Factors Predicting Fecal Occult Blood Testing among Residents of Bushehr, Iran, Based on the Health Belief Model

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Abstract

Colorectal cancer is a major cause of mortality worldwide. Fecal occult blood testing has proven a very effective screening tool for early detection and mortality reduction. The aim of this study was to determine predictors factors related to fecal occult blood testing using the Health Belief Model method among residents of Bushehr, Iran. A cross-sectional study was performed on a sample of 600 men and women more than 50 years of age. The sample was selected by a convenience method from patients referred to public and private laboratories throughout the city. Each subject filled out a questionnaire which was designed and developed based on Health Belief Model constructs. Statistical analysis was conducted using ANOVA, T-test, chi-square test, and logistic regression. Fecal occult blood tests were performed on 179 (29.8%) out of 600 subjects, of which 95 patients (58.1%) did a periodic examination test and 84 patients (46.9%) had a doctor’s advice for testing. According to the logistic regression model, the perceived barriers (P=0.0, Exp(B)= 0.3), perceived benefits (P<0.01, Exp(B)= 1.9) and self-efficacy (P<0.01, Exp(B)= 1.6) were predictive factors related to occult blood testing among subjects. The results showed that reducing people’s perception of barriers to testing, increasing perceived benefits of screening, and reinforcing self-efficacy can have major effect in increasing the rate of fecal occult blood screening for colorectal cancer prevention.

Keywords: Colorectal cancer - fecal occult blood test - Health Belief Model - Iran

Introduction

Colorectal cancer is one of the most prevalent and important types of cancer (Moshfeghi et al., 2011), and every year almost one million new cases of this cancer is reported worldwide. It plays out fatal for more than half of patients (Sadjadi et al., 2005). Recent studies indicate the increasing trend of this cancer in Asian countries (Centers for Disease Control and Prevention, 2008) and in Iran, this trend has been higher compared to other Asian countries (Moghimi-Dehkordi et al., 2012), in a way that among Iranian women, this illness is considered as the third most prevalent type of cancer and also among Iranian men, it is considered as the fifth prevalent type of cancer (Khazaeli et al., 2014).

High rates of death resulted by colorectal cancer have signified the importance of prevention of this cancer more than before. However, most fatalities resulted by colorectal cancer are easy to prevent through screening tests (Khazaeli et al., 2014). In addition, the five year survival rate of colorectal cancer is closely related to its diagnosis stage. If it is diagnosed during the early stages, the rate of survival increases up to 90 percent (Tastan et al., 2013). Therefore, regular screening tests are considered as one of the most valuable and important methods for diagnosis of this illness (Menon et al., 2003).

For diagnosis of colorectal cancer, there are several methods such as fecal occult blood testing (FOBT), Endoscopy (Colonoscopy and Sigmoidoscopy), and X-ray imagery (Winawer et al., 1993; Rex et al., 2009). Among these methods, the fecal occult blood testing can be considered as a simple, non-expensive and non-aggressive method as well as being the first credible way of early diagnosis of colorectal cancer (Moshfeghi et al., 2011) in a way that in many countries for men and women who are at risk of this cancer, the current recommendation is a onetime annual fecal occult blood test after reaching the age of 50. However, for people who are at high risks, these tests should start from younger ages and more frequently (Wong et al., 2013).

Evidence has shown that a person’s level of knowledge, type of perspective and beliefs in the context of risk factors and diseases are significantly related to performance of screening behaviors. And with respect to complexity of screening behaviors, application of behavioral theories and models becomes necessary in conducting screening...
tests (Sylvia et al., 2011). One of the applied models in this domain is the health belief model (HBM) which is widely used for evaluation of beliefs of individuals regarding screening behaviors (Sylvia et al., 2011; Levin et al., 2008; Pignone et al., 2011). According to this model, if an individual believes that he or she is susceptible to diseases such as cancer (Perceived susceptibility), and also comprehends the depth of this risk and seriousness of its several side-effects (Perceived severity) and considers recommended behaviors beneficial (Perceived benefits) for reduction of the risk or severity of illnesses, also if she or he is able to overcome the barriers of behavior such as expenses, time and etc. (Perceived barriers), and has enough confidence in his or her capabilities for behaving in a way that it leads to a desirable outcome (Perceived self-efficacy), then the individual will definitely have more tendency for participation in behaviors which promote health (Kim et al., 2012). In addition, the individual will be more likely to perform colorectal cancer screening.

In this regard, there are some disagreements on the effective constructs of HBM and in different studies, different constructs of HBM are related to performance of screening test (Javadzade et al., 2012; Hind et al., 2008).

