

Colon Cancer and Saudi Population

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ABSTRACT

Colon cancer is one of the major reasons of morbidity and increasing mortality rate around the world as it accounts more than 9% incidence rate among all other sorts of cancers. Again, Colon cancer has been the most common cancer type among male population and the 3rd most common cancer among female population in Saudi Arabia This review article describes the epidemiological description of Colon cancer throughout the world and especially in case of KSA. This article includes incidence, mortality and survival rate, geographic variations and chronological trends of Colon cancer. Understanding the pathogenesis of colon cancer, effect of Vitamin D and calcium on Colon cancer and metastasis of colon cancer. People are more likely to have colon cancer if their family members have previous history of colon cancer, polyps and possibly other types of cancer. Genetic colon cancer is of two types and can be referred as polyposis and genetic non-polyposis colon cancer. Colon cancer is increasing radically and is becoming the third deadliest cancer type among different cancers. The incidence rate of Colon cancer is not stable and uniform worldwide. In total, incidence rate of Colon cancer in men population accounts for 9.4% while incidence rate of Colon cancer in female accounts for 10.1%. The incident of Colon cancer was diagnosed in 1984 among 288 people who have been diagnosed for gastrointestinal diseases. Among them only 1.5% people were diagnosed and identified with Colon cancer. Colon cancer is now a serious public health issue throughout the world and accounts for more than half millions of deaths every year. Incidence rate of Colon cancer is more in male population than female and rate of prevalence is much higher in developed countries. People older than 75 years are more susceptible to this disease while in KSA people with 60 years or even more are more vulnerable towards colon cancer.

Keywords: Colon Cancer, Saudi Population

INTRODUCTION

Colon cancer is presently the third most popular cancer in the world with approximately one million new cases of Colon cancer identified every year and nearly a million deaths.¹⁻⁸ Alternatively, this disease is the third deadliest cancer ever identified among the males in the world and fourth most common cancer among females.⁵ This cancer can be referred as a slowly developing cancer which starts as a tissue growth of cancer cell or tumour into the interior facing of the colon. This abnormal growth of tumour known as polyp and then gradually turns into cancer in the wall of colon. This tissue growth subsequently grows into the blood vessels which upsurge the rate of metastasis to other anatomical sites. This type of cancer which start in the mucus generating glands of the colon is commonly distinguished as adenocarcinomas over 95% cases.^{9,10}

Colon cancer is a major reason behind morbidity and increasing mortality rate around the world. Developed countries like Australia, New Zealand, USA, Canada, and Western Europe are accounted for major portion of Colon cancer diagnosis and deaths while countries like China, India, Africa and South America are at lowest risks in case of Colon cancer.⁸ Colon cancer ranks first in males and third in females in Saudi Arabia among all other cancer types. KSA is considered to be with a low incidence rate in case of Colon cancer, but over the last ten years the number of Colon cancer diagnosed patients and rate of mortalities due to this disease has been increasing significantly.¹¹⁻¹⁵ Again, elder people or person aged 75 years or more are much prone to this cancer. Given that majority of this colon cancer has been diagnosed in older people and with the increasing rate of mortalities, this review article provides further motivation towards understanding the epidemiology of colon cancer and investigating the incidence, dissemination of this disease. Considering the rise of this disease in KSA and worldwide, this review article analyse the epidemiology of Colon cancer, disease trends in Saudi Arabia and around the world in order to understand more about this disease.

This review articles presents the epidemiology of Colon cancer, describing the main epidemiologic characteristics. The objectives of this review are to:

Review current understanding about the disease based on published statistics and information provided in peer-reviewed journals, specifically this review article will cover the descriptive epidemiology of Colon cancer, disease trends and time in Saudi Arabia and around the world and understanding the pathogenesis of colon cancer, effect of Vitamin D and calcium on Colon cancer and metastasis of colon cancer

LITERATURE REVIEW

Pathogenesis of Colon Cancer

Colon cancer's growth and development has been seen as a sequential procedure with three stages such as initiation, advancement and progress. There is clear confirmation that initiation stages of colon cancer starts with steady adjustments of the succession of DNA or DNA transformations. These

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transformations are trailed by an uncontrolled extension of the neoplastic clones which portrays tumour development. Colon cancer comes about because of a progression of hereditary changes which prompt the dynamic and irreversible loss of ordinary control of cell development and separation. On the other hand, there are a few molecular pathways fundamental the entry from typical mucosa to colon carcinoma.¹⁶⁻²⁰ Through this the presence of intestinal tumours with an alternate organic nature has been clarified, which may be used to focus on colon cancer treatment and cure. Those molecular pathways of colon cancer can be identified for followings:

- Sporadic colon cancer
- Familial adenomatous polyposis and related polyposis disorders²¹⁻²³
- Genetic non-polyposis colon tumour
- Inflammatory bowel diseases which may turn into colon cancer
- Familial colon disease

In this manner, there is predictable and significant confirmation recommending the presence of a few natural pathways prompting the same type of colon cancer, and it is likely that new pathways will be investigated later on.

