

## RESEARCH ARTICLE

# Increasing Trend in Colorectal Cancer Incidence in the Southeast of Iran 2003-2013: A Population Based Cancer Registry Study

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## Abstract

Rates based on age-adjusted incidence of colorectal cancers over a 10-year period in Kerman, the biggest province of Iran, were estimated from 2003 to 2013. Data were obtained from the population-based cancer registry unit of Kerman University of Medical Sciences (CR-KMU). Information included age, sex, city, ICD-O and year of registry. Our trend analyses cover 3.91% of the Iranian population. The data set comprised cases diagnosed from 2003 to 2013. The population of over 20 years was interpolated using 2003 and 2010 censuses. Then, truncated age-adjusted incidence rates were calculated. Increase was noted from 2003-2009 to 2010-2013 for 731 cancer cases considered in the analysis. The increases was most prominent in 2009. Totally, the frequency of the cancer was greater in males. Moreover, calculating truncated age-adjusted incidence rate indicated that the most prevalent age of colorectal incidence was in the 50-59 year age group except in 2007-2008 and 2012-2013, when greatest incidences occurred in people aged 60-69 years. Our data revealed that the incidence rates of colorectal cancer have increased over the past decade in our region of Iran.

**Keywords:** Neoplasm - colorectal - epidemiology - Iran

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## Introduction

Colorectal cancer is the fifth most common type of cancers in the world (1,378,000 cases in 2012). The most number of cases has been reported from Europe, West Pacific region, and North America (2008) in which 600,000 cases died because of large intestine cancers. Age adjusted incidence rate was 20.3 and 14.6 per 100,000 for males and females, respectively. The cancers were included 9% of men and 10% of women out of all type of cancers (Ferlay et al., 2013).

The incidence of the cancers are various among countries from 42 per 100,000 in Slovakia to 2 per 100,000 in Africa. The least incidence rate has been reported from Central Africa, India, Bangladesh, and Yemen (Siegel et al., 2014).

Iran is a country located in the East of Mediterranean region (EMRO) with 78 million population. In 2008, the incidence rate of the large intestine cancers in Iranian men and women has been estimated as 8.7 and 6.4 per 100,000 by International Agency on Research Cancer (IARC). Moreover, the information released from the IARC has indicated that the variety of the incidence of the cancer is considerable (men: 4 in Yemen to 19 per 100,000 in

Jordan; women; 3.5 in India to 14.5 per 100,000 in Jordan) (Center et al., 2009).

Some documents have projected the trend in colorectal cancer all around the world. The National Institute of Health (NIH) claimed that the trend of the cancer will be going up by 2020 (Klabunde et al., 2011). Moreover, the absolute number of new cases of colorectal cancer were increasing by 2008 in Canada (Gao et al., 2008). In Italy, a model have proved that the trend of colorectal cancer had been rising through 70s and 90s (Capocaccia et al., 1997).

Based on Iran Cancer Registry (ICR), the most cases of colorectal cancer were reported from the North of Iran (Golestan and Mazandaran province). In addition, ICR confirmed that colorectal cancer is the fifth cancer among Iranian men and the third one among Iranian women (Cancer, 2011). Recent studies comparing the incidence of the cancer during 1970-2000 concluded the increase of 80-100% in the incidence of colorectal cancer in Iran (Hosseini et al., 2004a).

Trend analysis is the subset of descriptive epidemiology helping health policy makers to consider more to challenging conditions like cancers and to allocate adequate resources to prevent, control and cure involving people. The aim of this study was to determine trend in

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colorectal cancer incidence in Kerman-the largest province of Iran -during last decade (2003-2013).

**Materials and Methods**

Data were obtained from the cancer registry of Kerman University of Medical Sciences-the branch of ICR. Data included age, sex and the year of diagnosis of colorectal cancer during 2003-2013. Since 1986, the ICR has been collecting and publishing cancer incidence from 3 population based cancer registries that currently include 32 province of Iran. Kerman is the largest province representing 3% of Iran population.

