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ORIGINAL ARTICLE

Health beliefs about fecal occult blood test in an average-risk population

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Abstract

Background: *Mexico has the 3rd place in the Latin American region in prevalence of colorectal cancer (CRC). Among the screening methods for CRC is the fecal occult blood test (FOBT) for people at average risk. Beliefs about CRC and screening methods may influence the adoption of screening methods.* **Objective:** *To analyze the association between knowledge, sociodemographic variables and health belief model dimensions according to the stages of adoption of FOBT in people aged 40 years or older.* **Method:** *Thirty-five hundred and fifty-two respondents to the health belief model scale for CRC and FOBT participated.* **Results:** *A significant association was found between the stages of FOBT adoption and knowledge of diagnostic methods for CRC (χ^2: 56.6 [3]; p = 0.000), significant differences were obtained for the dimensions of the belief model except for perceived severity (p = 0.055).* **Conclusions:** *The realization of FOBT is associated with knowledge of screening methods, being affiliated to a health service and advanced stages of change. Susceptibility beliefs, benefits, barriers, perceived self-efficacy and health motivation are what make the difference between initial and advanced stages of FOBT adoption.*

Keywords: *Colorectal cancer. Fecal occult blood test. Health belief model. Transtheoretical model.*

Creencias sobre la prueba de sangre oculta en heces en población con riesgo promedio

Resumen

Antecedentes: *México tiene el 3.er lugar de la región latinoamericana en prevalencia de cáncer colorrectal (CCR). Uno de los métodos de detección para el CCR es la prueba de sangre oculta en heces (PSOH) para las personas con riesgo promedio. Las creencias sobre el CCR y los métodos de detección pueden influir sobre la adopción de los métodos de detección.* **Objetivo:** *Analizar la asociación entre los conocimientos, las variables sociodemográficas y las dimensiones de modelo de creencias de salud de acuerdo con las etapas de adopción de la PSOH en personas de 40 años o más.* **Método:** *Participaron 352 personas que respondieron la escala del modelo de creencias de salud para el CCR y la PSOH.* **Resultados:** *Se encontró una asociación significativa entre las etapas de adopción de la PSOH y el conocimiento de métodos diagnósticos para CCR (χ^2: 56.6 [3]; p = 0.000), se obtuvieron diferencias significativas para las dimensiones del*

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modelo de creencias excepto en la severidad percibida (p = 0.055). **Conclusiones:** *Las creencias susceptibilidad, beneficios, las barreras, la autoeficacia percibida y la motivación para la salud son las que hacen la diferencia entre las etapas iniciales y avanzadas de adopción de la PSOH.*

Palabras clave: *Cáncer colorrectal. Prueba de sangre oculta en heces. Modelo de creencias de salud. Etapas de adopción.*

Introduction

Colorectal cancer (CRC) represents a growing public health problem and affects more developing countries each year[1]. In 2020, 1,931,590 new cases of CRC were reported worldwide, ranking #3[2]. Latin America and the Caribbean region represent the 4th highest prevalence of CRC globally and the 3rd in Mexico. In 2020, CRC was the 2nd most common type of cancer among Mexican men and the 4th among women[3].

CRC is among the top 5 cancers with the highest number of deaths in both sexes nationwide and in 2019 topped the list as the leading cause of cancer death among men aged 30 to 59 years[4].

According to the Pan American Health Organization[5], around one-third of all cancer cases can be prevented by educating the population to avoid major risk factors, such as smoking, excessive alcohol consumption, unhealthy diet, and physical inactivity. Screening and vaccination programs have proven effective in reducing the burden of certain types of cancer. The cancer burden is expected to increase by approximately 60% over the next 20 years[6], affecting health systems, individual health, and community well-being.

Screening programs for the early detection of any type of cancer begin by identifying the types of risk populations, which are average, elevated, and high risk. Patients older than 50 years without conditions such as familial adenomatous polyposis, inflammatory bowel disease, hereditary non-polyposis colorectal cancer, or positive family history of colorectal tumors are considered at average risk[7]. For these individuals, the American Cancer Society recommends starting regular screening at 45 years of age, with the recommended screening test for this population being the fecal occult blood test (FOBT)[8].