Colon cancer and genetics

Genetics are considered to be a known factor in case of colon cancer and nearly 5-10% of colon cancer identified is related to specific inherited situations.^{24,25} People are more likely to have colon cancer if their family members have previous history of colon cancer, polyps and possibly other types of cancer. Genetic colon cancer is of two types and can be referred as polyposis and genetic non-polyposis colon cancer.²⁶ Polyposis occurred due to the pathogenic alteration in *Adenomatous Polyposis Coli* (APC) genes while MYC-associated polyposis occurred due to the pathogenic alternation to the *Mut Y homolog* (MYH) genes. On the other hand, genetic non-polyposis colon cancer occurred due to germline pathogenic alterations to the DNA MMR genes.²⁴

Effect on Gastrointestinal Tract (GI tract)

Gastrointestinal Tract complications such as obstruction in bowel, diarrhea, constipation, impaction, and radiation enteritis are the common effects of colon cancer.²⁷⁻³² With the development and progression of the colon cancer these effects also increase to the patient's body. Intraluminal and extraluminal gut lesions occurred due to colon cancer or metastatic tumor, postoperative grips, and volvulus of the bowel and this influences peristalsis and the preservation of typical bowel actions.³³ These problems can prompt aggregate or partial impediment of the bowel. On the other hand, Radiation enteritis is a practical issue of the expansive and small bowel that occurred in-time or after a course of radiation treatment to the colon cancer affected portion.³⁴

Colon cancer metastasis

Metastatic of colon cancer is cancer that has moves to another parts of the body. When colon cancer moves, it most often

moves to the liver. Sometimes it spreads to the lungs, bones, or other organs in the body. Metastases to thoracic are almost as popular as metastases to liver in rectal cancer patients with a low stage at performance.²⁷ In colon cancer patients with solitary metastases the survival differed between 5 and 19 months depending on T or N stage.²⁸ Metastatic style differ notably between colon cancer and rectal cancers.

Colon cancer and vitamin D deficiency

More than 75% of individuals with colon cancer or tumour growths have low levels of vitamin D, and the most minimal levels are related with other cancer diseases.²⁹ A few reviews have recommended a connection between low vitamin D levels and high risk and movement of colon cancer. The normal level of vitamin D is around 24 ng/mL and people with vitamin D levels below 24 ng/ mL are almost three times more inclined to have colon cancer than those with higher vitamin D levels.³⁰ Vitamin D has absolutely demonstrated viable in colon disease prevention but there is still no clarification about how much vitamin D levels need to be maintained in preventing colon cancer.

Colon cancer and calcium

Calcium is not necessary for human body only for solid bones and teeth. Despite the fact that 99% of our calcium stores are found in the bones and teeth while the rest 1% considers being a more critical part for a healthy colon.³¹ Sufficient calcium intake can shield from colon polyps that cause colon cancer. Colon polyps are groups of cells on the surface of the colon that can develop and end up in a dangerous way. Calcium appears to shield high-chance individuals from building up the polyps that can prompt colon cancer.³²

Incidence of Colon cancer

Colon cancer is increasing radically and is becoming the third deadliest cancer type among different cancers. According to World Health Organization (WHO), in 2015 774,000 numbers of deaths are occurred due to this Colon cancer while the overall numbers of deaths were 8.8 million worldwide¹⁹ (figure-1).

Colon cancer accounts for nearly 9% of all kinds of cancers. Based on the estimates of GLOBOCAN in 2012, worldwide there were 13,60,602 cases for Colon cancer and approximated 693,933 deaths were reported worldwide which means that it is world's third most common cancer type and fourth most common causes of deaths among all sorts of cancer incidences.⁸ In 2012, Colon cancer contributed 9.7%

