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Awareness, attitude and barriers of colorectal cancer screening among high-risk populations in China: a cross-sectional study

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ABSTRACT

Objective To assess the awareness, attitude and barriers of colorectal cancer screening among high-risk populations in China.

Design A cross-sectional study was employed.

Setting This study was conducted in nine hospitals in Hunan province, China.

Participants Individuals with a high-risk for colorectal cancer were interviewed using a pretested structured questionnaire.

Primary and secondary outcome measures Knowledge, attitude towards colorectal cancer screening, sociodemographic factors associated with screening knowledge and behaviour and barriers of colorectal cancer screening.

Results This study included 684 participants. The mean knowledge score was 11.86/24 (SD 4.84). But over 70% of them held a positive attitude towards screening. Only 13.3% had undergone colorectal cancer screening. Independent factors related to knowledge were education level of college or above, working as a white collar, higher income, having health insurance, having seen a doctor in the past year and with a high perceived risk ($p<0.05$). Factors independently associated with screening behaviour included personal history of colorectal disease, having seen a doctor in the past year, previous discussion of colorectal cancer screening, high perceived risk and better knowledge ($p<0.05$). Main reasons for not undergoing screening were no symptoms or discomfort (71.1%), never having thought of the disease or screening (67.4%) and no doctor advised me (29.8%).

Conclusion In China, the majority of high-risk people had deficient knowledge and had never undergone colorectal cancer screening. But most of them held a positive attitude towards the benefits of colorectal cancer screening. This has promising implications to design targeted educational campaigns and establish screening programmes to improve colorectal cancer awareness and screening participation. Healthcare professionals should advise high-risk individuals to participate in screening and inform them about cancer risk.

Strengths and limitations of this study

- ► These findings may be used as a reference for other countries with no screening programmes.
- ► The study achieved a high response rate through face-to-face interviews by trained data collectors.
- ► The participants' screening history was self-reported; therefore, recall bias may have occurred.
- ► We may not have covered all of the barriers regarding screening uptake as only a quantitative method was used.

INTRODUCTION

Colorectal cancer is the third most common cancer and the second leading cause of cancer death worldwide.[1] The WHO showed that nearly half of the new cases were found in Asia and mostly in China.[2] Colorectal cancer is the second most common malignancy in China, with 521 400 new cases and 248 000 deaths occurring in 2018.[2] The incidence rates and mortality rates of colorectal cancer in China continue to rise due to an ageing and growing population.[3]

Early colorectal cancer has a better prognosis than advanced and metastatic colorectal cancer.[4] However, most patients are diagnosed during the advanced stage of the disease with a poor prognosis.[5 6] In China, the 5-year survival rate of colorectal cancer is lower than that of many developed countries such as Korea with a rising cancer burden.[7–10] A study showed that the incidence of prehospital delay among Chinese patients with colorectal cancer was 47%, suggesting delays in diagnosis and treatment.[11] These studies indicate that there are problems regarding screening and prevention of this disease. High-risk populations are the key target populations of cancer screening.[12] To strengthen efforts to promote colorectal cancer prevention and control, it is particularly important to improve screening for prevention and early detection of colorectal cancer for high-risk populations in China. High-risk populations for developing

colorectal cancer are individuals with colorectal diseases such as colorectal adenomas, inflammatory bowel disease and hereditary syndromes and those with a family history of colorectal cancer.[13 14]

Colorectal cancer screening via colonoscopy is known as an effective method to prevent and detect early-stage cancer and improve survival and prognosis.[15] Despite the heavy burden of colorectal cancer in China, unlike in other East Asian countries such as Korea, there are no nationwide screening guidelines or programmes.[16] As a result of the large populations but with an uneven distribution of health, medical and financial resources, opportunistic screening with colonoscopy in asymptomatic people is widely used in China.[17] Opportunistic screening is performed on a voluntary basis and is dependent on a request from a physician or individual.[18]