Mexico ranks 3rd in the Latin American region for CRC prevalence[2], and an increase in mortality from this type of cancer has been reported, with the highest rates being reported the northern part of Mexico[9]. Despite having diagnostic capacity for FOBT and colonoscopy, there are still no programs for detecting this type of cancer[10,11], unlike other types which have more widely disseminated prevention and early detection methods. Besides having diagnostic capacity, it is important to know if the population is prepared to adopt the recommended screening behavior and the psychosocial factors that influence an individual's decision to undertake such behavior.

In this regard, the Transtheoretical Model of Change assumes that not all individuals are equally ready to adopt a behavioral change. It offers the opportunity to plan and execute interventions considering the specific characteristics of each population or group targeted by the actions[12,13]. It proposes that healthy behavior development consists of moving through stages, from refusing to change behavior to maintaining change[14].

In the process, people can decide to adopt a particular preventive health behavior[15]. The main stages considered are: precontemplation, contemplation, preparation, action, maintenance, and relapse[16]. These stages are influenced by individuals' cognitive evaluations of health behavior, so the Health Belief Model (HBM) could complement the information about cancer beliefs and their detection practices[17].

According to the HBM, a health behavior is likely to appear when the individual perceives a health problem as serious, sees themselves as susceptible to that problem, and believes the action needed to avoid it will be beneficial and not costly[18]. The HBM dimensions are[19,20]: 1) perceived susceptibility, through which a person assesses their vulnerability to illness; 2) perceived severity, referring to beliefs on the importance of contracting a disease due to its severity or not receiving treatment after contracting it; 3) perceived benefits, representing the belief that a behavior is useful to reduce the likelihood of contracting a disease; 4) perceived barriers, representing the assessment of costs and difficulties in performing the behavior; 5) perceived self-efficacy, which is the personal assessment of the ability to control, organize, and adequately perform the behaviors[21]; and 6) health motivation.

Both models have been used to explain the determinants of screening behaviors in different types of cancer, including colorectal cancer[17,22].

The aim of this study is to identify knowledge about the signs, symptoms, and risk factors of CRC, the stages of FOBT adoption, analyze the association between knowledge, sociodemographic variables, and stages of

change, and compare the HBM dimensions based on the stages of adoption in individuals aged 40 and older at average risk.

Methods

Participants

We conducted a descriptive cross-sectional study with a non-probabilistic convenience sample. The inclusion criteria were men and women aged 40 to 75 years, without any symptoms of colorectal cancer (CRC). Exclusion criteria included having a personal or family history of digestive tract cancer or a personal history of benign colorectal lesions. The study was approved by the University Ethics Committee with number CE1/2022-14, and data were collected from October 2022 through April 2023. The recommendations of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement for observational articles were followed.

Evaluation Instruments

Sociodemographic Data Form

- Knowledge of CRC signs and symptoms. Consists of 18 statements to detect the level of knowledge about symptoms (yes, no, don't know), risk factors (increase, decrease, no effect), and CRC screening tests, based on information from the American Cancer Society[23]. Each correct answer is worth one point, with a score range between 0 and 18.
- Stages of change. Evaluated with 6 statements indicating each stage of adoption. Participants had to select the statement that best reflected their experience with FOBT:
  - Precontemplation: I have never had an FOBT and do not intend to have one.
  - Contemplation: I have never had an FOBT, but I plan to have one next year.
  - Preparation: I have never had an FOBT, but I plan to have one witthin the next 6 months and I have already made an appointment.
  - Action: I recently had my first FOBT and intend to have one every year.
  - Maintenance: I have had routine FOBTs for several years, once a year.
  - Relapse: I had some FOBTs several years ago, but I do not do them routinely every year, nor do I plan to have one next year.
- Health beliefs scale for CRC and FOBT. The Spanish version adapted by Juárez et al. (In press), was used. It has 39 items divided into 6 different dimensions: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, and health motivation. Response options range from 1 (no) to 4 (yes), with higher scores indicating a greater presence of the dimension. Cronbach's alpha for the scale dimensions ranges from 0.68 up to 0.86.

Procedure

Data mining was performed in the waiting room of a tertiary care center. People meeting the inclusion criteria were invited to participate; those who accepted signed the informed consent and completed the questionnaire in the form of an interview. Before starting the questions, participants were explained what fecal occult blood was to make sure they understood the procedure and could relate it to the questions.

