

Factors Associated with Participation in Colorectal Cancer Screening Using a Fecal Immunochemical Test (FIT) in Thai Population Aged 45 to 74 Years in Namphong District, Khon Kaen Province

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Background: Presently, the level of participation in screening programs for colorectal cancer (CRC) with Fecal Immunochemical Test (FIT) is considerably low.

Objective: To investigate factors associated with participation in CRC screening using a FIT in the Thai population age 45 to 74 years in the Namphong District of Khon Kaen Province.

Materials and Methods: In the present study, the unmatched case-control study design was applied. Three hundred ten participants were equally divided into two groups with 155 participants in the study group and the other 155 in the control group. The data were collected by conducting interviews. Moreover, to explain the association between the factors, multiple logistic regressions were used with adjusted odds ratio (OR_{adj}), a confidence level at 95%, and with p<0.05.

Results: It was found that ages were equal to or higher than 60 years (OR_{adj} 2.08; 95%CI 1.19 to 3.63), the lower education level (OR_{adj} 3.70; 95% CI 1.86 to 7.33), a family history of cancer (OR_{adj} 5.25; 95% CI 2.14 to 12.86), receiving advice from public health officials regarding CRC screening (OR_{adj} 3.09; 95% CI 1.81 to 5.27), and high level of knowledge about CRC (OR_{adj} 4.01; 95% CI 2.09 to 7.69) had all been related to participation in the CRC screening program with a statistical significance (p<0.05).

Conclusion: The results revealed that receiving advice from public health officials regarding CRC screening and that proper knowledge had been related to participation in screening programs for CRC with the FIT. Thus, to raise awareness and create a greater understanding, public health officers should disseminate knowledge about CRC. Information about the colorectal screening with the FIT should especially be spread to those people who are younger than 60 years of age, have educational levels higher than the primary level, and to those, who have no family history of CRC.

Keywords: Colorectal Cancer Screening; Fecal Immunochemical Test (FIT); Thai population

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Colorectal cancer (CRC) is one of the top five common types of cancer worldwide. The estimate number of new cases of CRC was 12.7 million

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patients each year⁽¹⁾. Of them, there are 1.2 million cases of CRC that cause 0.6 million deaths⁽¹⁾. In Thailand, the age standardized incidence rate (ASR) of CRC in male patients is 14.4 per 100,000 population and in females is 11.2 per 100,000 population. In Khon Kaen Province, the ASR is 13.1 per 100,000 in males and 9.0 per 100,000 in females⁽²⁾.

If most cancers are detected at an early stage, it could reduce the chance of disease metastasis, and could contribute to more effective treatment and control⁽³⁾. It was reported that if CRC could be detected at an initial stage, the mortality rate could be reduced, it could be cured, and the burden of treatment expenses could then also be reduced⁽⁴⁾. According

to the preliminary study results, there is a total population of 35,021 residents in Nam Phong district. From this population, there were 1,060 participants in the study, who had received screening for CRC by using FIT. Of those participants, 92 cases (3.0%) had a positive result or 8.7 percent consisting of 39 males and 53 females, which accounted for 11.5 percent and 7.4 percent, respectively⁽⁵⁾. According to the literature review, it was found that there were factors related to participation in CRC screening services, such as age, gender, marital status, education level, monthly income, family history of cancer, and receiving advice from public health officials. However, this type of study is rarely conducted in Thailand, and it represented a cross-sectional analysis⁽⁶⁾, which was different from the current research, which was a case-control study.

Regarding the situation of the severity of CRC and problem of having low participation in the cancer screening project, the present study was, therefore, needed to find the factors related to the participation of members of the population between the ages of 45 to 74 years in CRC screening programs with fecal immunochemical test (FIT).

Materials and Methods

Study design

The current research was an analytical research with an unmatched case-control study.

Participants

The present study was conducted under the CRC Screening Using FIT in a Thai Population Aged 45 to 74 Years: A Population-Based Randomized Controlled Trial. Cases were those who participated in the screening program, and data collection took three days for 155 people, or approximately 52 people per day, and they quit as soon as it was finished. They all lived in Nampong district for at least six months. Participants diagnosed with cancer in the last two years or diagnosed with acute gastritis, inflammatory bowel disease, or a related condition in the last two years were excluded. Controls were those who did not participate in the screening program and lived in Nampong district for at least six months. Controls were collected by simple random from the list of the people who did not participate in the program on the same day as the cases participated in the screening program.

