Colorectal cancer: incidence and trend in Brunei Darussalam

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ABSTRACT

Introduction: The incidence of colorectal cancer (CRC) is reported to be increasing. This study assessed the incidence and trend of CRCs in Brunei Darussalam, a developing nation.

Methods: All histologically-confirmed CRCs over a 22-year period (1986–2007) were identified from the National Cancer and the Department of Pathology registries and retrospectively reviewed.

Results: There was a total of 576 (male 59.0 percent, mean age 59.6 +/− 14.8 years, adenocarcinoma 97.6 percent, rectum 31.4 percent) CRCs diagnosed during this period. There was an increasing trend in the mean age at diagnosis, 55.2 +/− 17.5 years in 1986 to 62.0 +/− 13.0 years in 2007, but this was not significant (p-value equals 0.150, ANOVA). 18.8 percent were diagnosed in patients aged 45 years or below. There was no difference in the age at diagnosis between the genders (p-value equals to 0.432) and tumour sites, colon vs. rectum (p-value equals to 0.279). Overall, there was an increase in the age standardised rate (ASR) from 10.36 (1986–90) to 13.75 (1991–95), 15.90 (1996–2000), 16.87 (2001–05) and 24.31 per 100,000 (2006–07). Among the ethnic groups, the Chinese had higher ASRs (41.44) compared to the Malays (including the indigenous groups) with 15.46 per 100,000. The mean age of the Chinese (62.6 +/− 14.0 years) was significantly higher than that of the Malays (58.2 +/−14.9 years, p-value equals to 0.001) at diagnosis. The age-specific incidence rates for the genders were comparable, except for the age groups of older than 55–59 years, where the rate for males was higher.

Conclusion: The incidence of CRC is increasing in our local setting with differences observed among the ethnic groups. The Chinese had a higher incidence but developed CRC at a later age. These have important implications if screening for CRC is to be considered in our local setting.

Keywords: colon neoplasms, colorectal cancer, rectal neoplasms

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INTRODUCTION

Colorectal cancer (CRC) is the third most common cancer worldwide, after lung and breast cancers, with the incidence rates reported to be rising.[1] The incidence rates from the West are generally higher than those reported in the East. However, with rapid economic development and the increasing westernisation of lifestyle, many developing nations have also experienced increasing incidence rates. In the Asia-Pacific region, particularly in the developed or more westernised nations such as Singapore, Hong Kong, South Korea, Taiwan and Japan, and increasing incidences of CRCs have been reported.[1-7]

The adenoma-carcinoma sequence is the most widely-accepted pathogenesis pathway, which usually takes years to progress.[8] This make screening an ideal strategy, as the detection and removal of premalignant lesions can prevent the subsequent development of CRC.[9] Reports from the United States, where CRC screening programmes have been implemented, have shown that the incidence has decreased in two straight years and this has been attributed to the screening programmes.[10,11] The Asia-Pacific Working Group on Colorectal Cancer recently published a consensus statement on CRC screening for the Asia-Pacific region.[12] Before implementing any screening programme, it is important to know the underlying epidemiology of CRC in the respective local settings. This study assessed the incidence and trend of CRC in Brunei Darussalam, a developing nation with a predominantly Malay population.

METHODS

All histologically-confirmed CRCs over a 22-year period (1986–2007) were identified from the National Cancer and the Department of Pathology registries and retrospectively reviewed. The National Cancer Registry was set up in 2000, and all cancer registrations were done voluntarily.

Table I. Demographics of patients, colorectal cancer sites and histology types.