Statistical analysis

For the statistical analysis, SPSS version 22 was used. The sample size calculation was performed with a precision of 5% and a confidence level of 95%. Hypothesis proportion calculations were done while considering the sample subject to losses, resulting in n = 310. To identify knowledge levels, the frequency and percentage of each category were obtained. The chi-square test was used for the association between knowledge and sociodemographic variables, the Student t-test to compare beliefs between people who have undergone an FOBT and those who have not, and the one-way ANOVA test with Games-Howell post hoc analysis to compare beliefs among the stages of adoption.

Results

Sample description

A total of 464 candidates were identified for participation, 89 of whom did not accept and 23 did not meet the inclusion criteria, resulting in a total sample of 352 participants. Most were women, married, with a high school education. The mean age was 51.38 ± 8.5 years. A total of 75% of the participants had health insurance, and 65.9% had undergone some cancer screening test; regarding CRC screening tests, 15% had undergone an FOBT and 2% a colonoscopy (Table 1).

Table 1. Sociodemographic and clinical characteristics

	Frequency (%)
Sex	
Female	227 (64.5)
Marital Status	
Single	41 (11.6)
Married	183 (52)
Common-law partnership	68 (19.3)
Divorced	40 (11.4)
Widowed	50 (5.7)
Number of children	
0-2	158 (44.9)
3-5	184 (52.3)
6-8	10 (5.6)
Approximate monthly income	
Less than 4,000	23 (6.5)
5,000 to 10,000	219 (62.2)
11,000 to 50,000	108 (30.7)
51,000 to 100,000	2 (0.6)
More than 100,000	0
Education level	
No formal education	5 (1.4)
Elementary school	63 (17.9)
Junior high school	101 (28.7)
High school and/or technical school	121 (34.4)
Bachelor's degree	57 (16.2)
Postgraduate degree	5 (1.4)
Economically Active	
Yes	209 (59.4)
Medical insurance	
Yes	263 (74.7)
Type of medical insurance	
None	89 (25.3)
Public	238 (67.6)
Private	25 (7.5)
Cancer screening	
Cervical cytology	160 (45.5)
Mammography	118 (33.5)
Prostate-specific antigen (PSA)	44 (12.5)
FOBT	54 (15.3)
Colonoscopy	7 (2)
Other tests	21 (5.9)
Knowledge of CRC screening test	
FOBT	150 (42.6)
Colonoscopy	223 (63.7)
Flexible sigmoidoscopy	75 (21.3)
Medical recommendation for CRC screening	
No	324 (92.0)

CRC: colorectal cancer; FOBT: fecal occult blood test.

Knowledge about signs, symptoms, and risk factors of colorectal cancer

Table 2 shows that the symptoms most widely identified were anal bleeding or blood in the stool, unexplained weight loss, and fatigue. Most believed that anal pain is a sign of CRC. Regarding risk factors, most participants identified that the consumption of processed meats, red meats, and alcohol increases the risk of CRC. Regarding the knowledge of CRC detection methods, colonoscopy was the most well-known, followed by FOBT. Most participants were in the contemplation and precontemplation stages.

Association analysis

Among the sociodemographic variables and the performance of the FOBT, an association was found only with being affiliated with a health service (χ^2 = 3.7 (1); p = 0.045). The stages of adoption of the FOBT and the level of knowledge of signs, symptoms, and risk factors were not significant (χ^2: 3.24 [1]; p = 0.072). However, a significant association was found between the stages of adoption of the FOBT and knowledge of diagnostic methods for CRC (χ^2: 56.6 [3]; p = 0.000).

Comparison analysis

Beliefs were compared between people who have undergone FOBT and those who have not, and significant differences were found in perceived susceptibility [t(82.9): 2.72; p < 0.01; d = 0.39], perceived barriers [t(91.5): –4.91; p < 0.001; d = 0.65], and perceived self-efficacy [t(82.2): 4.11; p < 0.001; d = 0.56] (Table 3).

Comparison analysis between stages of adoption and health beliefs

The comparison analysis among the different stages of adoption of the FOBT found significant differences for the various dimensions of the belief model, except for perceived severity, which was at the limit of significance (p = 0.055).

In the post hoc analysis, significant differences were found between the precontemplation-contemplation and precontemplation-relapse stages (p < 0.01) for the dimension of perceived susceptibility (Table 4). Differences were found among the stages of precontemplation-preparation (p < 0.001), precontemplation-maintenance (p < 0.05), and relapse-preparation (p < 0.05) regarding the benefits dimension.

