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Statistical Analysis of Cancer Incidence in Riyadh Region, Saudi Arabia

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ABSTRACT

Background: Cancer incidence is increasing in Saudi Arabia and worldwide due to increase in life span of all population, and cancer incidence increase with age.

Objectives: The objectives of this study are to evaluate the frequency of cancer incidence Riyadh, Saudi Arabia and to assess the most common cancer compared to other regional countries.

Materials and Methods: The data of this study was based on Saudi cancer registry statistics. Comprehensive cancer registration was achieved through data obtained from a combination of sources, viz., (a) notifications by the medical profession, (b) pathology records, (c) hospital records, and (d) mortality data from the Registry of Births and Deaths (RBD), Ministry of Health (MOH). The data was analyzed for Riyadh province only because it is the capital and largest city of the Kingdom of Saudi Arabia, with population of 7125180 of Saudi population 30770375 (23.2%).

Results: The most leading cancer in Riyadh region is breast cancer (692 cases per year in average. 2.3% (16 cases) of breast cancer were males. The incidence of thyroid cancer is higher in females (343) by a factor of 4.0 compared to males (85). In contrast, the incidence of lung, leukemia, liver and other types of cancer were higher in males compared to females by a factor of 3.1, 1.2, 2.3 and 2.01, in that order.

Conclusions: This study illustrates the cancer incidence in Saudi Arabia is comparable with other regional and countries with the same health care level I worldwide. Cancer prevention programs are essential in reduction of cancer incidence rate such as reduction of smokers and smoking rate, health diet and sport and vaccination against hepatitis and other infectious diseases, which can cause cancer.

1. INTRODUCTION

Cancer is a global issue that affects all ages and socioeconomic groups. There are more than 200 types of Cancer (Cancer Research UK, 2016). Cancer can start anywhere in the human body since the body consists of trillions of cells. Tumors are either malignant, which is cancerous, or might be benign. Malignant and brain benign tumors are life-threatening (Willarad, 2007). Cancer is a leading cause of disease worldwide. An estimated 20 million new cancer cases and 9.7 million deaths in 2022 (WHO, 2024). Lung, female breast, colorectal, and stomach cancers accounted for more than 40% of all cases diagnosed worldwide (WHO, 2022). Based on the World Health Organization (WHO) report, Cancer is a leading cause of disease in developed countries, accounting for 8.2 million deaths in 2012. The most common causes of cancer death are cancers of the lung (1.59 million deaths), liver (745,000 deaths), stomach (723,000 deaths), colorectal (694,000 deaths), breast (521,000 deaths), and esophageal Cancer (400,000 deaths). (WHO, 2012). Many agents, including radiation, chemicals, infections, genetics, or hereditary reasons, cause Cancer. The severity of Cancer has no link with the cause of Cancer, while the probability of Cancer is proportional to the exposure to the cancer agent. Therefore, it is not easy to justify the causes of Cancer for a particular patient. Saudi Arabia, located in southwest Asia, covers 2,149,690 square kilometers of land (80% of the Arabian Peninsula area), making it the 13th largest nation in terms of land area. The population of Saudi Arabia is approximately 29.0 million (70% Saudi and 30% non-Saudi) (population density is 14 people/km²) (GASTAT, 2012). The average life expectancy is 74.1 years (72.2 years for males and 76.2 for females). According to the Saudi Cancer Registry (SCR), between January 01 and December 31, 2012, the total number of cancer incidence cases reported to the SCR was 14,846. Overall, Cancer affected 7,048 (47.5%) males and 7,798 (52.5%) females, with a male-to-female ratio of 100:87. Total of 11,333 cases were reported among Saudi, and 3,393 among Non-Saudis and 120 of unknown nationality (SCR, 2012). Cancer incidence is increasing in Saudi Arabia and worldwide due to an increase in the average life span in the kingdom, in addition to changes in population habits such as smoking rates and

obesity (GASTAT, 2012). Furthermore, the increased population awareness and availability of excellent medical care led to more diagnosed cancers (Al-Rikabi & Husain, 2012). To our knowledge, few studies were performed regarding cancer incidence in Saudi Arabia (Alghamidi et al., 2014; Hussain et al., 2013; Al-Rikabi & Husain, 2012; Rabah et al., 2010; Al-Nuaim et al., 1996). The objectives of this study are to (i) study and analyze the cancer incidence and its frequency in Riyadh, Saudi Arabia, and explore the causes and study of cancer incidence.