Setting

Namphong District, Khon Kaen Province.

Sample Size

The initial sample size was considered from the unmatched case-control study⁽⁷⁾, the proportion of case and control was 1:1, at the 0.05 level of significance, a power of 0.9 and odds ratio (OR) 3.60 times, which was recommended by the public health officials regarding CRC screening using the fecal occult blood test (FOBT)⁽⁸⁾. The proportion of females to males participated in screening for CRC was 118/188, which was equal to 0.63⁽⁸⁾. Then, the sample size was adjusted according to the analysis with the multiple logistic regression by using the formula⁽⁹⁾ with the partial correlation coefficient of 0.5, resulted in a total sample size of 210 people. Therefore, for reliability in conducting the research and preventing data loss, the sample size of the case included 155 people. The sample size of the control group also consisted of 155 people, totaling 310 people.

Data collection

The questionnaire was created by the researcher covering the objectives and conceptual framework of the present research in which the literature and related research had been reviewed. The interview form was divided into two parts as follows:

Part 1 consisted of the demographic factors and included seven items.

Part 2 consisted of the knowledge factors with three enumerating options, which were: 1 (Yes) and 0 (No or Uncertain). The knowledge about the causes of CRC included nine items, about the symptoms of CRC included seven items, about CRC screening included four items, and about the prevention methods of CRC included five items, resulting in a scale score of 0 to 25. The evaluation criteria that were applied had been derived from the Bloom's criteria⁽¹⁰⁾. Therefore, the knowledge scores were divided into two levels, a low level of knowledge with a score of 16 or less, and a high level of knowledge with a score of 17 or more. The interview was checked for validity by experts and tested for reliability. Kuder-Richardson (KR-20) was 0.83.

The two trained research assistants went to collect the data at the designated area between March 26 and April 10, 2018. All potential participants from the random sample were invited to join the study and asked to provide informed consent. All data were double entered, and a check was then made for invalid or unusual observations.

Statistical analysis

Descriptive statistics were used to summarize

the characteristics of the participants. The association between the factors and participation in CRC screening using the FIT were evaluated using ORs with 95% confidence intervals (CIs). Both crude and adjusted ORs were obtained using binary logistic regression for age, gender, marital status, highest level of education, monthly family income, family history of cancer, receiving suggestions from the public health officials about CRC screening, and knowledge of CRC. Factors included in the multivariable model and backward elimination were those found to be potentially associated with the participation in CRC screening using FIT in the bivariate analysis with a p-value of less than 0.25. Multivariate logistic regression was used to control for potential confounding factors. All statistical analyses were performed using STATA version 10. Statistical significance was set at a level of 0.05.

Ethics consideration

The present study was approved by the Ethics Committee on the Human Research of Khon Kaen University (No. HE612032), on February 14, 2018.

Results

Three hundred ten participants were included in the present study and were divided into 155 cases and 155 controls. The cases study had an average age of 59.7 years, and the controls average age was 57.3 years, most of them were female, at 73.6% and 61.9%, respectively. The cases and the control groups had a marital status of 81.3% and 69.6%, respectively. The members of the case and the control had graduated from primary school as their highest education level at 83.9% and 65.8%, respectively. The average family income for both the case and the control had been 5,359.3 baht per month. Most of the participants in both groups had no family history of cancer at 76.8% and 94.2%, respectively. Most of participants in the study cases had received advice from the public health officials regarding CRC screening at 67.1%, whereas 56.8% of the participants in the control had not received any advice from health officials about colorectal and colon cancer screenings. Most participants in the study cases had low level of colorectal cancer Knowledge at 63.9% and in the controls at 83.8%.

Analysis of factors associated with participation in the colorectal cancer screening program: univariate analysis

The demographic factors consisted of age,

gender, marital status, highest educational level, monthly family income, family history of cancer, receiving advice from public health officials, and knowledge of CRC. All of these were related to the participation in CRC screening program with statistical significance ($p < 0.05$).