Unfortunately, the screening rate of colorectal cancer in China is far away from satisfactory level. The majority (about 85%) of high-risk populations still never have done colorectal cancer screening according to the report by Chen *et al*[19] in 2018. Key factors contributing to nonparticipation in colorectal cancer screening could be a poor awareness of colorectal cancer screening, a negative attitude towards screening and multiple barriers related to screening.[20] Previous studies suggested that the general population had deficient knowledge of colorectal cancer and screening.[21 22] Moreover, few studies also indicated that screening knowledge and practice were suboptimal among high-risk populations.[23 24] In China, fewer studies reported inadequate public knowledge and screening of colorectal cancer.[25 26]

Currently, there are few studies exploring awareness, attitude and identify barriers for colorectal cancer screening among high-risk populations in China. Therefore, it is crucial to assess awareness, attitude and possible barriers that hinder screening, so that more effective approaches can be implemented to promote screening uptake. The objectives of this study were to (1) assess awareness, attitude and behaviour of colorectal cancer screening among high-risk populations in China, (2) examine sociodemographic factors associated with colorectal cancer screening knowledge and behaviour and (3) identify the barriers to colorectal cancer screening.

METHODS

Setting and sample

This was a cross-sectional study conducted between April and August 2019. The sample size was calculated based on 15% (ϖ) of the prevalence rate of colorectal cancer screening using a formula $N=(Z^2_{\alpha/2}\times\varpi\times(1-\varpi))/\delta^2$ [27] with 0.03 allowable error (δ) and $Z_{\alpha/2}=1.96$ at 95% CI. Considering the 40% nonresponse rate, the final sample size was 760.

Nine hospitals were selected from a total of 42 in Hunan province using a cluster random sampling method. The source population was individuals from gastrointestinal department of hospitals with a high risk of developing colorectal cancer according to medical records by convenience sampling. With the support of hospitals, each trained interviewer was accompanied by a medical staff to introduce the study aim. The inclusion criteria[13 14] included (1) age 18–75 years, (2) a family history of colorectal cancer or adenomas, (3) a personal history of colorectal cancer or adenomas, (4) a personal history of inflammatory bowel disease and (5) a personal history of hereditary syndromes. The exclusion criteria[13 14] included (1) age less than 18 years, (2) being diagnosed with colorectal cancer, (3) unable to communicate with the investigator and (4) severe cognitive impairment. Individuals who consented to participate in the study completed a standardised face-to-face questionnaire, which lasted for approximately 15–20 min. Each participant received ¥30 (about US$4.2) for completing the survey.

Instrument

The questionnaire included items about awareness, attitudes and screening for colorectal cancer. Survey items were identified from the research literature,[28 29] the American Cancer Society and China Anti-Cancer Association.[30] The questionnaire consisted of four sections. The first section comprised sociodemographic characteristics such as gender, age, education level, occupation, marital status, residence, income, health insurance and perceived health status. The second part included 24 questions about knowledge of colorectal cancer: risk factors, warning signs and screening tests. Two items had multiple answers, so the scoring was 1 point for each correct answer and 0 point for the wrong answer or 'don't know' with a total score of 24 points. The third section was related to attitudes towards colorectal cancer screening such as colorectal cancer is preventable, early colorectal cancer is curable, colonoscopy can help to find colorectal cancer early, colonoscopy can help to prevent colorectal cancer, colonoscopy is beneficial, colonoscopy is important. The possible responses were 'yes' or 'no'. In the fourth section, participants were questioned whether they had ever undergone colorectal cancer screening with 'yes' or 'no' answer. Participants who answered 'no' were asked to choose the reasons for not undergoing screening and more than one choice was allowed. Mean knowledge scores were calculated based on the number of correct responses and total scores ranged from 0 to 24 points.