	No. (%) of patients
Mean age and SD (range) (years)	59.6 ± 14.8 (19 –96)
Gender	
Male	340 (59.0)
Female	236 (41.0)
Ethnic groups	
Malays	371 (64.4)
Chinese	190 (33.0)
Indigenous	15 (2.6)
Locations of colorectal cancer	
Colon	397 (68.9)
Rectum	179 (31.1)
Histology types	
Adenocarcinoma	562 (97.57)
Lymphoma	6 (1.04)
Carcinoid	5 (0.87)
Others	3 (0.52)

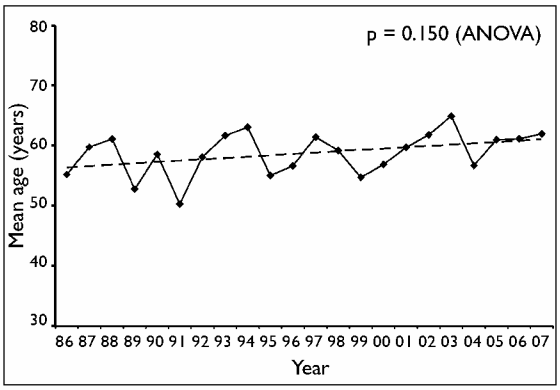

Fig. 1 Graph shows the average age at diagnosis over the 22-year study period and the trend of increasing age at diagnosis.

Clinicians caring for patients with CRC or other cancers were routinely sent a standard form soon after diagnosis. Details on patient demographics, types and locations of the cancer were noted. The Department of Pathology Registry was established in 1986 with the official opening of the Raja Isteri Pengiran Anak Saleha Hospital, Brunei Darussalam, and maintained by the department. This registry captures data on the gender, age, ethnic group and type of cancers, including all histology-proven CRCs, and is thus quite reliable. The two registries were used to minimise any missed cases of CRC. In our local setting, most of the CRCs were diagnosed with colonoscopy, and a minority was diagnosed via surgery. In the latter cases, the patients mostly presented acutely to the surgery department with complications of CRCs, such as bowel obstructions, and less frequently, with perforations or bleeding.

In this study, only the CRCs diagnosed in citizens, permanent residents and indigenous population were included. Data on age, ethnicity, gender, site of cancer and histology were extracted from the registries. The World Health Organization (WHO) population projection for Brunei Darussalam (1996–2007) was used for the calculation of the incidence rates. These projections provided gender and age breakdowns into five-year group intervals. Data on the ethnic breakdown (the indigenous population was included in the Malay group) was obtained from the Economic Planning Unit, Ministry of Finance, Brunei Darussalam. The population breakdown, which was based on the population estimate of 383,000 in 2006, was 66.7% Malays, 11.5% Chinese, 6.0% indigens and 15.8% expatriates. The population estimates for the years 1986–1995, which were unavailable from the WHO database, were estimated by using the expected population growth during these years (3.3% population growth per year). The age-specific incidences rates were calculated using the 1996 population breakdown. The age-standardised incidence rates (ASRs) were calculated using the WHO population as the standard population. The ASRs were calculated and presented in five-year blocks and individual years. Data was entered into the Word Excel spreadsheet, and the Statistical Package for Social Sciences version 10.0 (SPSS Inc, Chicago, IL, USA) was used for statistical comparison. The Student's *t*-test and the Mann-Whitney test were used, where appropriate. The analysis of variance (ANOVA) was used to compare multiple continuous variables. Significance was taken when the p-value was less than 0.05.

RESULTS

There were a total of 576 (59.0% male) CRCs diagnosed during the 22-year period. The patient demographics, CRC sites and histology types are listed in Table I. The overall mean age at diagnosis was 59.6 ± 14.8 (range 19–96) years. There was an increasing trend in the mean age of CRC diagnosis over the 22-year period, from 55.2 ± 17.5 years (1986) to 62.0 ± 13.0 years (2007) (Fig. 1). However, this was not statistically significant ($p = 0.150$, ANOVA). 18.8% of CRCs were diagnosed in patients aged ≤ 45 years. There was no significant difference in the age at diagnosis between the genders (male 60.0 ± 14.3 years vs. female 59.1 ± 15.5 years, $p = 0.432$) as well as the tumour sites (rectum 59.2 ± 14.9 vs. colon 60.6 ± 14.5, $p = 0.279$).