Analysis of factors associated with participation in the colorectal cancer screening program: multivariate analysis

It was found that age, highest education level, a family history of cancer, receiving advice from public health officials regarding CRC screening, and knowledge about CRC had all been related to participation in the CRC screening program with a statistical significance ($p < 0.05$). It was found that people, whose ages were equal to or higher than 60 years, were 2.08 times more likely to participate in CRC screening program when compared to those aged less than 60 years (OR_{adj} 2.08, 95% CI 1.19 to 3.63, $p = 0.010$). In addition, participants graduated from primary school were 3.7 times more likely to participate in CRC screening programs compared to those finished educational level higher than primary school (OR_{adj} 3.7, 95% CI 1.86 to 7.33, $p < 0.001$). Participants with a family history of cancer were 5.25 times more likely to participate in the CRC screening program compared to those who did not have family history of cancer (OR_{adj} 5.25, 95% CI 2.14 to 12.86, $p < 0.001$). People, who had been advised by the public health officials about CRC screening were 3.09 times more likely to participate in the CRC screening program compared to those who had not received any advice from public health officials (OR_{adj} 3.09, 95% CI 1.81 to 5.27, $p < 0.001$). Participants with high levels of knowledge about CRC were 4.01 times more likely to participate in the CRC screening program compared to those with low levels of knowledge, (OR_{adj} 4.01, 95% CI 2.09 to 7.69, $p < 0.001$), as shown in Table 1.

Discussion

CRC is a major common type of cancer worldwide. Therefore, the present study investigated factors associated with participation in CRC screening using the FIT in Thai population between the ages 45 to 74 years in the Namphong District of Khon Kaen Province. The present study finding showed that the factors associated with participation in the CRC screening programs were ages equal to or higher than 60 years, lower education level, a family history of cancer, receiving advice the from public health

Table 1. Multiple logistic regression analysis between factors and participation in the colorectal cancer screening program using the fecal immunochemical test (FIT)

Variables	Cases (n=155); n (%)	Controls (n=155); n (%)	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value
Age					0.010
<60 years	68 (43.9)	93 (60.0)	1		
≥60 years	87 (56.1)	62 (40.0)	1.92 (1.22 to 3.01)	2.08 (1.19 to 3.63)	
Highest level of education					<0.001
Higher than primary school	25 (16.1)	53 (34.2)	1		
Primary school	130 (83.9)	102 (65.8)	2.70 (1.57 to 4.64)	3.70 (1.86 to 7.33)	
Family history of cancer (e.g., father, mother, or direct relatives)					<0.001
No	119 (76.8)	146 (94.2)	1		
Yes	36 (23.2)	9 (5.8)	4.91 (2.27 to 10.59)	5.25 (2.14 to 12.86)	
Receiving suggestions from public health officials about colorectal cancer screening					<0.001
No	51 (32.9)	88 (56.8)	1		
Yes	104 (67.1)	67 (43.2)	2.68 (1.69 to 4.25)	3.09 (1.81 to 5.27)	
Knowledge of colorectal cancer					<0.001
Low level	99 (63.9)	130 (83.8)	1		
High level	56 (36.1)	25 (16.2)	2.94 (1.72 to 5.04)	4.01 (2.09 to 7.69)	

OR=odds ratio; CI= confidence interval

officials regarding CRC screening, and high level of knowledge about CRC.

People aged equal to or higher than 60 years were associated with participation in a CRC screening program using FIT with statistical significance. This was consistent with the findings from a study⁽¹¹⁾ in which it was found that being of an older age had a statistically significant correlation with CRC screening tests. Likewise, in Korea, it was found that people aged over 60 years had been associated with screening for CRC^(12,13). Similarly, according to a study carried out in Southeast Texas, USA, patients were selected for a study, which was conducted for 16 months during the years from 2004 to 2005. The results indicated that older age was associated with screening for CRC and colon cancer⁽¹⁴⁾. Moreover, a CRC Screening study carried out at the U.S. Community Health Center found that people aged between 65 and 75 years old had 2.49 times more likely to be screened for CRC compared to those aged of 50 to 64 years, but it also depended on the health insurance. Without health insurance, the rate of screening services was low⁽¹⁵⁾. The present study found that people aged less than 60 years were less likely to be screened for CRC because they thought they were not at risk of developing CRC. People completing primary education had a greater possibility of participating in the CRC screening program using FIT with statistical significance. In contrast, in a 2018

study⁽¹⁶⁾, it was found that those who graduated at a higher level than secondary or university level had been correlated with participation in CRC screening. In addition, in many other countries, such as USA⁽¹⁴⁾, Greece⁽¹⁷⁾, England⁽¹⁸⁾, Australia⁽¹⁹⁾, and Korea⁽¹²⁾, it was established that those who had graduated from a university had a statistically significant correlation with participation in CRC screening.

