RESEARCH ARTICLE

Colorectal Cancer Screening among Government Servants in Brunei Darussalam

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Abstract

Background: This study concerns uptake and results of colorectal cancer (CRC) screening of government servant as part of the Health Screening Program that was conducted in Brunei Darussalam in 2009. Materials and Methods: Government servants above the age of 40 or with family history of CRC were screened with a single fecal occult blood test (FIT, immunohistochemistry). Among 11,576 eligible subjects, 7,360 (66.9%) returned their specimen. Subjects with positive family history of CRC (n=329) or polyps (n=135) were advised to attend clinics to arrange screening. All the subjects with positive FIT (n=142, 1.9%) were referred to the endoscopy unit for counselling for screening colonoscopy. Results: Overall only 17.7% of eligible subjects attended for screening; 54.9% (n=79/142) of positive FIT, 8.8% (n=29/329) of positive family history of CRC and none with history of polyps (n=0/135). Of these, only 54 patients (50.5%) agreed for colonoscopy, 52 (48.6%) declined as they were asymptomatic, and one was not offered (0.9%) due to his very young age. On screening colonoscopy, 12.9% (n=7) had advanced lesions including a sigmoid carcinoma *in situ* and six advanced polyps. The other findings included non advanced polyps (n=21), diverticular (n=11) and hemorrhoids (n=26). One patient who missed his screening colonoscopy appointment re-presented two years later and was diagnosed with advanced right sided CRC. All the advanced lesions were detected in patients with positive FIT, giving a yield of 20.5% for advanced lesions including cancers in the 5.1% FIT positive subjects. Conclusions: Our study showed screening for CRC even with a single FIT was effective. However, the uptake rate was poor with just over half of the patients agreeing to screening colonoscopy. Measures to increase public awareness are important. Since one limitation of our study was the relatively small sample size, larger studies should be conduced in future.

Keywords: Colorectal cancer - screening colonoscopy - fecal occult blood - compliance - Brunei Darussalam

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Introduction

Colorectal cancer (CRC) is the most common gastrointestinal malignancy worldwide with more than half a million cases diagnosed, and is the fourth leading causes of mortality with over 320,000 deaths recorded in 2008 (GLOBOCAN, 2008). Unfortunately, most patients with CRC are asymptomatic at the early stages and are usually diagnosed at advanced stages. As the pathogenesis of CRC takes over several years, CRC can be prevented through detection and removal of premalignant lesions. Therefore, people with risk factors such family history, previous history of polyps, age above 50 and symptoms attributable to the colon should be screened for CRC (Desch et al., 2005; Sung et al., 2008; US Preventive Services Task Force, 2008; von Karsa et al., 2013). This can be done through several modalities which are divided into colorectal neoplasm detection (fecal occult blood testing (FOBT) or colorectal neoplasm detection and prevention (sigmoidoscopy and colonoscopy).

CRC screening has been shown to reduce the incidence (Mandel et al., 2000; Atkins et al., 2010; Segnam et al., 2011; Scheon et al., 2012) and mortality of CRC by up to 50% (Mandel et al., 1999; 2000; Desch et al., 2005; Atkins et al., 2010; Segnam et al., 2011; Scheon et al., 2012). The simplest method for screening is by using fecal occult blood test (FOBT). Those found to have positive FOBT then proceed to screening colonoscopy. For those who have negative FOBT should continue on either annual or bi-annual FOBT testing. Colonoscopy is widely used for CRC screening as it allows detection and removal of premalignant lesions. For those with negative colonoscopy, their next scheduled screening colonoscopy should in ten years' time. Other screening accepted modalities include sigmoidoscopy combined with FOBT, computed tomography colonography and now less favoured barium enema (Sung et al., 2008; US Preventive Services Task Force, 2008; von Karsa et al., 2013).

In Brunei Darussalam, CRC is the most common

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gastrointestinal cancer and the trend is increasing (Chong et al., 2009) Currently, most lesions are detected at advanced stages, making curative treatment not possible. The Ministry of Health of Brunei Darussalam conducted a health screening program for the government servants between 2008 and 2011 which assessed the general health and also included screening for CRC. Eligible subjects were asked to subject a single fecal immunohistochemistry test (FIT). This study reports our findings with CRC screening program using a single FIT.

Materials and Methods

Setting and subject

Government servants from the various ministries were invited to participate in this health screening programme. Subjects were screened for their BMI, smoking status, blood pressure, fasting blood sugar, fasting lipid and enquired on family history of CRC or neoplasms. All subject who were 40 years or above were invited to do a single FIT (Immunohistochemistry) for testing. Instruction on how to obtain stool specimen were given to all subjects and they were informed to return the specimen the following day to the State laboratory or the nearest hospital following given instructions. All returned stool specimens were processed in the state laboratory following manufacturers' instruction. All the results of the FIT were return to the screening coordinating centre (the Health Promotion Centre, Ministry of Health).