2. MATERIALS AND METHODS

2.1. Data collection

The data of this retrospective study was based on Saudi cancer registry statistics. Comprehensive cancer registration was achieved through data obtained from a combination of sources, viz., (a) notifications by the medical profession, (b) pathology records, (c) hospital records, and (d) mortality data from the Registry of Births and Deaths (RBD), Ministry of Health (MOH). The data was analyzed for Riyadh province only because it is the capital and largest city of the Kingdom of Saudi Arabia, with a population of 7.1 million of the Saudi population of 30.7 million (23.2%).

2.2. Statistical analysis

The data was analyzed using the Statistical Package for Social Sciences (SPSS, version 20).

3. RESULTS

The leading cancer in Riyadh region is breast cancer (692 cases per year on average. 2.3% (16 cases) of breast cancer were males. The incidence of thyroid cancer is higher in females (343) by a factor of 4.0 compared to males (85). In contrast, the incidence of lung, leukemia, liver, and other types of cancer was higher in males compared to females by a factor of 3.1, 1.2, 2.3, and 2.01, in that order (Figures 2 & 3). It shows the incidence of cancer in specific categories from 2003 to 2012. Breast and colorectal cancers are the leading cancers in the Riyadh region, while lung cancer is the most minor common cancer among these groups. Figure 3. Illustrates the breast and prostate cancer incidence in Riyadh from 2003-

2012. The incidence of breast cancer increased in regular intervals from 2003 up to 2010, then slightly decreased during 2011 and 2012. On the other hand, the incidence of prostate cancer has fluctuated during the last ten years. The peak value was in 2005 and then decreased during the following years (Figure 1). Figure 3. Patient adherence status to antiretroviral therapy