It appeared that people with a family history of cancer had shown a greater possibility of participating in the CRC screening program using FIT with a statistical significance consistent with the previous studies from many countries. For example, in Australia, people with a family history of CRC were correlated with participation in CRC screening (RR 1.18, 95% CI 1.17 to 1.19)⁽¹⁶⁾. Similarly, Italian women with a family history of CRC were correlated with participation in CRC screening (OR 4.3, 95% CI 1.48 to 12.70)⁽²⁰⁾. In addition, people in Korea, having family history of cancer were correlated with participation in CRC screening (OR_{adj} 1.28, 95% CI 1.11 to 1.48)⁽¹³⁾. Furthermore, people with family history of CRC were correlated with the sessile serrated polyp detection rate (statistically significant) OR 1.58, 95% CI 1.02 to 2.27⁽²¹⁾. For example, these people had parents or direct relatives, who had been at high risk of getting cancer, especially as they increased in age. They may have also been worried and afraid that they might get cancer like their family

members. Therefore, they made the decision to join a cancer screening project with the hope of finding that they were not at risk for CRC⁽¹⁶⁾.

It turned out that when people had received advice from the public health officials, there was a greater possibility for them to participate in the CRC screening program using FIT with statistical significance. This was consistent with a study⁽²²⁾ of the Korean Americans advised by their doctors, so, there would be increased of the CRC screening services. Similarly, many other studies confirmed that people advised by doctors or the public health officials about cancer screening, were correlated with the rise in the numbers of CRC screenings^(8,14,23-25). When people receive advice about the screening methods for CRC through various channels, such as through a broadcasting tower or through the distribution of leaflets, the public would have access to the knowledge and understanding about screening for CRC through FIT. It was found that people with a high level of knowledge about CRC had had more opportunities to participate in the CRC screening program using FIT with statistical significance. In USA, having the knowledge had increased the awareness of the importance of cancer screening⁽¹⁴⁾, which was consistent with findings from a study carried out in Roi Et Province, Thailand. It was found that having knowledge about CRC had been related to screening for CRC because the samples, who had received previous knowledge about CRC, already knew that the screening for CRC using FIT was an easy, inexpensive, and pain-free method⁽⁶⁾.

Further research into FIT participation factors should focus on socioeconomic status, which may affect program attention since participants need to take personal leave, as well as health literacy and CRC preventative behaviors.

Limitation

The area for this study was in a rural region, where most of samples had only finished the primary level and were available to join the screening because some of them were unemployed or staying at home. Since the study was committed on working days, people who had higher educational level went to work, therefore, lower educational people were more likely to join the screening than higher educational people.

Conclusion

The results revealed that receiving advice from the public health officials regarding CRC screening and that proper knowledge had been related to

participation in screening programs for CRC with the FIT. Thus, to raise awareness and create a greater understanding about CRC and the screening test, the public health officers should disseminate knowledge about CRC. Information about the colorectal screening with the FIT should especially be spread to those people who are younger than 60 years of age, educational levels higher than the primary level, and to those, who do not have a family history of CRC.

The strength of case-control analytical research is that it takes less time to carry out a study than performing a follow-up study, which results in lower costs. This is suitable for studying diseases that have a longer disease progression and are difficult to track, such as cancer.

What is already known on this topic?

The previous studies found that the factors related to CRC screening services were age, gender, marital status, education level, monthly income, family history of cancer, and receiving advice from the public health officials.

What this study adds?

The study found the factors related to colorectal cancer screening were age equal to or higher than 60 years, the lower education level, family history of cancer, receiving advice from the public health officials regarding colorectal cancer screening, and high level of knowledge about colorectal cancer. Most of the previous studies were conducted by a cross-sectional analytical study, however, this study was conducted by a case-control study. Moreover, the situation of colorectal cancer in Nam Phong District has been remaining a serious public health concern and had low participation in the cancer screening.

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Conflicts of interest

The authors declare no conflicts of interest in this study.

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