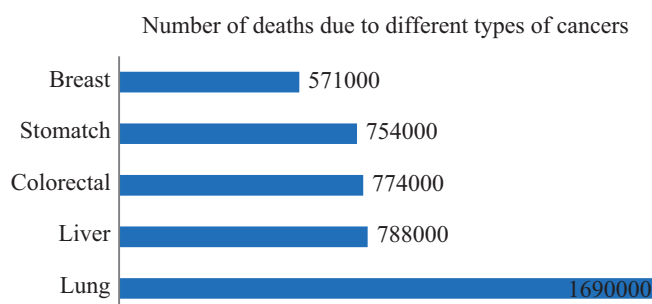


Figure-1: Worldwide number of deaths due to different types of cancer in 2015¹⁹

of all types of cancer worldwide on top of non-melanoma skin cancers while it accounted for 8.5% of total deaths due to cancers in 2012. Alternatively, estimates of GLOBOCAN in 2012 showed that there were 447,136 new cases for Colon cancer in Europe and approximately 214,866 deaths due to Colon cancer in Europe which means that it is 2nd most common cancer type within Europe region and also 2nd most common causes of deaths in Europe.⁸ Colon cancer in Europe contributed 13% of all types of cancer on top of non-melanoma skin cancers and accounted for nearly 12.2% deaths. On the other hand, in 2012 there were nearly 3543,582 numbers of patients worldwide and 12,03,943 numbers of patients from Europe suffering from Colon cancer who have been alive over five years. According to the five year trends of GLOBOCAN it can be said that the numbers of Colon cancer survivors around the world were 68.2 per 100,000 patients while this number was 192.3 per 100,000 patients in Europe region.⁸ Cumulative risk for people aged less than 75 years was 1.95% around the world whereas the risk rate was 1.57% for female and 2.36% for male. Likely, in case of European region, cumulative risk for people aged less than 75 years was 3.51% whereas the risk rate was 2.73% for female and 4.48% for male population.⁸

Chronological trends

In case of incidence rates of Colon cancer different population around the world have experienced different trends over the time. In case of United States, the incidence rates is slowly declining over the time while in case of northern Europe and western Europe the rate seems quite stable.⁹ On the other hand, incidence rates are increasing significantly in recently developed countries in the world like Japan, Singapore and other eastern European countries in the world. Moreover, in many of these countries Colon cancer incidence rates increased by two times since 1970s.¹⁸

Incidence rates for Colon cancer increased from the year of 1975 through mid of 80s and again the rate of incidence seemed to be decreased over the year with an exception in 1996 and 1998 as the incidence rate surged slightly in these two years.⁴ Again from 2008 till 2010 the rate has been decreased and it is to be noted that in 2010 the incidence rate declined by 4% for both men and women. This is considered to be the largest decrease rate over the last decades and it is achieved due to the technological and medical advancement in identifying and removing the tumour or polyp from the affected area.¹¹ This effort was made successful as a result of the increase in colon cancer screening over the past decades. On the other hand, in 1970s and 80s white men and women were much prone to this cancer and due to this incidence rates for Colon cancer were higher in white men and women than that of black men and women. Alternatively, after 1980s the rates of Colon cancer incidence increased for black men and women.¹ Again, the incidence rates for Colon cancer also differ with respect to the age. According to the incidence rate trends over the year of 2001-2010 it is found that incidence rates declined for the people over 50 years and even older people while younger people who are below 50 years are

much inclined to have Colon cancer.⁴

Geographic variations

The incidence rate of Colon cancer is not stable and uniform worldwide. In total, incidence rate of Colon cancer in men population accounts for 9.4% while incidence rate of Colon cancer in female accounts for 10.1%.² In case of incidence rates of Colon cancer different geographic population around the world have experienced different trends. But this disease is prevailing in developed countries with western cultures.⁵ In case of incidence rate of Colon cancer these developed countries account for estimated 63% of worldwide rate while the difference in incidence rate between highest rates to lowest rates are sometimes more than ten times. Generally less than 5 persons per 100,000 population in Africa and Asia are prone to this whereas in case of Oceania, some parts of Europe and United States more than 40 persons per 100,000 population are identified with this cancer.³

Republic of Korea has the highest incidence rate combining both men and women while Slovakia and Hungary are in 2nd and 3rd place²⁰ (figure-2).

In 2012, Slovakia had the largest incidence rate of Colon cancer for men population while Hungary and Republic of Korea were in 2nd and 3rd place.²⁰ For men population approximately 53% of the cases identified as Colon cancer in developed countries. Moreover, Oceania and some countries in Europe had the highest rate of incident for male population while Caribbean, Africa and some parts of Asia had the lowest rate.²⁰ On the other hand, in 2012, Norway had the largest incidence rate of Colon cancer for men population while Denmark and Netherlands were in 2nd and 3rd place. For women population approximately 55% of the cases identified as Colon cancer in developed countries. Moreover, Oceania and some countries in Europe had the highest rate of incident for female population while countries of Africa and some parts of Asia had the lowest rate.²⁰

Epidemiology of Colon Cancer in KSA

The incident of Colon cancer was diagnosed in 1984 among 288 people who have been diagnosed for gastrointestinal diseases.⁷ Among them only 1.5% people were diagnosed and identified with Colon cancer. The incidence rate of Colon cancer in Saudi Arabia within 1994-2003 was quite similar to the Colon cancer prevalence in United States.¹⁴ Colon cancer