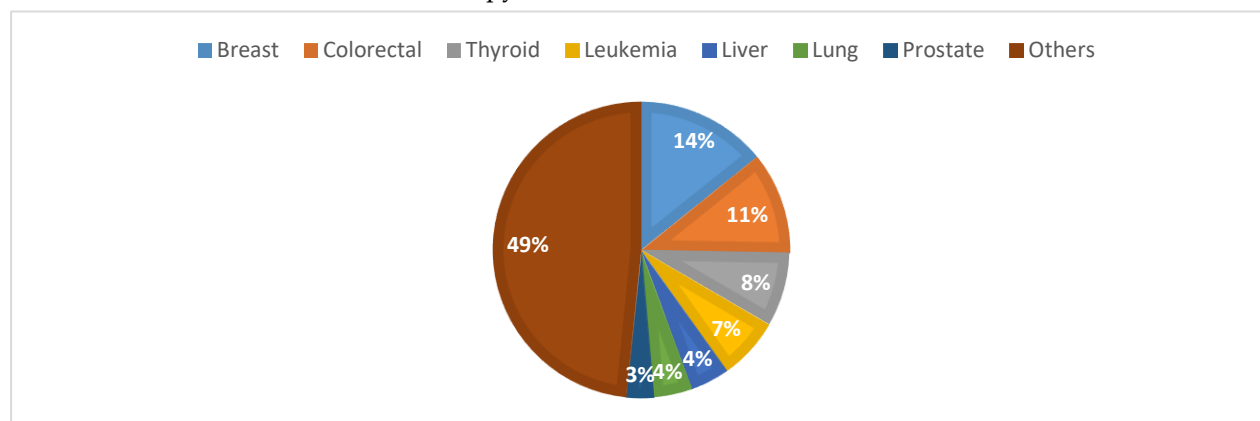


Figure 1. percentage of common cancer incidence in Riyadh, Saudi Arabia

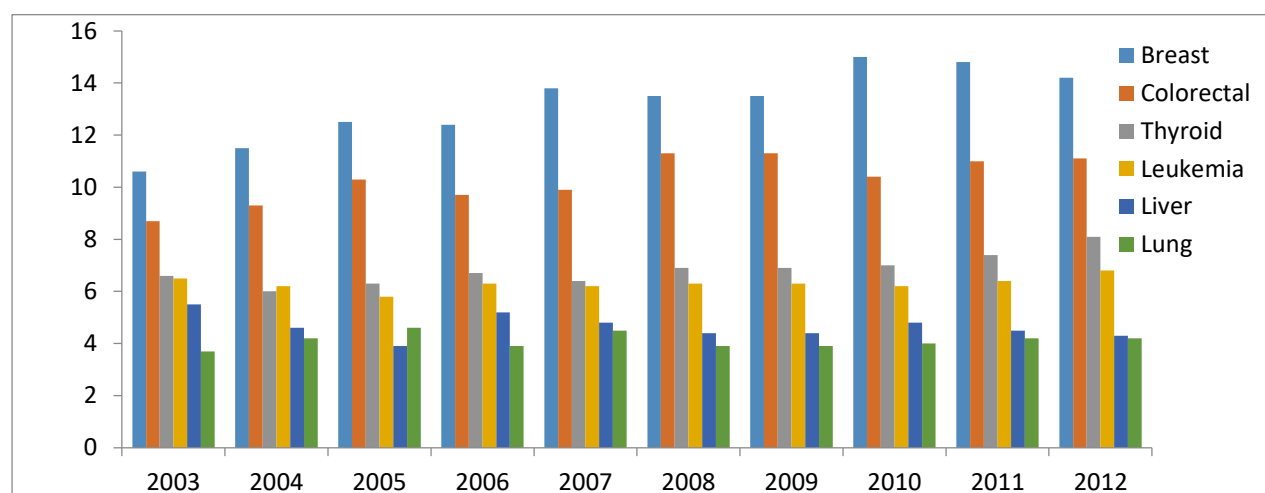


Figure 2. Cancer incidence pattern from 2003 to 2021 in Riyadh, Saudi Arabia

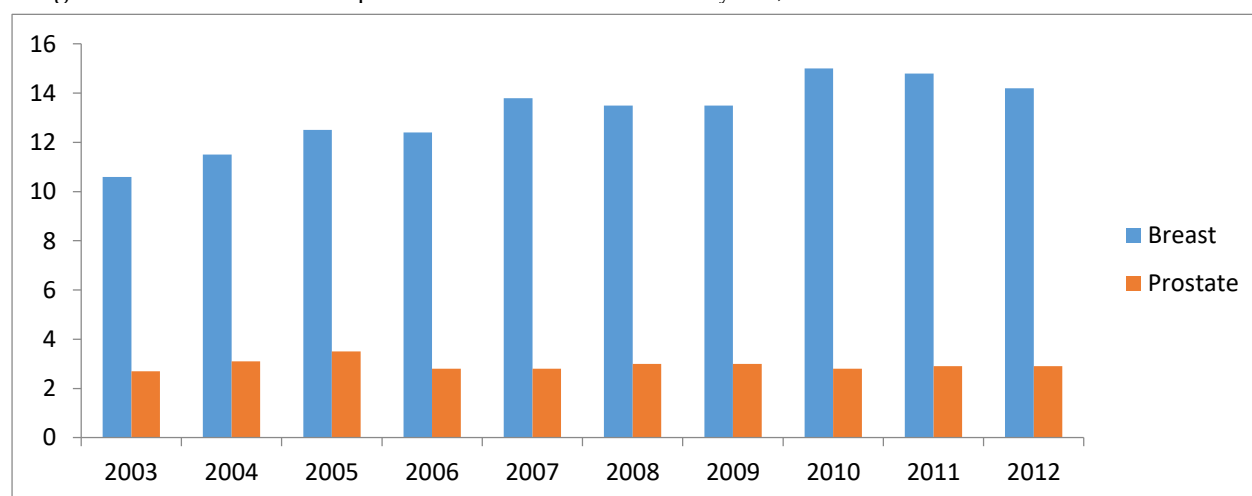


Figure 3. Prostate and Breast cancer incidence from 2003 to 2021 in Rivadh. Saudi Arabia

