RESEARCH COMMUNICATION

Colorectal Cancer in Central Tunisia: Increasing Incidence Trends over a 15-Year Period

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Abstract

Introduction: Significant variation in colorectal cancer incidence rates and trends has been observed across countries. Data from Tunisia are sparse. In this paper, we analyzed trends in incidence rates of the colorectal cancer over a 15-year period, 1993-2007, in Central Tunisia. Design: Five-year age-specific rates, crude incidence rates, world age-standardized rates, and annual percent change were calculated using annual data on population size and its estimated age structure. Results: A total of 1,443 incident cases of colorectal cancer were registered, with a male to-female sex ratio of 1.1:1. The world age-standardized rate was 10.0 per 100,000 among females and 11.7 among males. Over time, there were significant increasing trends by +2.6% (95% CI: 0.1%, 5.1%) and +5.3% (95% CI: 2.7%, 7.9%) for females and males, respectively. Conclusion: The absence of a screening program for colorectal cancer could explain the increasing trends observed among males and females in Central Tunisia. Our findings point the need to plan and develop effective programs aimed at the control and prevention of the spread of colorectal cancer in Tunisia.

Keywords: Colorectal cancer - incidence trends - increase - Tunisia

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Introduction

Colorectal cancer is the fourth most common cancer in men and the third most common cancer in women worldwide (Parkin et al., 2002). Significant international variations in the distribution of colorectal cancer have been observed (Parkin, 2004; Curado et al., 2007; Center et al., 2009; Center et al., 2009; Ferlay et al., 2010). Risk factors for colorectal cancer include obesity, a diet low in fruits and vegetables, physical inactivity, and smoking (Giovannucci, 2002; Popkin, 2004; Giovannucci and Wu, 2006; Botteri et al., 2008). Previous studies have reported rapid increases in colorectal cancer incidence rates, particularly in economically transitioning countries in many parts of the world (Parkin et al., 2002; Thygesen et al., 2004; Cress et al., 2006). In most western countries, colorectal cancer incidence rates are stable or on the increase (Center et al., 2009; Center et al., 2009). In the United States, incidence rates are decreasing among both males and females due to the widespread use of surveillance colonoscopy used as spontaneous screening test (Meissner et al., 2006; Center et al., 2009; Center et al., 2009). However, data on incidence trends of the colorectal cancer from Tunisia were sparse. We present here colorectal cancer incidence trends in Central Tunisia over a 15 year-period.

Materials and Methods

Colorectal cancer incident cases were retrieved from the Cancer Registry of the Centre of Tunisia, a population-based cancer registry active in Tunisia since 1993 (Parkin et al., 2003; Curado et al., 2007; Missaoui et al., 2010). The cancer registry was established under the auspices of the International Agency of Research on Cancer (IARC), Lyon (France) and located in the Pathology Department of the Farhet Hached University Hospital, Sousse (Tunisia). Cancer Registry of the Centre of Tunisia includes six provinces (Sousse, Monastir, Mahdia, Kasserine, Sidi Bouzid, and Kairouan) covering a total surface of 28,426 km^2.

The International Classification of Diseases, 10th revision (ICD-10) was used for cancer classification (Percy et al., 1992). In the present study, the inclusion criteria were new cases of colorectal caner (C18, C19-20, and C21) diagnosed between the 1st January 1993 and the 31st December 2007. Incidence rates were analyzed during 1993-2007 as well as during the three periods (1993-1997, 1998-2002, and 2003-2007). The proportional age distribution of Sousse population for each year between 1993 and 2007 was provided by the National Institute of Statistics in Tunisia. Crude incidence rates (CR) and five-year age-specific rates were calculated

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separately in respect for the three periods, using population denominators derived as described (Curado et al., 2003; Bray et al., 2002). Age-standardized incidence rates (ASR) were calculated by the direct method, using the world standard population (Curado et al., 2003). Rates were expressed per 100,000 person-years (Curado et al., 2003). Trends of incidence rates were analyzed during three periods (1993-1997, 1998-2002 and 2003-2007). The annual percent change (APC) was calculated as previously described (Bray et al., 2005; Chen et al., 2006). In brief, the APC is calculated by fitting log-linear regression line to the natural logarithms of the rates using calendar year as the independent variable (Bray et al., 2005). The APC was obtained from the formula $100 \times [e\beta - 1]$, where β is the parameter estimate obtained on fitting period of event as a continuous variable to the logarithm of the rate (Bray et al., 2005). Statistical significance was determined by calculating 95% confidence intervals (95% CI) for the APC (Szklo and Nieto, 2000). In describing the change, the terms "increase" or "decrease" were used when the rate ratio was statistically significant (two-sided p values < 0.05); otherwise the term "stable" was used.