Overall, there was a steady increase in the ASR, from 10.36 (1986–90) to 13.75 (1991–95), 15.90 (1996–2000), 16.87 (2001–05) and 24.31 per 100,000 (2006–07) (Fig. 2). The ASR for the individual years (Fig. 3) shows wider fluctuations in the incidence rates with an obvious upward trend. Among the ethnic groups, the ASR for the Chinese was 41.44/100,000, compared to the Malays (including the indigens) of 15.46/100,000. The Chinese (mean age 62.6 ± 14.0 years) were significantly older than the Malays

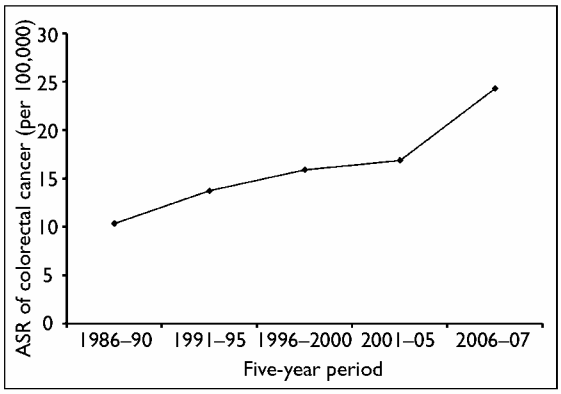

Fig. 2 Graph shows the age-standardised rates over five-year period blocks.

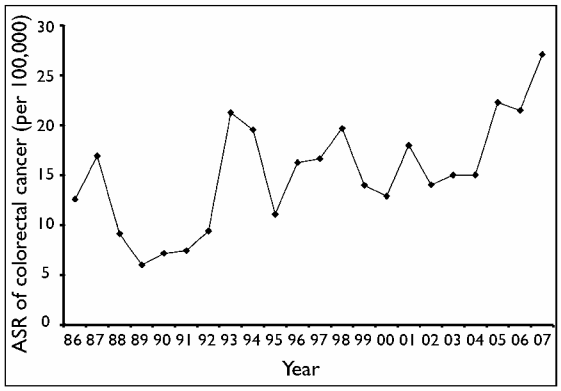

Fig. 3 Graph shows the age-standardised rates for individual years over the 22-year study period.

(mean age 58.2 ± 14.9 years, p = 0.001) at the point of CRC diagnosis. When the Malay group was analysed separately, the indigenous group was diagnosed at a younger age (53.0 ± 18.4 years) compared to both the Malays (58.4 ± 14.8 years, $p < 0.05$) and the Chinese ($p < 0.05$). The overall ASR for males and females were 20.95 and 15.05 per 100,000, respectively.

Overall, the age-specific incidence rates increased with age. The rate was higher among the Chinese compared to the Malays (Fig. 4). The age-specific incidence rates for the males were comparable to that of the females, until after the age of 60 years, where males showed higher rates (Fig. 5). The age-specific incidence rates for tumour sites showed that the colon was generally twice more common compared to the rectum (Fig. 6).

DISCUSSION

Brunei Darussalam is a rapidly-developing nation with a predominant Malay population. Similar to what has been reported in many developed and developing nations, our study also showed an increasing incidence of CRC. Reports from the more developed nations in the Asia-Pacific region have also shown increasing incidence rates.[1-7,12] The reported incidence rates range from 24.7 to 49.3/100,000 for men and are comparable to the rates reported from the West. Incidence rates in North America were reported to be 44.6 and 33.1 per 100,000 for men and women, respectively, and the rates in Western Europe were reported to be 42.9 per 100,000 for men. In our local setting, the overall ASR for men and women were 20.95 and 15.05 per 100,000, respectively. These were lower than the rates reported by more developed Asia-Pacific nations.