The reliability was evaluated by pretesting 80 people. The internal consistency of the questionnaires was accomplished by estimating the Cronbach's alpha based on the recommendation of >0.70. The Cronbach's alpha calculated was 0.88. Face validity was performed to assess the comprehension towards understanding of the questionnaire and to assess how important it was to target study participants. Finally, the questionnaire was modified and re-evaluated to fit the study population based on the feedback from the pilot study.

Statistical analysis

Data were analysed using IBM SPSS V.23.0. Descriptive statistics were used to describe the participants' sociodemographics and responses to each question. The t-test and analysis of variance test were used to investigate the association of demographic factors with knowledge. The χ^2 or Fisher's exact test were used to find the association between demographic factors and behaviour of colorectal cancer screening. Variables with a p value ≤0.15 in the univariate analysis were included in the multiple linear regression analyses to investigate the independent factors for screening knowledge, while variables with p value ≤0.15 in the univariate analysis were included in the binary logistic regression analysis to identify the independent factors for screening behaviour. Only the results of the bivariate and multivariate analyses were presented using OR and 95% CI. A p value of <0.05 was regarded as statistically significant.

Patient and public involvement

No participants were involved in our work. The study results will be made available to participants interested in this subject.

RESULTS

Sample characteristics

Of the 760 high-risk individuals, 712 consented to involve in the study, of whom 28 completed less than 50% of the questionnaire. Thus, the final response rate was 90.0% (n=684). The mean age of the participants was 47.01±7.39 years (range=27–74 years). Of the total sample, more than half (54.5%) were men, 75.6% had high school education or below and 58.0% lived in urban areas. Almost all (94.4%) were married and 86.7% were insured. About 37.9% had low income. The majority (88.7%) had no personal history of colorectal disease and 93.1% had a family history of colorectal cancer or adenomas. Only 14.2% reported previous discussion of screening with the doctor, and 13.7% perceived their risk of developing colorectal cancer was high. Other variables are listed in table 1.

Knowledge of colorectal cancer and screening

Table 2 presents the participants' knowledge about colorectal cancer and screening including risk factors, warning signs and screening tests. The mean total knowledge score was 11.86 (SD 4.84, range 0–24). The mean knowledge scores for risk factors, warning signs and screening tests were 5.38 (SD 2.70, range from 0 to 11), 4.60 (SD 2.03, range 0–8) and 1.88 (SD 1.19, range 0–5), respectively. The most well-recognised risk factors were inflammatory bowel disease (63.2%), followed by colon polyps (62.1%) and excess alcohol consumption (60.4%). Less well-recognised risk factors included family history of colorectal cancer (49.6%), smoking (48.1%), older age (45.3%), being overweight or obese (44.0%), having an inherited syndrome (40.8%) and

Table 1 Participant characteristics (n=684)

Characteristics	N (%)
Gender	
Male	373 (54.5)
Female	311 (45.5)
Age (years)	
<40	79 (11.5)
40–49	399 (58.3)
50–59	163 (23.8)
>60	43 (6.3)
Mean±SD	47.01±7.39
Education level	
High school or below	517 (75.6)
College or above	167 (24.4)
Occupation	
Farmer	63 (9.2)
Worker	304 (44.4)
Unemployed	105 (15.4)
White collar	212 (31.0)
Marital status	
Single	38 (5.6)
Married	646 (94.4)
Residence	
Urban	397 (58.0)
Rural	287 (42.0)
Income (¥)	
<3000	259 (37.9)
3000–5000	207 (30.3)
>5000	218 (31.9)
Health insurance	
Yes	593 (86.7)
No	91 (13.3)
Self-reported health status	
Good	274 (40.1)
Fair	363 (53.1)
Poor	47 (6.9)
Personal history of colorectal disease	
Yes	77 (11.3)
No	607 (88.7)
Seen a doctor in the past year	
None	356 (52.0)
1–2 times	230 (33.6)
≥3 times	98 (14.3)
Previous discussion of colorectal cancer screening	
Yes	97 (14.2)
No	587 (85.8)