Results

A total of 17238 cancer cases were registered during the 15-year period, of which 1,443 colorectal cancer cases (8.4%). There were 781 men (54.1%) versus 662 (45.9%) women. The median age was 62 with a mean age of 60.1 years (ranging from 9 to 90 years). Colorectal cancer accounted for 7.4% and 9.3% of all cancers cases among males and females, respectively. The ratio of colon to rectum cases was 1.3:1 overall; and 1.4:1 and 1.2:1 in females and males, respectively.

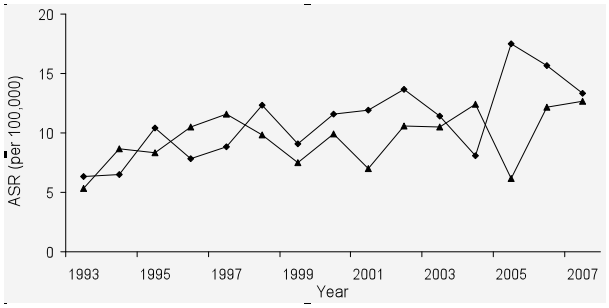

Figure 1. Trends in Age-standardized Incidence Rates (ASR) of Colorectal Cancer in Central Tunisia, 1993–2007

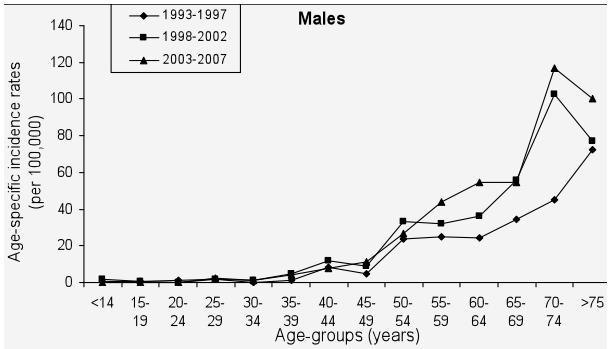

Figure 2. Age-specific Incidence Rates of Colorectal Cancer in Central Tunisia During Three Time-periods

The crude incidence rates (CR) during the whole 15-year period were 8.8 per 100,000 in men, and 8.2 per 100,000 in women, with a male-to-female ratio of 1.1:1. Colorectal cancer was ranked fourth among male cancers with an ASR of 11.7 per 100,000; there is a markedly increasing trend by an APC of + 5.3% (95% CI: 2.7%, 8.0%) during the observation period (Fig. 1). Colorectal cancer was ranked sixth during the 1993-1997 period (ASR: 7.7). This cancer took the third place (ASR: 12.9) among all men's cancers in the 2003-2007 period.

Among women, colorectal cancer has ranked the second in incidence (ASR: 10.0) with a significant increase by +2.6% (95% CI: 0.1%, 5.1%) during the observation period (Figure 1). This cancer was ranked the third most common cancer between 1993 and 1997 (ASR: 8.7); and in the 2003-2007 period, it took the second place among all women's cancers (ASR: 10.7).

Figure 2 shows the age-specific incidence rates of the colorectal cancer during the three periods. Notable increase has taken place in the incidence of this cancer in males aged more than 55 years. Increasing trends in incidence of colorectal cancer are significant mainly in women aged 60-64 and 65-69.

Discussion

In Central Tunisia, colorectal cancer was ranked fourth in males, but second among women. Incidence rates are slightly higher in men than in women as reported (Center et al., 2009; Center et al., 2009). The ratio of colon to rectum cases was rather more in females. In industrialized countries, cancer of the colon is more frequent than rectal cancer with a ratio of colon to rectum cases of 2:1 or more; while in non-industrialized countries rates are generally similar (Labianca et al., 2010). Incidence rates of colorectal cancer reported here were slightly lower than the rate described in other Arabic countries, such us Libya (ASR: 12.9), Saudi Arabia (ASR: 14.3), and Jordan (ASR: 15.3) (Ferlay et al., 2010). Nevertheless, the incidence rates were relatively higher than that described in most African countries except the South African Republic, such us Tanzania (ASR: 2.7) and Guinea (ASR: 2.6) (Center et al., 2009; Center et al., 2009; Ferlay et al., 2010). Central and South America, and much of Asia are also areas of low risk (Parkin, 2004; Ferlay et al., 2010). Among both males and females, the lowest rates of colorectal cancer incidence were observed for registries in India (ASR: 4.3), Yemen (ASR: 4.3), Egypt (ASR: 4.6), and Pakistan (ASR: 4.9) (Center et al., 2009; Center et al., 2009; Ferlay et al., 2010). In these economically developing regions of the world, low colorectal cancer incidence rates may reflect a lower prevalence of known risk factors which are associated with economic development and westernization (Popkin, 1994; Giovannucci, 2002; Giovannucci and Wu, 2006; Botteri et al., 2008). The majority of registries with the highest incidence rates of colorectal cancer were located in Europe, North America, and Oceania, such us, Canada (ASR: 45.4), Germany (ASR: 45.2), and Australia (ASR: 46) (Center et al., 2009; Center et al., 2009; Ferlay et al., 2010).

