transplantation (BMT)

At KCCC, the department of hematology and stem cell transplantation has a very active service with dedicated units such as leukemia/myeloma, lymphoma, and Bone Marrow Transplant (BMT). It has an inpatient service of 40–50 beds along with 8-beds for BMT. The department has different academic activities on a weekly or monthly basis as well as other multidisciplinary meetings with other specialties. The academic activities and inpatient discussion rounds are being held every Tuesday morning. There are multiple daily clinics held at AM and PM.

BMT programs initiated in 2001, starting with autologous Stem Cell Transplantation (SCT) till 2011. More than 200 patients have had SCT at KCCC so far. The issue of donor availability and drug shortage are the two main obstacles for expanding the Bone Marrow Transplantation program [15].

7.7.2 Radiation Therapy

The radiotherapy department in KCCC has an intensity-modulated radiotherapy and brachytherapy. It encompasses an inpatient and an outpatient service. The department is divided into subunits according to the cancer type: head and neck, cervical and genito-urinary cancers, sarcomas, thoracic and brain, breast, and gastrointestinal (GIT). Gamma-knife surgery is present in Ibn Sina hospital, which is the center of excellence for neurology and neurosurgery in Kuwait. The radiotherapy department works with the medical and surgical department in decision-making. The three departments attend the tumor board review and multidisciplinary meetings together for decision-making.

7.7.3 Surgery

KCCC has the only dedicated surgical oncology department in the country. In addition, dedicated surgical units provide treatment at secondary hospitals as well. Subspecialty oncology units for Colorectal and Hepatobiliary cancer exist currently

in Al-Amiri, Mubarak, and Jaber Hospitals. Surgeons from different sites collaborate in a multidisciplinary setting to execute their plans. Skillful Kuwaiti surgeons constitute most of the staff with extensive experience in minimally invasive procedures, breast oncoplastic procedures and multivisceral resections. Robotic surgery is available at two sites and is primarily utilized for urological malignancies. More recently, robotic surgery has been introduced for gastrointestinal cancer. A peritoneal carcinomatosis treatment program combined with Hyperthermic Intraperitoneal Chemotherapy (HIPEC) has started at Al-Amiri hospital.

7.7.4 Pediatric Oncology

Pediatric hematology/oncology unit was first established in 1976 within the department of pediatric in Alsabah hospital that was expanded in 1986 to a 24-bed capacity in the ward- dedicated only to treat inpatient and outpatient children with hematological and oncological disorders. In April 2000, the Kuwait's Ministry of Health established a dedicated specialized pediatric hematology/oncology center (NBK Children's hospital) in Sabah medical district, where all children up to the age of 16 years are referred from all over the country.

The center has a 24-hour emergency room, inpatient wards for children with benign and malignant hematological disorders as well as oncology care, outpatient clinic and a day care unit. The service for Stem Cell Transplantation was recently introduced in Kuwait for children, and the first Stem Cell Transplant was done for a child with neuroblastoma in Oct 2020.

7.7.5 Survivorship Track

Survivorship programs have been established for breast and colon cancer. There are dedicated clinics and staff that conduct the survivorship programs according to specific guidelines for active surveillance and management of post-treatment sequelae. Patients are screened for recurrences, counseled for secondary prevention, and assessed for their physical and mental well-being. Patients' material for the survivorship programs are published on the KCCC website: https://kuwaitcancercenter.net/.

7.7.6 Palliative Care Track

The Palliative Care Center is closely affiliated with KCCC. Their services span from symptom management to end of life care in a multidisciplinary setting. Patients with advanced cancers are strongly advised to receive joint care by oncologists and palliative care specialists at the beginning of their cancer journey.

Sheikha Badriya Al Ahmad Al Jaber Al-Sabah Medical Oncology Center has been accredited and designated center of integrated oncology and palliative care by the European Society of Medical Oncology since 2015.

7.8 Research and Education

Scientific and clinical research is a cornerstone in any healthcare system, and it plays a catalytic role in improving medical practice based on the best available evidence. In the case of Kuwait and cancer research, there is a long history of such new healthcare systems, with early publications back to the 70s, being considered the earliest publications in the region. Since then, clinicians and researchers in Kuwait have published hundreds of medical publications in clinical and preclinical fields. On the other hand, Kuwait has well-established scientific and academic institutes, i.e., Kuwait University (KU), Kuwait Foundation for the Advancement of Sciences (KFAS) and Kuwait Institute of Scientific Research (KISR), which were established in the late 1960s. Such institutes and scientific entities help in creating a progressive environment for researchers to help them in their scientific quest.

The Kuwait cancer registry started with the establishment of the Kuwait cancer center and it gave valuable information about the dynamics of cancer over more than 40 years. More recently, in September 2019, a malignant hematology registry was established to capture cases of leukemia, lymphoma, and myeloma prospectively with dedicated teams to different disease entities with the aim to look at our statistics, demographic distribution, assess our quality of care and assess our outcomes in different disease areas. We believe the utilization of such historical data will help us in understanding the changes in disease's nature and it might help in creating prediction models, which will be a useful tool for clinicians and researchers.

7.9 Challenges and Advantages

Recognizing the impact of cancer on public health and on society starts with addressing the problem and formulating a comprehensive future plan highlighting the current and upcoming challenges. According to WHO reports, cancer is one of the leading causes of death in people below the age of 70 worldwide [16]. In Kuwait, for example, breast cancer alone was the seventh cause of death in 2019, followed by colon cancer as the 10th most common cause [16]. With a rising concern regarding the increase in the incidence of particular cancers among young age populations, such as colon cancer [17], solidifies early detection and screening argument by expanding the national screening programs. On the other hand, the importance of cancer research in both clinical and preclinical phases is more crucial than ever before, and the investment in improving the research infrastructure should have a high priority. Nevertheless, constant updates and improvements in the established system, particularly in

diagnostics and therapeutics aspects, are still of high importance and should not be overlooked as we expect an increase in demand for such interventions. One of the challenges we face in Kuwait is the paucity of practicing oncologists, hem-oncologists, Radiation oncologists and researchers, which will create a burden in the near future. Such rarity can be overcome by improving the established postgraduate training programs and by creating attractive chances for cancer researchers.

7.10 The Future of Cancer Care in Kuwait

The field of oncology is rapidly evolving across all the areas of diagnostic, therapeutic, and prognostic factors; furthermore, people are aging, which results in higher incidence and prevalence of cancer. Primarily, expanding the infrastructure through building a new cancer center with 618 beds capacity. Moreover, to increase the number of healthcare professionals at KCCC (physicians, nurses, technicians, and other important ancillary services). Lastly, building home health programs to facilitate patient care and treatment. One of the most important steps the country is facing is to move to a paperless work environment and have electronic medical records to optimize research, registries and capturing our data. Research is one of the core services that allow us to know our performance and improve the quality of care; this needs to be done in collaboration with Kuwait University, KFAS or KSIR.

7.11 Conclusion

Cancer care in Kuwait was established more than 50 years ago. It has been rapidly evolving with more advanced technology in the era of personalized medicine. Both infrastructure and healthcare professionals are increasing to keep up with these advances.

Contribution AA, JA, BA and JA wrote and reviewed the manuscript.

Conflict of Interest Authors have no conflict of interest to declare.

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