Continued

Table 1 Continued

Characteristics	N (%)
Family history of colorectal cancer or adenomas	
Yes	637 (93.1)
No	47 (6.9)
Perceived risk	
Low	248 (36.3)
Medium	342 (50.0)
High	94 (13.7)

diabetes (11.5%). The most highly recognised warning signs were blood in the stool (76.0%), rectal bleeding (74.0%) and change in bowel habits (66.4%). The least recognised symptoms included unexplained weight loss (57.3%), bowel does not empty (55.3%) and tiredness/anaemia (29.5%). Importantly, only 40.9% were aware that colorectal cancer could be asymptomatic. The most commonly heard of screening test was colonoscopy but only 46.6% knew that colonoscopy was the gold standard method of colorectal cancer screening. Less than a third were aware of stool DNA test (21.5%) and immunochemical fecal occult blood test (IFOBT) combined with high-risk factor questionnaire (8.6%).

Table 3 presents the results of the multiple linear regression for factors associated with colorectal cancer screening knowledge. In the univariate analysis, education level, occupation, residence, income, health insurance, having seen a doctor in the past year, previous discussion of colorectal cancer screening and perceived risk were significantly associated with colorectal cancer knowledge ($p<0.05$). These factors and variables with p value <0.15 (personal history of colorectal disease) in the univariate analysis were included in the multiple linear regression model. Factors independently associated with knowledge were education level, occupation, income, health insurance, having seen a doctor in the past year and perceived risk ($p<0.05$).

Participants who were found to be more knowledgeable about colorectal cancer and screening included with a college education or above (β=2.41, 95% CI 1.54 to 3.28, p<0.001), working as a white collar (β=1.89, 95% CI 0.42 to 3.36, p=0.012), with higher income (β=1.65, 95% CI 0.70 to 2.59, p=0.001; β=1.47, 95% CI 0.43 to 2.51, p=0.006), having health insurance (β=1.39, 95% CI 0.43 to 2.36, p=0.005), having seen a doctor in the past year (β=1.93, 95% CI 0.93 to 2.92, p<0.001) and perceiving greater risk (β=1.82, 95% CI 0.76 to 2.88, p=0.001).

Attitudes towards colorectal cancer screening

Table 4 shows the attitudes towards colorectal cancer screening. A majority of participants held a positive attitude towards screening. More than 70% of them thought that colorectal cancer was preventable, early colorectal cancer was curable, colonoscopy could help to find

Table 2 Knowledge of colorectal cancer and screening (n=684)

Category	N (%)
Risk factors	
Older age	310 (45.3)
Low physical activity	384 (56.1)
High intake of red and processed meat	388 (56.7)
Smoking	329 (48.1)
Excess alcohol consumption	413 (60.4)
Being overweight or obese	301 (44.0)
Colon polyps	425 (62.1)
Inflammatory bowel disease	432 (63.2)
Family history of colorectal cancer	339 (49.6)
Having an inherited syndrome	279 (40.8)
Diabetes	79 (11.5)
Warning symptoms	
Blood in the stool	520 (76.0)
Rectal bleeding	506 (74.0)
Change in bowel habits	454 (66.4)
Tiredness/anaemia	202 (29.5)
Unexplained weight loss	392 (57.3)
Abdominal pain	417 (61.0)
Bowel does not empty	378 (55.3)
Colorectal cancer can be present without any symptoms	280 (40.9)
Screening tests	
FOBT	294 (43.0)
Colonoscopy/sigmoidoscopy	465 (68.0)
Stool DNA test	147 (21.5)
IFOBT combined with high-risk factor questionnaire	59 (8.6)
Which of the four choices is the gold standard method of colorectal cancer screening? (Colonoscopy)	319 (46.6)

FOBT, Fecal occult blood test; IFOBT, Immunochemical fecal occult blood test.

colorectal cancer early, colonoscopy could help to prevent early colorectal cancer, colonoscopy was beneficial and colonoscopy was important. But only 58.7% thought they needed colonoscopy if they felt well. Of all the participants, only 91 (13.3%) had undergone colorectal cancer screening. There was a significant portion of participants (86.7%) who had not participated in colorectal cancer screening.