On this basis, with respect to importance of early diagnosis of colorectal cancer and low trend of people older than fifty years to performance of fecal occult blood testing as an effective method for diagnosis of this cancer, in addition to existence of paradoxes in findings of previous researches regarding effective elements in performance of this method of screening, researchers have performed a research aimed at determination of anticipator factors in performance of fecal occult blood testing based on HBM among over 50 year old citizens of the city of Boushehr in order to design and propose an effective solution for propagation of this hygienic behavior which can be extremely effective in promotion of health level of the entire society.

**Materials and Methods**

**Study design**

The present study is a cross-sectional study performed on 600 men and women over fifty years old since March to May, 2015 in four laboratories in Boushehr, a southwestern province in Iran. The sampling was convenience method from clients of private and public laboratories. The criteria for entering this study include an age of over 50 years, permanent residence in the city of Boushehr, not being infected with colorectal cancer or other cancers as well as not having a record for colorectal cancer among the family. Also the exclusion criteria were lack of tendency for participation in the study.

With respect to rate of performance of fecal occult blood testing which was reported as 40 percent in previous researches (Bae et al., 2014), a minimum number of 577 individuals were estimated for the sample and with considering for 5% attrition rate, the sample size was determined as approximately 600 individuals.

**Methods and data collection**

The study was performed in two stages. The first stage was dedicated to preparation and determination of validity and reliability of the questionnaire. For this purpose, through a library study, the entire questionnaires regarding the health belief model in the context of colorectal cancer were extracted and translated (Satia et al., 2007; Shokar et al., 2008; Chen et al., 2010). Furthermore, a series of questions were prepared. Face and content validities of the questionnaire were evaluated by 11 experts in the domain of health education and nursing. According to content validity index (CVI) and the content validity ratio (CVR), necessary reformations were performed. CVR was respectively 0.8 for perceived susceptibility, 0.7 for perceived severity, 0.7 for perceived benefits, 0.6 for perceived barriers, and 0.7 for self-efficacy. The total CVR of the scale was determined as 0.7 and for awareness questions, this value was calculated as 0.8. The simplicity index for scale was 0.9. The index of clarity was calculated as 0.9. In addition, the index of relevancy for the total scale was calculated as 0.9. Furthermore, in preliminary studies, reliability of instruments was determined through completion of questionnaires by 30 individuals of the sample and calculation of Kuder Richardson coefficient for awareness questions as well as calculation of Cronbach’s alpha coefficient for constructs of the model. The Cronbach’s alpha coefficient was respectively calculated as 0.7 for the structure of susceptibility, 0.9 for severity, 0.9 for benefits, 0.9 for barriers, and 0.9 for self-efficacy. Also the total reliability of questions was calculated as 0.8.

In the second stage, the final questionnaire was filled by respondents referred to public laboratories (one laboratory) and private laboratories (three laboratories). It is noteworthy to state that certain laboratories were selected randomly.

**Instruments and measures**

The final questionnaire included three sections comprised of modifying factors, questions regarding the constructs and a section related to performance of screening test.

The section of modifying factors was aimed at evaluation of demographic features and predisposing factors to colorectal cancer with 20 questions as well as evaluation of awareness regarding colorectal cancer with 20 items which included right answers (1 point), and wrong answers (0 points).

The section related to constructs of HBM included 52 items. Six items were related to perceived susceptibility, 15 items were related to perceived severity, eight items were related to perceived benefits, 17 items were related to perceived barriers, and six items were related to self-efficacy. Perceived susceptibility, severity, benefits and barriers were evaluated on a 5 degree Likert scale of completely disagree (1 point) to completely agree (5 points). Also the questionnaire of self-efficacy was evaluated based on a 5 degree Likert scale of never (1 point) to always (5 points). Section three included two questions regarding the performance of FOBT and causes of performance of FOBT including doctors’ advice, periodical checkups, spotting blood in stool, etc.

After data collection, the data were analyzed by the
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Ethical principles
In order to consider research ethics, prior to completion of questionnaires, the entire goals and aims of the study were orally explained for studied subjects and the questionnaires were filled upon their agreement. During the completion of questionnaires, subjects were free to leave the study whenever they desired to.

Results
Among 612 completed questionnaires, 12 questionnaires were put away as they were incomplete. Finally, data analyses was performed on 600 individuals. In this study, 311 participants were female (51.8%) and 289 participants were male (48.2%). Most of participants were married (504 participants or 84%). Also 380 participants (63.4%) were illiterate or with primary education. Most of women participating in this study were housewives (248 participants or 79.7%). The number of retired men was 125 individuals (43.2%). The rest of demographic descriptions and their relation with fecal occult blood testing are demonstrated in Table 1. Among the participants of the study, 252 individuals (42%) had a history of gastrointestinal diseases, and 198 individuals (33%) had reported a history of other cancers in their family. Most of participants of the study (319 individuals or 53.2%) were covered by social security insurance. In terms of predisposing factors to colorectal cancer, 289 individuals (48.2%) had no exercise or physical activity. Most individuals (460 participants or 76.7%) reported consuming fruits and vegetables more than three times per week. Also 209 individuals (34.8%) smoked cigarettes or hookah.