Overall, the mean age of diagnosis in our population was comparable to previous reports. There was also an increasing trend observed in the mean age of diagnosis over the 22-year period. This is not an unexpected finding and is most likely the result of the ageing population. Between 1977 and 2005, the life expectancies in our local setting have increased from 68.13 to 74.68 years for males, and 71.43 to 77.59 years for females. There was no difference in the mean age of diagnosis between the genders and the locations of the cancers. However, among the ethnic groups, CRCs were diagnosed in significantly older Chinese patients compared to the Malay and indigenous groups. This has important implications if screening is to be considered in our local setting.

Importantly, almost a fifth of those diagnosed with CRC were aged 45 years or younger. Again, this has important implication if a screening programme is to be considered. The current recommendations for screening is 50 years or older in those without any family history of CRC or other risk factors.[12,13] Unfortunately, complete details on the family history of CRC based on the two registries were unavailable, and therefore correlation of family history with patients diagnosed with CRC at age 45 years or less, could not be conducted. However, among the cohort of over 300 patients treated for CRC and followed up in the oncology unit, there were only three families with familial cancer syndrome. Male gender has been shown and widely accepted to be associated with an increased risk for CRC.[1,12] In our local setting, more male subjects were diagnosed with CRC. The age-adjusted specific incidence rates for males were higher and almost double that of the rates for females. The age-specific rates were comparable for both genders until after the age group of 55–59 years, where the rates increased markedly for males.

Certain ethnicities have been shown to have a higher risk compared to others.[1] Similar to reports from Singapore and Malaysia, we also showed that the Chinese had a higher incidence compared to the Malays.[1-3] The Chinese population in our local setting had an ASR of almost three times that of the Malay population. In fact, the ASR in our Chinese population was higher than the rates reported in Singapore and comparable to those in

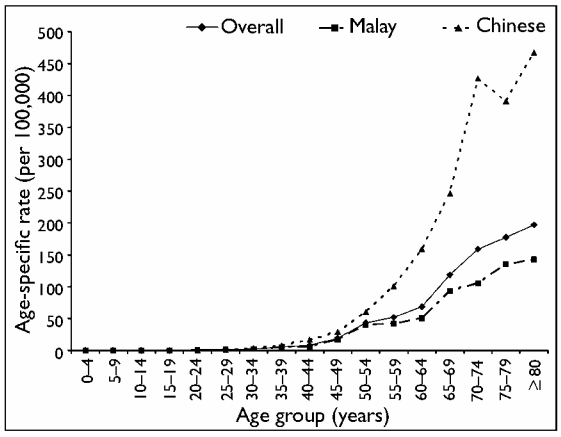

Fig. 4 Graph shows the overall and ethnic-specific incidence rates for colorectal cancer according to age.

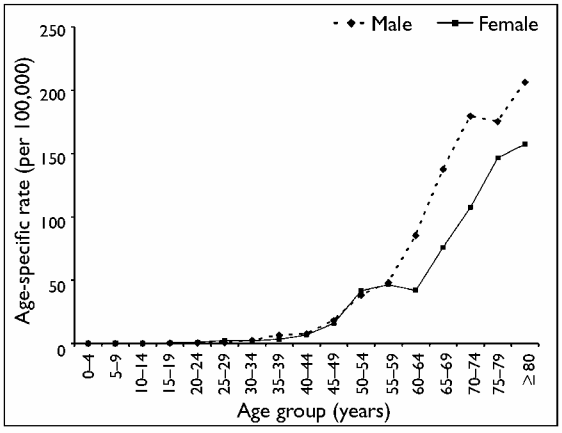

Fig. 5 Graph shows the age-specific incidence rates between the genders.