*Age-specific rate*

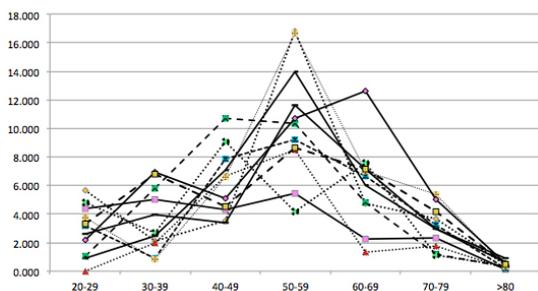
Age-specific rate is one the most common and important stratum-specific rate. The age-specific rate is the number of events/event over a given time period (per 1000 or 100000 population per year). Comparing each age group over the given time and between population groups allow policy makers have a valid aspect to the changes of the event and allocating appropriate sources to the population’s event.

Age-specific incidence rate of colorectal cancer is the incidence of colorectal cancer limited to particular age group, in which numerator is the number of new cases of colorectal cancer in that age group, and the denominator the number of persons in that age group in the population. Age groups were from 20 year-old with ten years interval to over 80 year-old.

Standardization of the rate adjusts and controls differences in population structure and allows scientists to compare the values over the time and place. One the most common factor can be used to adjust for because many events especially cancers are closely and strongly related to age is likely vary across time and place.

We used recommended standard population by World Health Organization (WHO) to adjust age specific incidence rate of colorectal cancer in Kerman province (ref). Although it seems complicated having new cases of each year and population of each age group is adequate.

Iran have conducted five censuses after 1979 revolution (ref.amar.org.ir), hence, estimating the population of other years was a step to calculating age-specific incidence of colorectal cancer. Linear regression model was applied to predict the populations between censuses. All mentioned analysis was done in Excel MS.



**Figure 1. Age-Standardized Incidence Rates of Colorectal Cancer in Kerman Province, 2003-2013.**

*Trend analysis*

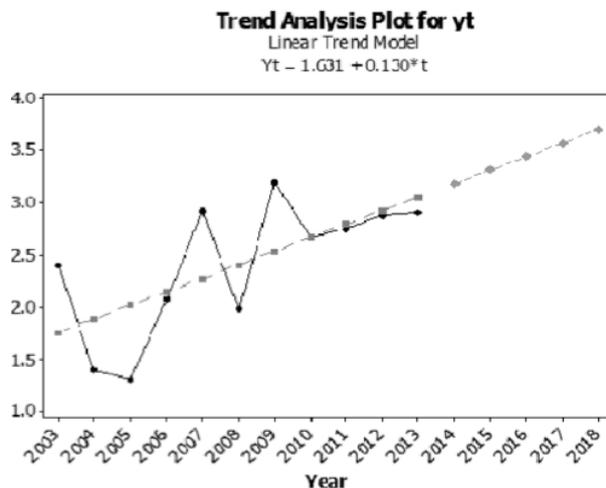
Studying time trends can make information on risk factors and historical evolution of the factors. Moreover, geographical variation in incidence between populations might count for genetic variety, changes of environmental risk factors. Comparing frequency of given population over the time and places could be profitable for instance the increase in incidence of bladder cancers parallels the progressive using of substandard pesticides after sanctions of Iran. Here, we applied linear trend model to estimate the time trend of colorectal cancer through 2003-2013 and also predicting secular trend of the cancer in Kerman province till 2018 in MINITAB 16 Statistical software.

**Results**

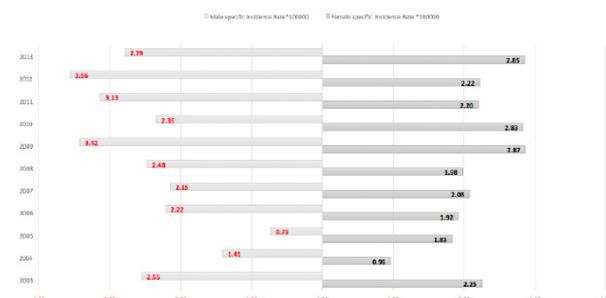
From 2003-2013, there were 731 incident cases of colorectal cancers registered in Kerman cancer registry. The age range was 59.65±15.14 and 51% were men.

The age-adjusted incidence rate peaked during 2009 in 50-59 subpopulation with 16.7 cases per 1000 Kerman province population. A substantial decline of colorectal cancer was observed from 2004-2006, decreasing from 5.036 to 1.94 per1000 of 30-39 Yrs population. A distinct acceleration was seen in 30-30 and 60-69 Yrs during 2012-2013 (+56.55%). Data revealed that the incidence speed up in 30-39 Yrs more than the other age groups (Figure 1).