In the barriers dimension, differences were found among the maintenance-precontemplation (p < 0.001), maintenance-contemplation (p < 0.05), preparation-precontemplation (p < 0.001), and relapse-precontemplation

Table 2. Knowledge about signs, symptoms, and risk factors of colorectal cancer

The following are suggestive symptoms/signs of CRC	Yes	No	
Abdominal mass	212 (60.2%)	140 (39.8%)	
Changes in bowel habits	232 (65.9%)	120 (34.1%)	
Anal pain	216 (61.4%)	136 (38.6%)	
Fecal tenesmus	181 (51.4%)	171 (48.6%)	
Colic or abdominal pain	216 (61.4%)	136 (38.6%)	
Rectal bleeding	299 (84.9%)	53 (15.1%)	
Hematochezia	312 (88.6%)	40 (11.4%)	
Weakness/fatigue	238 (67.6%)	114 (32.4%)	
Unexplained weight loss	274 (77.8%)	78 (22.2%)	
Do the following factors increase, decrease, or do not affect the risk of developing CRC?	**Increases**	**Decreases**	**No effect**
Obesity	209 (59.4%)	4 (1.1%)	139 (39.5%)
Moderate/high physical activity	18 (5.1%)	197 (56%)	137 (38.9%)
High consumption of red meat	262 (74.4%)	23 (6.6%)	67 (19%)
Eating fruits and vegetables	3 (0.9%)	243 (69%)	106 (30.1%)
Eating whole and fiber-rich foods	11 (3.1%)	229 (65.1%)	112 (31.8%)
Alcohol consumption	248 (70.5%)	6 (1.7%)	98 (27.8%)
High consumption of processed meats	283 (80.4%)	10 (2.8%)	59 (16.8%)
Physical inactivity	139 (39.5%)	23 (6.5%)	190 (54%)
Tobacco consumption	197 (56%)	5 (1.4%)	150 (42.6%)

CRC: colorectal cancer.

Table 3. Comparison analysis

HBM dimension	Fecal occult blood test	
	Yes (n = 54) Mean (SD)	No (n = 298) Mean (SD)
Susceptibility	12.3 (2.6)	11.2 (3.1)
Severity	18.6 (2.5)	18.7 (3.0)
Benefits	17.4 (1.9)	17.1 (2.4)
Barriers	12.4 (3.6)	15.2 (4.8)
Self-efficacy	39.5 (4.1)	37.0 (4.8)
Motivation	15.9 (2.8)	15.0 (3.2)

HBM: Health Belief Model; m: mean; SD: standard deviation.

($p < 0.001$) stages. In the self-efficacy dimension, differences were found among precontemplation-preparation ($p < 0.001$), precontemplation-maintenance ($p < 0.001$), precontemplation-action ($p < 0.05$); also among contemplation-preparation ($p < 0.05$), contemplation-maintenance ($p < 0.05$), and precontemplation-maintenance ($p < 0.05$) for the health motivation dimension.

Discussion

Regarding the identification of knowledge, which is similar to other studies[24,25], anal bleeding and blood in the stool are the main symptoms associated with CRC. However, a high percentage still confuses it with conditions such as anal pain, physical inactivity, and tobacco use. Overall, the population shows low knowledge about CRC symptoms and risk factors. The knowledge is lower than reported in a Norwegian study, in which 60% identified CRC risk factors[26]. This highlights the importance of continuing to educate the population about modifiable risk factors.

Table 4. Differences between the stages of adoption of the FOBT and the dimensions of the Health Belief Model