Process

All subjects with positive FIT were referred to the Endoscopy Unit of the main tertiary referral hospital (RIPAS Hospital) for counselling. Subjects who were found to have a positive family history of CRC or personal or family history of colonic polyps were advised to see their respective doctors for referral for screening colonoscopy. After the first contact with the Endoscopy Unit, subjects were given another scheduled appointment for counselling regarding the indication for screening colonoscopy. Verbal and written explanations/ instructions on bowel preparation were given to those who agreed to proceed with screening colonoscopy. Screening colonoscopy was typically scheduled within the next few weeks depending on the convenience of the subjects and also availability of lists. Bowel preparation use does two doses of fleet soda (45 ml each) to be taken the previous day for colonoscopy in the following morning and split doses for those procedures in the following afternoon. A pamphlet was also given to patients as per usual practice. The procedure and the risk associated with colonoscopy were also explained as per usual practice. For subjects who remained unsure or declined screening colonoscopy at the initial visit were given appointment for further explanation and consideration.

Analyses

All the data (demographic and indications) and the findings of endoscopy were captured in the Endoscopic unit database as per usual practice. These data were retrieved and analysed using the Microsoft Word excel programme.

Figure 1 depicts the flow process and the number of subjects involved in the Health Screening Programme.

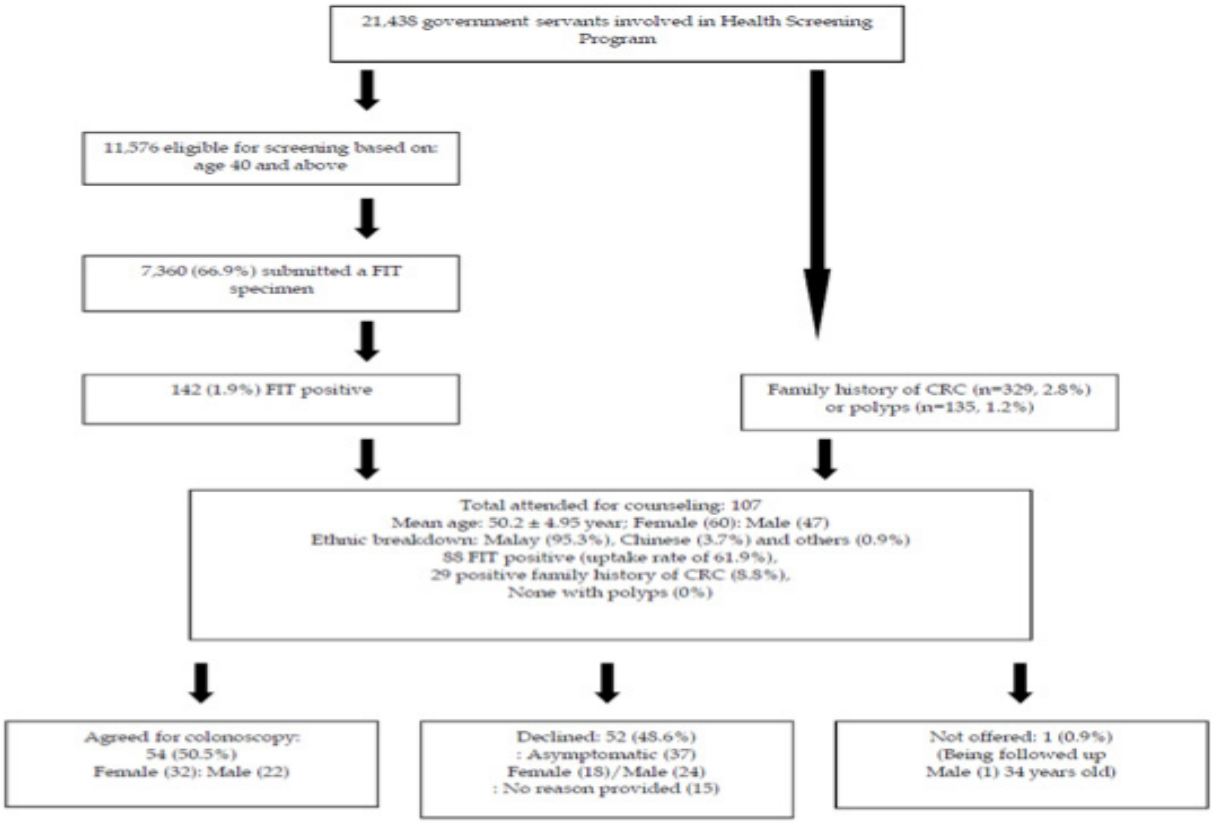

Figure 1. Flow Diagram Depicting the Number of; Subjects Screened, Findings, Referral and Acceptances for Colonoscopy Screening

Results

Overall, there were 21,348 subjects who were involved with the programme, and of this 11,576 were invited for FIT screening. Among the invited subjects (66.9%, n=7,360) who returned the FIT, 142 (1.9%) were found to be positive. Three hundred and twenty nine and 135 subjects had positive family history of CRC and history of colonic polyps respectively. Among the entire subject involved, only 17.7% of eligible subjects attended for screening; 54.9% of those with positive FIT, 8.8% of positive family history of CRC and none of those with a history of polyps. Of those who had positive FIT, several subjects actually requested a repeat FIT and majority were negative and their decision to declined screening was based on this.