In terms of performance of screening for fecal occult blood testing, 179 individuals (29.9%) had performed the test during the last recent years and most of them (95 individuals or 53.1%) had performed the test for periodical checkups. Also 84 of them (46.9%) had performed the test by recommendation of their physician because of having pain in their stomach. Other subsidiary causes of performance of test for these people included spotting blood in stool (32 individuals or 17.9%), having problems in bowel (23 individuals or 12.8%) and recommendation of

| Variable                        | Doing FOBT in last year (%) | Not FOBT in last year (%) | P value |
|---------------------------------|-----------------------------|---------------------------|---------|
| Sex                             |                             |                           |         |
| Man                             | 83.0 (28.8)                 | 205.0 (71.2)              | 0.60    |
| Woman                          | 96.0 (30.9)                 | 215.0 (69.1)              |         |
| Single                          | 5.0 (41.7)                  | 7.0 (58.3)                |         |
| Marriage                        |                             |                           |         |
| Married                         | 138.0 (27.4)                | 365.0 (72.6)              | 0.02    |
| Widowed or divorced             | 35.0 (42.2)                 | 48.0 (57.8)               |         |
| Illiterate                      | 69.0 (34.5)                 | 131.0 (65.5)              |         |
| Primary education               | 60.0 (33.3)                 | 120.0 (66.7)              | 0.02    |
| Diploma                         | 38.0 (23.3)                 | 125.0 (76.7)              |         |
| Academic                        | 10.0 (18.5)                 | 44.0 (81.5)               |         |
| History of gastrointestinal disease |                       |                           |         |
| Yes                             | 78.0 (31)                   | 174.0 (69)                | 0.63    |
| No                              | 101.0 (29.1)                | 246.0 (70.9)              |         |
| Family history of cancer        |                             |                           |         |
| Yes                             | 68.0 (34.5)                 | 129.0 (65.5)              | 0.08    |
| No                              | 111.0 (27.6)                | 291.0 (72.4)              |         |
| Insurance                       |                             |                           |         |
| Social security                 | 98.0 (30.8)                 | 220.0 (69.2)              | 0.03    |
| Health service                  | 43.0 (30.9)                 | 96.0 (69.1)               |         |
| Others                          | 28.0 (34.6)                 | 530.0 (65.4)              |         |
| Physical activity               |                             |                           |         |
| Yes                             | 101.0 (33.7)                | 208.0 (66.7)              | 0.24    |
| No                              | 77.0 (26.6)                 | 212.0 (73.4)              |         |
| Fruits and vegetables           |                             |                           |         |
| Less than 3 times a week        | 46.0 (34.3)                 | 88.0 (65.7)               | 0.22    |
| More than 3 times a week        | 132.0 (28.8)                | 327.0 (71.2)              |         |
| Cigarette and hookah            |                             |                           |         |
| Yes                             | 58.0 (27.9)                 | 150.0 (72.1)              | 0.42    |
| No                              | 120.0 (31.1)                | 266.0 (68.9)              |         |
| Job                             |                             |                           |         |
| Yes                             | 100.0 (30.1)                | 232.0 (69.9)              | 0.95    |
| No                              | 78.0 (30.4)                 | 179.0 (69.6)              |         |
| Source of information           |                             |                           |         |
| Yes                             | 124.0 (38.3)                | 200.0 (61.7)              | 0.00    |
| No                              | 55.0 (20)                   | 220.0 (80)                |         |
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perceived barriers (P=0.00), perceived benefits (P<0.01) and perceived self-efficacy (P<0.01) were predictors of FOBT performance in a way that as one unit was added to perceived barriers, the chance of performance of test decreased by 74%. Also with a one unit increase in perceived benefits, the performance chance of the test would increase by 91%. In addition by one unit increase in the perceived self-efficacy, the performance chance of the test would increase by 58.8%. Among the demographic variables, the variable of education had also a significant effect. In this regard, the chance of performance of test in individuals with university education (P=0.00) and in individuals with high-school education (P=0.00) was lower compared to illiterate individuals.

Discussion

Results of this research indicated that the rate of performance of fecal occult blood testing was 29.9% and in comparison with a similar previous research by Bae in Southern Korea which reported this rate as 40.3% (Bae et al., 2014), this rate is too low.

Also Shoori Bigdeli et al (2015) have carried out a research in the city of Qom aimed at analysis of awareness, beliefs and performance of people older than 50 years towards colorectal cancer screening. In this study, results showed that only 2.5% of respondents had previously performed screening tests and 93.5% of them had no awareness regarding colorectal cancer screening. James et al (2006) also performed a study and revealed that most people participating in their research had low levels of information about screening tests.