Table 5 shows the results of the bivariate analysis for factors associated with colorectal cancer screening behaviour. In the univariate analysis, factors significantly associated with colorectal cancer screening behaviour were personal history of colorectal disease, having seen a

Table 3 Multiple linear regression of factors associated with colorectal cancer knowledge (n=684)

	Knowledge score			
	β	SE	95% CI	P
Education level				
High school or below	1 (ref)			
College or above	2.410	0.442	1.542 to 3.279	<0.001*
Occupation				
Farmer	1 (ref)			
Worker	1.002	0.645	−0.264 to 2.268	0.121
Unemployed	0.786	0.693	−0.573 to 2.146	0.257
White collar	1.891	0.750	0.420 to 3.363	0.012*
Income (¥)				
<3000	1 (ref)			
3000–5000	1.646	0.480	0.703 to 2.589	0.001*
>5000	1.470	0.530	0.429 to 2.512	0.006*
Health insurance				
No	1 (ref)			
Yes	1.386	0.493	0.429 to 2.364	0.005*
Seen a doctor in the past year				
None	1 (ref)			
1–2 times	0.586	0.368	−0.137 to 1.309	0.112
≥3 times	1.925	0.506	0.932 to 2.918	<0.001*
Perceived risk				
Low	1 (ref)			
Medium	−0.292	0.364	−1.007 to 0.423	0.423
High	1.820	0.540	0.760 to 2.879	0.001*
Constant	7.365	0.704	5.983 to 8.747	0.000*

R^2=0.210, F=17.510, P=0.000.
*Statistically significant at p<0.05.
ref, reference.

doctor in the past year, previous discussion of colorectal cancer screening and perceived risk (p<0.05). These factors and variables with p value <0.15 (education level) in the univariate analysis were included in the binary logistic regression model. The independent variables associated with colorectal cancer screening behaviour included personal history of colorectal disease, having seen a doctor in the past year, previous discussion of colorectal cancer screening, perceived risk and knowledge (p<0.05). Participants with a personal history of colorectal disease were more likely to have attended colorectal cancer screening compared with those without colorectal disease (OR 2.33, 95% CI 1.12 to 4.87, p=0.024). Participants who had seen a doctor in the past year were more likely to have undergone colorectal cancer screening than those who had never seen a doctor in the past year (OR 3.20, 95% CI 1.80 to 5.68, p<0.001; OR 2.41, 95% CI 1.17 to 4.96, p=0.017). Moreover, participants who had previous discussion of colorectal cancer screening were more likely to have been screened for colorectal cancer (OR 2.42, 95% CI 1.25 to 4.66, p=0.008). Furthermore, those with a higher perceived risk of developing colorectal cancer tended to have undergone screening than the other groups (OR 4.03, 95% CI 1.95 to 8.32, p<0.001). Additionally, those who had more knowledge were more

Table 4 Colorectal cancer screening perceptions (n=684)

Question	N (%)
Colorectal cancer is preventable	524 (76.6)
Early colorectal cancer is curable	595 (87.0)
Colonoscopy can help to find colorectal cancer early	615 (89.9)
Colonoscopy can help to prevent colorectal cancer	521 (76.2)
Colonoscopy is beneficial	567 (82.9)
Colonoscopy is important	496 (72.5)
You need colonoscopy even if you feel healthy	402 (58.8)

Table 5 Bivariate analysis of factors associated with colorectal cancer screening behaviour (n=684)