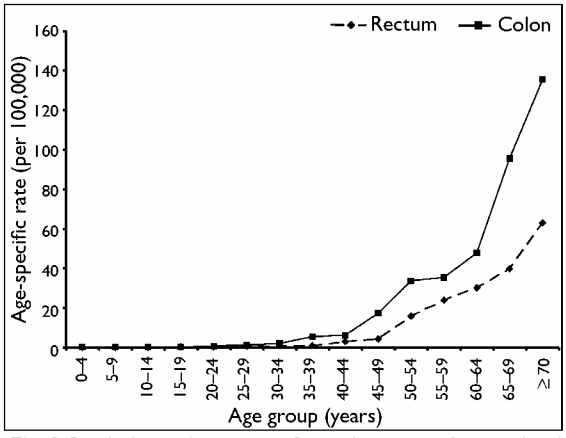

Fig. 6 Graph shows the age-specific incidence rates for rectal and colon cancers.

Hong Kong. The true ASR are likely to be slightly higher for our Chinese population as some of the Chinese patients are known to seek medical investigations and treatment overseas. Such cases may not have been followed up in our clinics, and would therefore not have been recorded in our registries. However, the numbers were small and this trend was decreasing.

The reasons for the trends observed in our local setting are not known. However, the factors responsible are probably similar to those identified in previous reports. The westernisation of lifestyles which is believed to be an important factor, is also occurring in our country.[12] Diets rich in saturated fat and red meat, low in fibre, coupled with sedentary lifestyles and an increasing prevalence of obesity are important contributory factors.[14-20] Ethnic background also plays an important role. Our Chinese population has a higher risk than the Malays and the indigens. The environmental factor is also important and is probably related to lifestyle changes. Studies looking at Japanese and Indian immigrants to the United States have shown an increased risk compared to their homeland counterparts.[21,22] The ageing population is probably the most important factor. This is evident by the increasing age-specific rates seen for the genders and ethnic groups. Metabolic syndrome has also been identified to be a factor.[12] A recent study showed that the prevalence of being overweight and obese was 35% and 27.7%, respectively, among our patients seen in the various clinics.[23] Similarly, smoking is also endemic in our local setting.

Another possible reason for the observed increase in the incidence of CRCs could be the wider use of colonoscopy or an increased awareness of the population. However, in our local setting, colonoscopic services had been available since the late 1980s, and it was very unlikely that the practices between the early and later periods studied had been different, particularly for the symptomatic patients or those with strong indications. Nevertheless, over the years, the proportion of screening procedures, albeit small, had been slowly increasing, and the population on the whole is now more knowledgeable and less likely to decline colonoscopic evaluations. In the earlier period, even if the patients had declined evaluations at the initial presentations and were left untreated, they were most likely to present and be diagnosed at a later time. Furthermore, the proportions of CRCs of various stages had remained consistent throughout the study period. If the increasing trend is attributed to the wider use of colonoscopy, one would expect to see more CRCs at earlier stages in the later period. Therefore, this suggests that the increasing trend observed is real.

There were a few limitations in our study. Firstly, the study was retrospective and the data was limited to what had been captured by the registries. Secondly, the calculations of the incidence rates were based on WHO population estimates for our local setting and this may have affected the actual rates. We could not use the data from the population census as the population breakdowns were not divided into five-year groups. However, any

differences were likely to be very small as the data from the national census and the WHO population report was quite comparable. The main strength of our study was the use of reliable, established Registries, in particular the Department of Pathology Registry which captures all the histologically-proven CRC for the whole country.

If CRC screening is to be considered, all the discussed characteristics and differences would need to be taken into account. Screening may have to be carried out at a younger age for both the Malays and the indigenous groups compared to the Chinese. However, at the same time, screening should specifically target the Chinese population as their overall risk for CRC is higher. In conclusion, the incidence of CRC is increasing in our local setting with differences observed among the ethnic groups. The Chinese population showed a higher incidence but developed CRC at a later age, compared to the Malays. The indigenous groups had the lowest age at diagnosis. These have important implications for CRC screening programmes. Importantly, more studies need to be conducted for those diagnosed at age 45 years or younger.

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