The trend of colorectal cancer in Kerman province the model was  $Y_t = 1.631 + 0.130t$  which has a linear form trend. Based on the model the incidence of colorectal



**Figure 2. Trend Analysis of Colorectal Cancer in Kerman Province, 2003-2018**



**Figure 3. Incidence Rates of Colorectal Cancer in Kerman Province by Sex, 2003-2013**

*Increasing Trend in Colorectal Cancer in the Southeast of Iran 2003-2013: a Population Based Cancer Registry Study* (1980-2000) (Hosseini et al., 2004b).

cancer will get faster till 2018 (Figure 2). Comparing sex specific incidence rate revealed that there was not any statistical difference between men and women ( $P=0.4$ ), however, male incidence rate was approximately more than female's (figure 3).

## Discussion

Many countries all around the world aware their members about gastrointestinal cancers and have run strategies to prevent them. However, initially, convincing stake holders to allocate appropriate sources needs clear and persuasive evidences. Proving increasing in the trend of colorectal cancer could provide key documents in this case. Here we provided evidence about trend in colorectal cancer in the south east of Iran where cancer registries are not very efficient to keep politicians immediately alert about the trend of cancers. Our main finding indicated that the trend in colorectal cancer has been accelerating during the last decade (2003-2013) and increasing is continuing till 2018.

From the East to the West, there are documents trying to prove the progressive increase of colorectal cancer. In Europe, a sharp increasing in the incidence of colorectal cancer has been estimated during a 15 years (Holmqvist, 1997; Swerdlow et al., 1998; Svensson et al., 2002). Asia is not an exception, many countries have reported acceleration in the trend, like the Pacific Rim countries (Sung et al., 2005) such as Hong Kong (Yee et al., 2010; Xie et al., 2012) and Saudi Arabia (Mosli and Al-Ahwal, 2012). In contrast, the USA has enhanced screening programs and is successful in controlling and decreasing the trend of colorectal cancer (Cress et al., 2006).

Many studies has been estimated the incidence and trend of gastrointestinal (GI) cancer in Iran. GI cancers was known as the five common cancer in Iran (Radmard, 2010). Four years incidence rate of colorectal cancer in Iran using national cancer registry data was revealed that incidence of CRC in people under 50 years and in rectum were reported higher than other countries (Safaei et al., 2012).

The incidence of colorectal tumors has been assessed in five provinces of Iran from 1996 to 2000. It has reported age-adjusted rates of CRC 8.2 and 7.0 per 100000 in Iranian males and females, respectively. They also proved that the age of the incidence reduced to those less than 40 years of age at the time of diagnosis (Ansari et al., 2006).

A study in East Azerbaijan province of Iran confirmed the ascending trend of colorectal cancer in this region during 2007-2011, although, it indicated good control of esophageal cancer in the area. In the other province, Golestan, the ASRs of cancers of interest were 175.3 for males and 141.1 for females and increasing trends in the incidence of colorectal cancer during 2004-2008 (Roshandel et al., 2012; Somi et al., 2014).

Because of increasing in cancer risk factors, trend of colorectal cancer is going up to approximately fast in the west of Iran (2000-2005) (Abdifard et al., 2013). On the other hand, the increasing of the trend has been considered in Shiraz -a city in the southwest of Iran- markedly the incidence sharply enhanced in the 40-60 year age group

The age-standardized rate of colorectal cancer was estimated as 10 per 100000 females and 11.6 per 100000 males in Khuzestan-a province in the southwest of Iran-with annually increasing trend during 2004-2008 (Amoori et al., 2014).

There is no doubt that the trend of cancers especially gastrointestinal cancers is increasing during last decades (epidemiological transition) and numerous studies revealed the issue. On the other hand, improvement of registry systems during the time and converting to pathologic based evidence and promoting of health literacy in Iran. Hence, it seems that part of increasing trend is because of recording system but all of the trend does not attributed to the systems (Mousavi et al., 2009). Moreover, during last decades the government has concerned to health really more than the other times, therefore people's knowledge has been promoted and self-responsibility has enhanced, consequently, more cases can be screened and diagnosed. This procedure leads in amplifying registration.

It is clear that the reasons only could justify a part of the increased trend. Aging of population and deterioration of life style (nutritional pattern, and physical inactivity) aggravate risk for non-communicable diseases especially cancers. Hence, it is expected that some part of trend is due to real increasing in the incidence of colorectal cancer in the society.

As a result, policy makers should consider more to such cancers, approve more policies to prevent and early diagnosis, allocate appropriate sources, and also identify and aware high risk populations.

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