4. DISCUSSION

Cancer incidence in Riyadh region (Saudi Arabia) is increasing proportionally with life expectancy as shown in Figure 1. This can be attributed to the improvement in diagnostic tools, early detection techniques, and increased population awareness. Breast cancer is the leading cancer in Saudi Arabia. As illustrated in Figure 1, the incidence rate of female cancer showed a slight increase from 2003-2012 (2 % each year), while the number of male breast cancer remained constant (range between 0-10 cases per year). Breast cancer in Riyadh region is the most diagnosed cancer; it constitutes 17% to 25% of total cancer cases. This incidence is lower than the overall incidence in Saudi Arabia, which ranges between 20-35%. These statistical results are comparable to those of neighboring Gulf countries with the same socioeconomic conditions. The incidence of breast cancer in these countries ranged from 16.1% in Oman to 44.3% in Kuwait (NCR, 2012). The results of this study showed that breast cancer incidence rates in Saudi women (Riyadh Region) have increased from 152 cases per 100,000 women to 389 cases in 2012, as illustrated in Figure 1. Therefore, it is anticipated that the incidence of breast cancer will rise due to the population's growth, lifestyle, and aging. Most women are still diagnosed in the late stage of the disease because women may avoid breast screening or medical advice due to shyness until their disease becomes far-advanced, even though all breast screening departments in Saudi Arabia are operated by female staff. The problem in Riyadh is less complicated because women from Riyadh are well-educated and well-informed about breast cancer (Bcheraoui, 2015). In addition to that, the average age of breast cancer diagnosis is 48 years, which is far below the average age in developing countries. Therefore, women's and society's education is crucial (Sagga, 2015; Bcheraoui, 2015).

Colorectal cancer has the highest second incidence in Riyadh cancer. Internationally, colorectal cancer accounts for over 9% of all cancer incidences, and it affects men and women almost equally. (Siegel et al., 2013). In Saudi Arabia, the leading causes of colorectal cancer are obesity, lifestyle (dietary system), family history, and lack of physical activity (Alamari, 2014).

However, in developing countries, the situation is different. Recently, Siegel et al. (2014) reported that delay-adjusted cancer incidence rates declined slightly in men (by 0.6% per year) and were stable in women, while cancer death rates decreased by 1.8% per year in men and 1.4% per year in women. The combined cancer death rate (deaths per 100,000 population) has been continuously declining for two decades, from a peak of 215.1 in 1991 to 171.8 in 2010. This 20% decline means avoiding approximately 1,340,400 cancer deaths (952,700 among men and 387,700 among women) during this time. The magnitude of the decline in cancer death rates from 1991 to 2010 varies substantially by age, race, and sex, ranging from no decline among white women aged 80 years and older to a 55% decline among black men aged 40 years to 49 years. Notably, black men experienced the most significant drop within every 10-year age group. Further progress can be accelerated by applying existing cancer control knowledge across all population segments. These results illustrated that cancer control is possible using specific parameters such as a change of lifestyle, healthy habits, and effective control of cancerous agents.

The top 10 most frequently common cancer sites were the lung, stomach, colon and rectum, liver, breast, esophagus, pancreas, bladder, brain, and lymphoma, accounting for 76.12% of the total cancer cases. The top 10 causes of cancer death were cancers of the lung, liver, stomach, esophagus, colon and rectum, pancreas, breast, leukemia, brain, and lymphoma, accounting for 84.37% of the total cancer deaths.