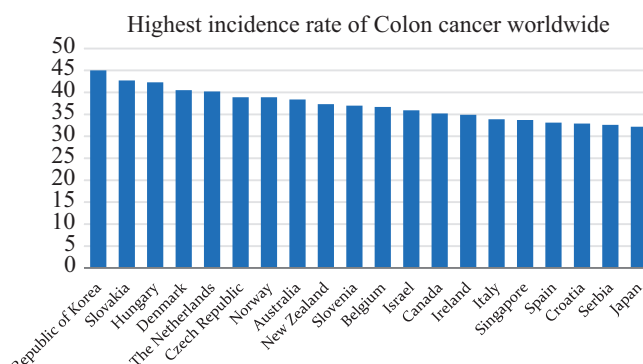


Figure-2: Top 20 countries around the world with highest Incidence rate of Colon cancer in 2012²⁰

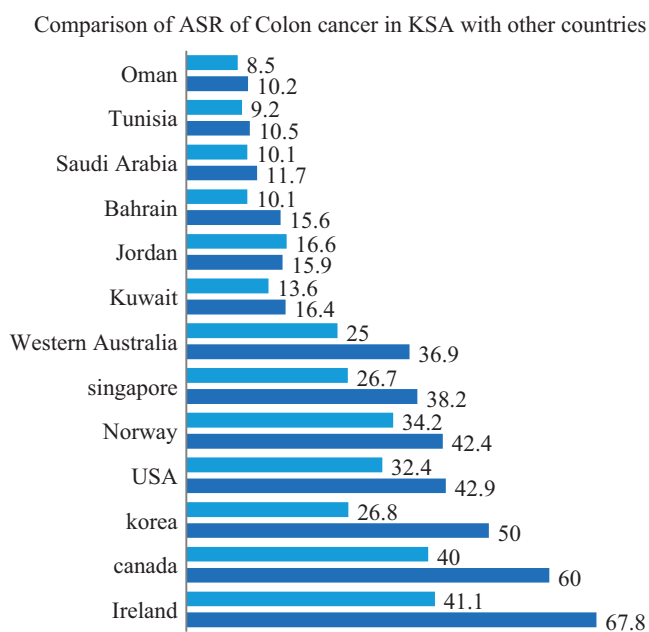


Figure-3: Comparison of Age Standardized Rate (ASR) for Colon cancer in Saudi Arabia in 2013 compared to other selected countries in the world¹³

has been the most common cancer type among male population and the 3rd most common among female population in Saudi Arabia. According to the cancer incidence report of Saudi Arabia, 1387 people were diagnosed in Colon cancer in 2013 which accounts for 11.9% of the overall diagnosed cancer.¹³ If affected 53.1% of male population within this group and 46.9% of women were affected in Colon cancer in 2013. This type of cancer becomes the 2nd most happening cancer type among Saudi individuals of all ages.¹³ Again, Colon cancer accounts for 13.9% of diagnosed male population while for female population it is 10.2%. Moreover, the age standardized rate (ASR) for Colon cancer for male was 11.7 per 100,000 population whereas for female the ASR was 10.1 per 100,000 population.¹³ In case of Saudi population, most of the people affected and diagnosed with Colon cancer are mainly older and aged people. The median age for the male population diagnosed with this cancer was 60 years while for female population the median age was 56 years.¹²

On the other hand, the age standardized rate (ASR) for Colon cancer in both male and female vary non-uniformly over the different regions in Saudi Arabia. Eastern part of Saudi Arabia and Riyadh were identified with highest ASR rate of Colon cancer in KSA followed by Asir, Madinah and Makkah.¹³ Again, in Eastern part of KSA the ASR is 13.1 per 100,000 population for female and 17.6 per 100,000 population for female. Similarly, in Riyadh the ASR is 15.3 per 100,000 population for female and 17.1 per 100,000 population for female.¹⁷ On the other hand, Jazan has the lowest ASR rate for both female and male population, reported only 1.4 and 2.6 respectively compared to other regions in KSA¹² (figure-3).

CONCLUSION

Colon cancer is now a serious public health issue throughout

the world and accounts for more than half millions of deaths every year. Incidence rate of Colon cancer is more in male population than female and rate of prevalence is much higher in developed countries. People older than 75 years are more susceptible to this disease while in KSA people with 60 years or even more are more vulnerable towards colon cancer. Death of large population through Colon cancer can be prevented by making this cancer type a form of cancer and this will become a success for Colon cancer epidemiology.

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