Variable	Screened N (%)	Unscreened N (%)	OR	95% CI	P
Personal history of colorectal disease					
No	60 (9.9)	547 (90.1)	1 (ref)		
Yes	31 (40.3)	46 (59.7)	2.337	1.121 to 4.874	0.024*
Seen a doctor in the past year					
None	23 (6.5)	333 (93.5)	1 (ref)		
1–2 times	43 (18.7)	187 (81.3)	3.195	1.799 to 5.676	<0.001*
≥3 times	25 (25.5)	73 (74.5)	2.409	1.170 to 4.958	0.017*
Previous discussion of colorectal cancer screening					
No	57 (9.7)	530 (90.3)	1 (ref)		
Yes	34 (35.1)	63 (64.9)	2.416	1.254 to 4.655	0.008*
Perceived risk					
Low	17 (6.9)	231 (93.1)	1 (ref)		
Medium	38 (11.1)	304 (88.9)	1.246	0.666 to 2.333	0.491
High	36 (38.3)	58 (61.7)	4.029	1.951 to 8.320	<0.001*
Knowledge score, mean (SD)	13.9 (4.6)	11.6 (4.8)	1.060	1.001 to 1.121	0.044*

*Statistically significant at p<0.05.
ref, reference.

likely to have done colorectal cancer screening (OR 1.06, 95% CI 1.00 to 1.12, p=0.044).

Barriers to participate in colorectal cancer screening

Table 6 reports the reasons why participants have not undergone colorectal cancer screening. There were 71.1% of the participants pointed out that screening was not needful due to no symptoms or discomfort, 67.4% said that they had never thought of the disease or screening, and 29.8% mentioned that lack of recommendation by physicians. A significant number of participants who thought screening was too painful, unpleasant or embarrassing (20.0%) and some answered that they were not at risk for colorectal cancer (19.0%). Other reasons were lack of time (15.3%), difficult to access medical facilities (12.4%), fear of bowel preparation (12.3%), unawareness of the benefits of screening (11.2%) and financial problem (9.6%).

Table 6 Reasons for not undergoing colonoscopy (n=593)

Reasons	N (%)
Never thought of it	400 (67.4)
Doctor did not advise me	177 (29.8)
No symptoms or discomfort	422 (71.1)
Afraid of detecting colorectal cancer	39 (6.5)
Lack of time	91 (15.3)
Fear regarding bowel preparation	73 (12.3)
Too painful, unpleasant or embarrassing	119 (20.0)
Financial problem	57 (9.6)
Unawareness of the benefits of screening	67 (11.2)
Difficult to access medical facilities	74 (12.4)
Believe risks outweigh benefits	17 (2.8)
Lack of support from others	4 (0.6)
Not at risk for colorectal cancer	113 (19.0)

DISCUSSION

Understanding and recognising awareness and attitude regarding colorectal cancer screening and reasons towards low screening uptake among high-risk populations could help in developing appropriate policies for prevention and control of colorectal cancer. The study found that most of the participants had deficient knowledge and had never done colorectal cancer screening, but held a positive attitude towards screening and its benefits. Main reasons for not seeking screening included no symptoms and never having thought of the disease or screening.

Colorectal cancer and screening awareness

Participants' knowledge of colorectal cancer and screening was insufficient, which was similar to studies conducted in Hong Kong and Saudi Arabia[31 32] but lower than that found in the Australian and Iranian studies.[33 34] Moreover, while participants had a relatively good awareness of warning symptoms, they had a poorer awareness of risk factors and screening tests. Less than half of the participants identified risk factors such as smoking, older age, being overweight or obese, having an inherited syndrome and diabetes. This result indicates that people are unfamiliar with cancer-related risk factors.