Cancer remains a significant disease threatening people's health in China. Prevention and control should be enhanced (Chen et al., 2007), especially for the primary cancers. The three most common cancers in the UK are breast, lung, and colorectal, accounting for around 41 percent of cases and 40 percent of deaths from cancer.

Except for bone sarcoma and lung cancer in females, mortality rates for specific cancer types decreased significantly for both sexes during the study period. The incidence of certain cancers increased while it decreased for others. Mortality rates decreased for most cancers, with the most significant improvement observed for breast carcinomas. Further research is needed to identify the reasons for the increasing incidence of certain cancers. (Hagggar et al., 2012). The most common

cancers in Kuwait (breast, colorectal, and lung) are largely preventable. Prompt and effective interventional prevention programs that vigorously involve diet, anti-smoking, and physical activity for both sexes are urgently required (El-Basmy et al., 2010).

Generally, Bahraini men had a higher ASR for most cancer types, and the most common type of cancer^l was lung for males (35.2 per 100 000), followed by bladder (14.5) and prostate (14.3), and breast for females (46.8), followed by lung (12.2) and ovary (7.7). Stomach cancer, non-Hodgkin lymphoma, and leukemia are the three most common cancers in males, and breast, thyroid, and cervical cancers are the most common in females in the nine years. (Nooyi et al., 2011)

The pattern of cancer indicated the increased burden of liver cancer. Breast cancer occupied the second rank. A study of rates of individual cancer sites might help give clues for preventive programs. (Amal S. Ibrahim et al, 2014). The incidence rates given for the eastern region showed differences from previously reported values (i.e., the rate of colon cancer was the highest in North Africa, whereas other malignancies occurred less frequently). Potential explanations for the urban-rural difference and the difference in incidence rates were put forth. The significance of this study is that it establishes a baseline of cancer incidence, which should be the backbone for any future national cancer plan in Libya. Proper surveillance programs need to be in place, and healthcare policy should be adjusted to take into account the more prevalent and pressing cancers in society. The five most frequently reported cancers among adult males were: lung (10.6%), colorectal (9.8%), leukemia (9.3%), urinary and bladder (8.6%), and prostate (7.4%). For adult females, these were breast (32.0%), colorectal (9.0%), leukemia (6.7%), thyroid (4.9%), and corpus uteri (4.6%). Cancer rates have changed little since 1996. (Al-Tarawneh et al, 2010). Cancer is a growing public health concern in Saudi Arabia. The country has witnessed a significant increase in cancer incidence over the past few decades, mirroring global trends. The pattern of cancers is evolving, with lifestyle-related cancers becoming increasingly prevalent. The most common types of cancer in Saudi Arabia vary between genders. For men, colorectal cancer, lung cancer, and

prostate cancer are among the leading cancers, while for women, breast cancer is the most prevalent, followed by colorectal and thyroid cancer. Factors contributing to cancer incidence in Saudi Arabia include (i) Lifestyle changes due to increased tobacco use, unhealthy diet, physical inactivity, and obesity are contributing to the rise of lifestyle-related cancers; (ii) Environmental factors such as exposure to certain environmental pollutants and ionizing radiation may increase the cancer incidence. According to research, more than 30% of cancers diagnosed today might be avoided by limiting environmental and toxic carcinogen exposures, as well as implementing lifestyle changes such as quitting smoking and eating healthy food (Ma et al., 2022). Nonetheless, cancer remains the second largest cause of mortality in most developed countries.

5. CONCLUSION

This study illustrates the cancer incidence in Saudi Arabia is comparable with other regions and countries with the same health care level worldwide. Cancer prevention programs are essential in the reduction of cancer incidence rates, such as reduction of smokers and smoking rates, healthy diet and sports, and vaccination against hepatitis and other infectious diseases, which can cause cancer. Despite recent progress, cancer prevention and care continue to face significant hurdles. More effort is needed to expand the Saudi cancer registry database to include information about access to care, hospitals, treatment regimens, and fatality rates.

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All authors contributed equally to this work

Conflicts of Interest:

The authors declare no conflicts of interest.

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