The overall uptake rate for screening colonoscopy was 50.4% (n=54). Thirty-seven (34.6%) declined as they were asymptomatic, and one was not offered (0.9%) due to his very young age. One subject with family history of CRC already had screening colonoscopy done the previous year. The subject who was not offered screening was a 29 year-old man whose father had CRC. He remained under follow up. There were no significant differences between those who agreed or declined screening (Table 1).

On colonoscopy, 12.9% (n=7, 4 male and 3 female) with a median age of 52 (range 43 to 54) were found to have advanced lesions; one cancer (1.9%, early sigmoid carcinoma in situ) and six advanced polyps (11.1%). The other findings included; non advanced polyps (n=21), diverticular (n=11) and hemorrhoids (n=26). One patient (49 year-old, Case 8) who missed his screening colonoscopy represented two years later abdominal pain and weight loss and was diagnosed with advanced right sided CRC with metastases. The summary of these subjects are shown in Table 2.

All the advanced lesions were detected in patients with positive FIT, giving a yield of 20.5% for advanced lesions including the two cancers (5.1%).

Table 1. Demographic and Breakdown of Subjects Eligible for Screening

		Overall (n=107)	Screened (n=54)	Not screened (n= 53)
Mean age (years, standard deviation)		50.2 ± 4.9	50.5 ± 4.2	49.9 ± 5.6
Gender	Male	48 (44.9)	23 (42.6)	25 (47.2)
	Female	59 (55.1)	31 (57.4)	28 (52.8)
Race	Malay	102 (95.3)	52 (96.3)	50 (94.3)
	Chinese	4 (3.7)	1 (1.9)	3 (5.7)
	Others	1 (0.9)	1 (1.0)	0 (0)
BMI (kg/m^2)		27.0 (4.7)	26.7 (5.2)	27.3 (4.1)
Comorbid conditions				
Hypertension		34 (32.4)	19 (35.2)	15 (29.4)
Hyperlipidemia		22 (21.0)	14 (25.9)	8 (15.7)
Ischemic heart disease		1 (0.9)	1 (0.9)	0 (0)
Diabetes Mellitus		20 (19.0)	10 (18.5)	10 (19.6)

Discussion

Our study is the first official screening program for CRC in our country that was part of a health screening program for government servants. The other conditions that were also assessed were body weight (body mass index), blood pressure, fasting blood sugar and fasting lipid. Of the subjects involved, over 11,000 were eligible for CRC screening. These subjects were offered CRC screening with a single FIT. In our setting, we had used 40 as the start of screening as CRC cancers in the young population (defined as diagnosed at age 45 or less) accounted for 18.5% of all CRC. [Chong VH et al., 2009] A single FIT was chosen mainly to simplify the process and to reduce noncompliance rate. Use of a single test was also shown to be cost effective (Goede et al., 2003).

Among those invited for screening, only 66.9% returned their FIT, a participation rate that is comparable or better to what has been reported in the literature (Logan RF et al., 2012). However, in any screening program, it is very important to maximise the participation rate to reduce to impact of CRC. While this may increase workload and the overall healthcare cost, it is cost saving in the long run in term of future healthcare cost for CRC related complications and life saved from screening.

The participation rate for screening colonoscopy (50.4%) among our subjects varied between the

Table 2. Demographic and Endoscopic Findings of Patients with Advanced Lesions

Case	Age/gender/ Race	FHX CRC	Comorbid	Findings	Comments
1	48/M/Malay	Yes (only aware after screening)	No	Large stalked polyp (20 mm) and histology showed Intramucosal carcinoma arising in a tubulo-villous adenoma	Surveillance colonoscopy six months post polypectomy (normal). Next scheduled colonoscopy 2-3 years.
2	54/M/Malay	No	Epilepsy	2 Sigmoid polyps: largest 15mm (tubular adenoma with moderate dysplasia) and 7mm	Under follow up
3	53/F/Malay	No	Lipid	2 Sigmoid polyps; largest 15mm (adenomatous polyp) and smaller one 8mm, and diverticular disease	Under follow up
4	43/F/Malay	No	No	Sigmoid polyp 12mm (tubular adenoma)	Under follow up
5	46/F/Malay	No	Asthma	Sigmoid polyp 10mm (adenomatous)	Under follow up
6	52/M/Malay	Father	No	Rectal polyps including a 9 mm adenomatous polyps	Under follow up
7	53/M/Malay	No	Lipid	Hepatic flexure polyp (adenomatous 7mm) and splenic flexure (adenomatous)	Under follow up
8	49/M/Malay	No	No	An obstruction tumour in the hepatic flexure. CT scan showed metastasis spine, cervical lymph nodes and liver	Referred for counseling (December 2010) but failed to attend. Presented with weight loss and abdominal pain in December 2012