Two of thirds of participants identified the main warning signs, while nonspecific symptoms such as tiredness/anaemia, bowel does not empty and unexplained weight loss were less likely to be identified. This would delay in seeking medical help.[35] Importantly, less than half of the participants knew that colorectal cancer can be asymptomatic, implying a gap in educational interventions. Furthermore, approximately a quarter of the participants indicated that they had never heard of even one screening test. This result shows that poor awareness of screening tests is a factor contributing to low participation rate of colorectal cancer screening and indicates that screening tests could be a good target for cancer awareness-raising initiatives.[36]

Our findings found that respondents with lower education level and income and who worked as farmers had worse awareness. Furthermore, those who had no health insurance, had never seen a physician within the past year and with a lower perceived risk of colorectal cancer showed lower knowledge. There is a possibility that they had insufficient access to social resources and were less aware of information about colorectal cancer screening.[37] Studies have reported similar findings that socially disadvantaged groups were less knowledgeable.[38 39] Evidence also suggests that socially disadvantaged groups were less likely to have undergone screening.[22 37] Thus, educational interventions should target these underserved and socially disadvantaged individuals.

Colorectal cancer screening attitude

Participants held positive attitudes towards screening and early diagnosis of colorectal cancer, implying that they were aware of the value of early diagnosis and the benefits of screening, while only less than 60% of the participants agreed that they needed colonoscopy even if they felt healthy. Therefore, it is necessary to educate the public about the importance and necessity of screening. Only a small percentage of participants (13.3%) had undergone colorectal cancer screening at least once, which was similar to that reported in the Hong Kong studies (14%)[26] but lower than that of the Korean and Iranian studies (>45%).[23 40] This difference may be because, in China, colonoscopy is conducted via opportunistic screening, and thus, it relies on individuals voluntarily requesting it and shouldering the expenses.[16 17] It is noteworthy that the majority of participants had never done colonoscopy screening possibly due to low-risk perception, poor awareness towards screening or other reasons that may have limited their access to screening.[23] Therefore, it is crucial to explore the important barriers of colonoscopy screening among Chinese high-risk populations.[19]

Bivariate analysis showed that personal history of colorectal disease, having seen a doctor in the past year, previous discussion of colorectal cancer screening, perceived risk and knowledge were significantly associated with better screening behaviour. We found that only a minority (14%) of participants reported previous discussion about screening with physicians and thought that they had a high risk of developing colorectal cancer, which was below the estimates (28%–55%) from studies in Iran and USA.[23 24] This finding indicated that the participants were underestimating their risk of colorectal cancer and were not aware of the importance of screening. It is, therefore, urgent to plan health education interventions to correct public misperceptions of self-risk of developing colorectal cancer and to emphasise the significance of screening.

Similar to our findings, a study found that individuals with gastrointestinal tract diseases were more likely to undergo gastrointestinal cancer screening than individuals without diseases, which may because the onset of uncomfortable symptoms motivates them to seek medical help and participate in screening.[41] A study that assessed beliefs, knowledge and screening among Asian Americans in California found that participants who had seen their physician within the past year were more likely to attend colorectal cancer screening.[22] Furthermore, participants who received a physician's advice for screening were associated with higher adherence to cancer screening.[42] Choi *et al* found that those with a greater perceived risk of colorectal cancer were also significantly more likely to be screened than those with a lower perceived risk.[43] Wong *et al* found that participants with better knowledge concerning colorectal cancer screening were associated with performing screening.[26] Therefore, physicians should emphasise screening and risk education for high-risk individuals.

Colorectal cancer screening barriers

'No symptoms or discomfort' was the most common reason for not undergoing screening. This was consistent with previous studies.[41 44] This implies that participants mistakenly become convinced that screening is only required on symptoms or feeling ill. They then go to health facilities to seek medical help, which can be worrying because the disease only becomes symptomatic at an advanced stage.[45] Therefore, there is a strong need to address such misconceptions and to educate people about the indications of cancer screening.