The present analysis of colorectal cancer incidence

in Central Tunisia showed significant increasing trends over time not only in men but in women also. More rapid trends of colorectal cancers were reported from other cancer registries (Center et al., 2009; Center et al., 2009). Incidence rates increased in economically transitioning countries especially those that were once part of the Soviet Union and the Eastern European Communist Bloc such as Poland, Estonia, the Czech Republic, and Slovakia (Center et al., 2009; Center et al., 2009; Ferlay et al., 2010). During the last years, rates increased continuously among males in the Czech Republic (ASR: 60.7) and Slovakia (ASR: 60.6) surpassing the peak rate of United States males (ASR: 34.1) (Center et al., 2009; Center et al., 2009; Ferlay et al., 2010). Changes in risk factors in these countries during the transition from planned market economies to open market economies could partly explain these increasing trends (Knai et al., 2007). In fact, the adoption of western lifestyles and behaviors such as the consumption of high-fat diets and physical inactivity could explain the incidence increase in these countries (Center et al., 2009; Center et al., 2009). The joint effect of elevated smoking prevalence and obesity may have contributed in part to the high colorectal cancer rates among males in the Czech Republic and Slovakia (Center et al., 2009; Center et al., 2009).

The more significant increase in colorectal cancer incidence rates in men compared with women reported in our study joined the worldwide reports (Center et al., 2009; Center et al., 2009). These findings could reflect the slower adoption of certain risk behaviors associated with colorectal cancer such as: smoking, heavy alcohol consumption and obesity (Popkin, 2004; Knai et al., 2007; Baillie, 2008; Center et al., 2009; Center et al., 2009). In Japan, a developed country with one of the strongest economies worldwide, the high incidence of colorectal cancer, particularly among males, is most likely due to modifications in dietary intake (Kono et al., 2004), increased obesity (Matsushita et al., 2008, and the differing effect of obesity in men and women (Frezza et al., 2006).

In contrast to our findings, in Australia and Western Europe, incidence rates have generally stabilized in recent years with the exception of Spain (Center et al., 2009; Center et al., 2009). In the United States, colorectal cancer incidence rates decreased significantly for American men and women from 1983-87 to 1998-2002 based on nine Surveillance, Epidemiology, and End Results (SEER) registries. Based on recent incidence data from the United States, incidence rates continued to decrease through 2005 in both males and females (Jemal et al., 2008; Jemal et al., 2008). Similar decreasing rates were reported among Canadian and New Zealand women (Center et al., 2009; Center et al., 2009).

Colorectal cancer screening programs increase the detection of tumors at earlier stages and reduce colorectal cancer incidence and mortality (Walsh and Terdiman, 2003; Baxter et al., 2009). In the United States, the increased use of screening has been cited as one of the most important factors responsible for the recent decline in colorectal cancer rates. Colonoscopy has been the most prevalent of all colorectal cancer screening tests (Meissner et al., 2006), contributing to the marked decline in incidence rates of this cancer among American males and females (Espey et al., 2007; Jemal et al., 2008; Jemal et al., 2008; Levin et al., 2008; Center et al., 2009; Center et al., 2009). Targeted prevention and early detection programs could reverse the increasing trend of colorectal cancer incidence rates observed in Central Tunisia (Benson et al., 2008). However, in Tunisia, there is still no screening program for the colorectal cancer which could explain the increasing trends.

In conclusion, colorectal cancer incidence showed significant increasing trends between 1993 and 2007 among both men and women in Central Tunisia. The absence of colorectal cancer screening program in Tunisia could explain the increasing trends. Our findings justify the need to plan and develop effective programs aiming at the control and prevention of the spread of colorectal cancer in Tunisia.

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