indications. Positive FIT had the highest participation. However, the number is still low and can be improved. Of concern were the low participations rates of the other two groups. Unlike the FIT positive group, the other two groups were only given advice to see their practitioners regarding screening. The low participation is possibly due to several reasons. First, there were fewer cues for actions as there was no reinforcement (i.e. written instruction to see their practitioners) and no subsequent reminders. Second, some of these subjects may already be under follow up of the gastroenterology clinic, and already had screening. However from experience, it is very unlikely that all those with a family history of CRC would have undergone screening as the uptake rate is low, even soon after the index cases had been diagnosed. Third, these groups including those with who requested a repeat FIT may perceive that they are not at risk of CRC, especially if they do not have any symptoms. Fourth, it is possible that without any active referral or process, some may have forgotten about the advice. The actual reasons for the low participation rates of the latter two groups need further studies as these two groups are categorised as high risk groups and will benefit with screening (Desch et al., 2005; Sung et al., 2008; US Preventive Services Task Force, 2008; von Karsa et al., 2013).

The most common reasons given for declining screening colonoscopy were having no symptoms relatable to the colon. A multicentre questionnaire study in the Asia Pacific regions reported that subjects who were well and perceived low risk were less likely to go for screening (Koo et al., 2012). In addition to this, disparities in healthcare provision or uptake are evident. In multi-ethnic countries, the minority groups are also less likely to go for screening. In our study, among those who declined screening colonoscopy included several with positive FIT who actually requested for repeat FIT. A few were actually agreed for screening colonoscopy but failed to attend for their procedure. In fact, our patient (Case 8) with the advanced CRC would have been detected at an earlier and perhaps curable stage had he not missed his scheduled procedure. A lack of a recall system is also an important issue that needs to be addressed. The Ministry of Health is currently implementing the use of electronic record for the whole country (Brunei Health Information and Management System; BruHIMS) and it is hope that this can address the issue of recall and reminders.

Our FIT positive rate was only 1.9% and this is again comparable to rates reported from other screening programs (Logan et al., 2012). Literature has reported rates of between 1 and 5%. We had only used a single FIT mainly to make the screening process easy. Increasing the number of FIT may increase the yield, but this will increase the noncompliance and false positive rates. Furthermore, increasing the number of test beyond three has not been shown to be cost effective. The positive rate for family history of cancer and polyp were 2.8% and 1.2% respectively. This is again consistent with other screening programs.

Among subjects who proceeded to screening colonoscopy, 12.9% were found to have important findings, four men and three women with a median age of 52 (range 43 to 54). This included a case sigmoid carcinoma *in situ*. Including the patient (Case 8) who found to have CRC two years later after missing his screening colonoscopy, the yield increased to 14.9%. Importantly, if he had attended for his screening colonoscopy, the lesion would have been detected at an earlier and perhaps curable stage. All the advanced lesions were detected in patients with positive FIT, giving a yield of 20.5% for advanced lesions for FIT positive subjects.

The other findings included non-advanced polyps (n=21, 38.9%), diverticular (n=11, 20.3%) and hemorrhoids (n=26, 48.1%). While these are non-significant conditions, the patient do not need to undergo another colonoscopy for the next ten years which will cut down on the number of eligible subjects in a screening program.

The main take home message from our study was the low participation rate. This likely stemmed from the overall lack of awareness and knowledge of CRC in our setting (Koo et al., 2012). This is also true in many countries. A previous Asia Pacific multicenters study that had included Brunei Darussalam showed that overall knowledge was poor, leading to perceived low risk for CRC, even in those with family history of CRC. It is also important to have an effective recall system. Subjects who declined screening colonoscopy or failed to present themselves should be monitored. They should be recalled and then counselled at regular intervals. Other studies have shown that minority group tend to have lower participation rates and the reasons behind these differ between the minority groups (Jerant et al., 2008; Perencevich et al., 2013). In our study, the majority of the subjects were Malays. Further studies assessing the uptake rate including more of other racial groups will be important for planning of a National CRC screening program.

In conclusion, our study showed that a CRC program can be effective based even on a single FIT, but the participation rate was poor. Reasons for the low participation need to be looked into and addressed as it will reduce the efficacy of any screening programs. Measures to increase public awareness are important.

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