Moreover, 'never thought about the disease or screening' was another major barrier for participation in screening, which further reflects the lack of knowledge about colorectal cancer and its screening. This may be partly because colonoscopy for colorectal cancer screening is not covered by Chinese routine medical check-up.[16] In addition, it may also be because cancer is a taboo topic in Chinese culture and traditional beliefs, and Chinese people are reluctant to think or speak about it. The notion of detecting a hidden or asymptomatic disease by screening does not exist in traditional Chinese beliefs.[12] This result emphasises the need to increase awareness of the importance of colorectal cancer screening for this preventable disease. It is also necessary to design culturally tailored education to reduce adverse beliefs or attitudes towards cancer.

'Lack of recommendation from physician' was found to be a key reason for not participating in screening. This suggests that clinicians need to pay more attention to educating patients about screening and to improving patient–physician communication. Physicians should also play an active role in delivering early screening information to high-risk populations. Other barriers observed included 'too painful, unpleasant or embarrassing' and 'I am not at risk for colorectal cancer'. As reported, the majority of the barriers is related to a lack of understanding and awareness of colorectal cancer screening. Some were health system and health professional related. Therefore, it is imperative to conduct awareness campaigns to attract public attention, correct these misconceptions and overcome psychological barriers. Better communication with participants regarding the screening procedure could potentially remove the perception of embarrassment and fear. Healthcare professionals should encourage high-risk individuals to participate in screening and inform them about cancer risk.

Implications

Korea, a country with high incidence rates of colorectal cancer, has implemented a nationwide screening programme and set up institutions responsible for providing comprehensive cancer information to promote public awareness and screening uptake.[9] In China, the government has begun to pay attention to awareness and screening about cancer. Health China Action: Cancer Prevention and Control Implementation Plan and Healthy China 2030 Strategy set a series of goals of attaining more than a 70% awareness rate of cancer prevention knowledge, making public aware of their cancer risk and promoting cancer screening for high-risk groups.[46 47] However, data to evaluate the effectiveness of such initiatives are lacking; therefore, this study could be used as a basis to measure the effectiveness of further health-promoting campaigns.

Our results have indicated that Chinese high-risk people have deficient awareness, some misconceptions and barriers regarding colorectal cancer screening. Moreover, they are still not aware of their cancer risk and the need for undergoing screening. Our findings suggest that strategies to improve awareness and screening uptake in high-risk populations should include three components. First, the government should learn from initiatives in different countries. Appropriate and effective educational campaigns should be conducted, using web-based education tools to broadcast scientific colorectal cancer prevention information.[48 49] Moreover, the government should establish an organised colorectal cancer screening programme and incorporate screening into healthcare system in the future.[23] Second, healthcare professionals should be trained to play an active role in improving high-risk people's awareness, perceptions and behaviour about colorectal cancer screening. Less-known risk factors, screening tests and major barriers discovered in this study need to be emphasised during education interventions. Furthermore, health promotion campaigns should focus on those who do not see their physician regularly, those without colorectal disease, those with a low perceived risk and those with poor knowledge.

Strengths and limitations

To our knowledge, this is the first study in mainland China aiming to assess awareness, attitude and behaviour about colorectal cancer screening and to explore the reasons underlying low screening rate among high-risk populations. The study achieved a high response rate through face-to-face interviews by trained interviewers, which strengthened the validity of the study results. Our study had some limitations. First, as the participants' screening history was self-reported, recall bias may have occurred. However, respondents were given a brief description of screening tests before asking if they had ever undergone screening. Second, we may not have covered all of the barriers regarding screening uptake as only a quantitative method was used. Further study is warranted to use qualitative or mixed-method to comprehensively explore the related factors. Moreover, we assume that respondents who visit hospitals tend to have better health awareness. Third, validity of the instrument, which is an important factor in evaluating the quality of the instrument, was not explored well.

CONCLUSION

This study indicates that the majority of high-risk people had deficient knowledge and had never undergone colorectal cancer screening. But most of them held a positive attitude towards the benefits of screening. Being asymptomatic and never having thought of the disease or screening were the main reasons for not undergoing screening. Our study gives insight into the development of strategies to improve screening of colorectal cancer in China.

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