Beliefs/ Stages of adoption	Precontemplation (n = 106) Mean (SD)	Contemplation[2] (n = 166) Mean (SD)	Preparation (n = 26) Mean (SD)	Action[4] (n = 3) Mean (SD)	Maintenance[5] (n = 12) Mean (SD)	Relapse (n = 39) Mean (SD)	Multiple comparison
Susceptibility	10.4 (3.2)	11.6 (3.0)	11.6 (3.6)	11.0 (1.7)	12.7 (3.7)	12.3 (2.3)	1 vs 2, 6*
Severity	18.1 (3.0)	19.1 (2.9)	18.9 (3.2)	18.0 (1.0)	18.4 (4.3)	18.7 (1.8)	
Benefits	16.4 (2.8)	17.4 (2.0)	18.7 (1.3)	18.6 (1.5)	18.3 (1.6)	17.0 (1.9)	1 vs 3, 5† 3 vs 6†
Barriers	16.5 (5.4)	14.8 (4.4)	12.6 (3.5)	11.3 (2.8)	10.5 (2.7)	13.1 (3.7)	1 vs 3, 5, 6* 2 vs 5†
Self-efficacy	35.9 (5.5)	37.2 (4.2)	40.0 (4.1)	44.0 (0.0)	42.3 (2.1)	38.4 (4.1)	1 vs 3, 5, 6† 2 vs 3, 5†
Health motivation	10.9 (3.3)	11.6 (2.8)	12.5 (3.1)	12.3 (3.0)	13.6 (2.2)	11.6 (2.6)	1 vs 5†

* $p < 0.0$
† $p < 0.5$
FOBT: fecal occult blood test.

Regarding knowledge of CRC screening tests, colonoscopy was primarily identified, followed by FOBT. A total of 57.4% of participants were unaware of FOBT, which is the recommended test based on their age, similar to the report conducted by Rodríguez Hernández et al.[27], in which 88.9% of participants were unaware of FOBT as a diagnostic method for CRC. Another study stated that 98% of participants had heard of FOBT, and 17% had undergone the test[28], a higher rate than the obtained in this study, in which 15% of participants had undergone FOBT.

Regarding the stage of adoption of FOBT, most are in the stages in which the test has not yet been performed (precontemplation). The results differ from those reported in the same country regarding mammography, where women are in the maintenance and relapse stages[29]. However, in Korea, 36% are in the action and maintenance stages[30]. We should mention that a high rate is in the contemplation and preparation stages, intending to undergo FOBT. In these stages, promoting or recommending the test could help them take the step to perform it.

FOBT performance was associated with knowledge about detection methods and being affiliated with a health service. Knowledge of diagnostic methods was also associated with more advanced stages of change. These results are partially similar to those obtained by Huang et al.[31], who found an association between a higher level of knowledge of symptoms, risk factors, screening methods, and participation in CRC screening tests. Similarly, Samuel et al.[32] did not find sociodemographic factors associated with CRC screening methods, which stresses the importance of promoting CRC signs and symptoms and detection methods in health promotion campaigns and in the health services participants attend.

Beliefs that make a difference between the initial and advanced stages of adoption include perceived susceptibility, benefits, barriers, perceived self-efficacy, and health motivation. This is similar to what former studies have stated that people in the precontemplation stage, who do not intend to undergo the test, show fewer benefits and more perceived barriers vs those in the contemplation (considering taking the test) and action stages (have taken the test)[33,34]. Barriers, benefits, and self-efficacy also predict the most advanced stage. In both studies, the most advanced stage was preparation. This study also shows that these same beliefs are higher in people in the action, maintenance, and relapse stages.

This is confirmed by the data obtained in the comparison between people who have undergone FOBT and those who have not, showing that people who have undergone FOBT feel more susceptible to CRC, perceive fewer barriers to FOBT, and feel more confident in performing the procedures required for FOBT. However, no differences were found in the perceived benefits dimension, indicating an opportunity to highlight the benefits of undergoing FOBT at the recommended age for asymptomatic individuals. It is also important to provide an adequate explanation of how it is performed to promote self-efficacy and identify the main barriers to undergoing FOBT to help those in the precontemplation and contemplation stages move to action and maintenance through the development of intervention

programs that can induce changes in perception and behavior regarding CRC detection[35].

Limitations

This study was conducted among individuals seeking medical attention, so knowledge levels about detection methods may be higher than in the general population interviewed in other contexts. Also, the stage of change data was self-reported and not verified in medical records. However, this study provides an overview of the psychosocial panorama of the Mexican population regarding CRC.

Conclusions

The evaluated population at average risk shows low knowledge about CRC symptoms and risk factors, 57% are unaware of FOBT, and only 15% have undergone it. FOBT performance is associated with knowledge of detection methods, affiliation with a health service, and advanced stages of change. People who have undergone FOBT exhibit more perceived susceptibility and self-efficacy than those who have not.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that the procedures followed complied with the ethical standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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