In this study, most people who had previously underwent screening tests, had reported their reasons as their physicians' recommendation and the most important and prevalent information source for participants of this research included radio, television, healthcare personnel

Table 2. Model Structures and Their Relationship to Do or Not to Do a Fecal Occult Blood Test

| Constructs of HBM Structures | Doing FOBT in last year Mean±SD | Not FOBT in last year Mean±SD | P Value |
|------------------------------|---------------------------------|-------------------------------|---------|
| Perceived susceptibility     | 3.3±0.6                         | 3.2±0.6                       | 0.02    |
| Perceived severity           | 3.9±0.4                         | 3.8±0.5                       | 0.00    |
| Perceived barrier            | 2.3±0.5                         | 2.8±0.5                       | 0.00    |
| Perceived benefits           | 4.2±0.5                         | 3.8±0.6                       | 0.00    |
| Self-efficacy                | 4.1±0.6                         | 3.5±0.9                       | 0.00    |
| Knowledge                    | 0.4±0.2                         | 0.5±0.2                       | 0.00    |

families (22 individuals or 12.3%). Most common information sources were respectively radio and television (195 individuals or 32.6%), healthcare agents (130 individuals or 21.7%), and family and friends (110 individuals or 18.3%). In addition, 72 individuals (12.0%) had no previous information regarding prevention of colorectal cancer.

In this study, the mean, standard deviations of awareness, and constructs of model based on doing and not doing of FOBT are shown in Table 2.

For determining the prediction power of constructs of the model in performance of fecal occult blood testing, the Logistic regression model was used. In this model, the two level variable of performance of screening test as the response variable and demographic variables and constructs which were associated with performance of test as independent variables were inserted into the Logistic model; as a result, the model became significant (P=0.00). Based on Logistic regression, the constructs of

Table 3. Logistic Regression Coefficients Related to Predictive Testing for Fecal Occult Blood Test

| Constructs and variables | B     | Exp(B) | P. value |
|--------------------------|-------|--------|---------|
| Perceived susceptibility | 0.2   | 1.3    | 0.21    |
| Perceived severity       | 0.1   | 1.1    | 0.66    |
| Perceived barrier        | -1.0  | 0.3    | 0.00    |
| perceived benefits       | 0.6   | 1.9    | <0.01   |
| self-efficacy            | 0.5   | 1.6    | <0.01   |
| Knowledge                | 1.1   | 3.0    | 0.09    |
| Marriage                 | -0.8  | 0.4    | 0.33    |

widowed or divorced/single -0.3 0.7 0.74
Primary/illiterate -0.4 0.6 0.11
Diploma/illiterate -1.2 0.3 0.00
Academic/illiterate -1.8 0.2 0.00
Social Security/no insurance 0.8 2.2 0.09
Health service insurance/no insurance 0.8 2.2 0.12
other Insurance/insurance loss 1.0 2.7 0.06
Get information/no information 0.6 1.9 0.01
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In conclusion, generally, results of this research have shown that the rate of performance of screening test is currently low and this fact requires more courage for encouraging people towards performance of screening tests. Also, the results have indicated that perceived barriers, benefits and self-efficacy are potential predictors of performance of fecal occult blood testing. Therefore, it is recommended to seek the help of strategies for reduction of barriers as well as increasing perceived benefits and self-efficacy.

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References

Bae N, Park S, Lim S (2014). Factors associated with adherence to fecal occult blood testing for colorectal cancer screening among adults in the Republic of Korea. *Eur J Oncol Nurs*, 18, 72-7.

Beydoun HA, Beydoun MA (2008). Predictors of colorectal cancer screening behaviors among average-risk older adults in the United States. *Cancer Causes Control*, 19, 339–59.

Chen CC, Basch CE, Yamada T (2010). An evaluation of cold-cystoscopy use: implications for health education. *J Cancer Educ*, 25, 160-5.

Dassow P (2005). Setting educational priorities for women’s preventive health: measuring beliefs about screening across disease states. *J Womens Health*, 14, 324-30.

Hind AB, May AB (2008). Predictors of colorectal cancer screening behaviors among average-risk older adults in the United States. *Cancer Causes Control*, 19, 339–59.

Hey JL, Ford JS, Klein D, et al (2003). Adherence to colorectal cancer screening in mammography-adoherent older women. *J Behav Med*, 26, 553-76.

James TM, Greiner KA, Ellerbeck EF, Feng C, Ahluwalia JS (2006). Disparities in colorectal cancer screening: A guideline based analysis of adherence. *Ethnic Dis*, 1, 228-33.

James AS, Campbell MK, Hudson MA (2002). Perceived barriers and benefits to colon cancer screening among African Americans in North Carolina: how does perception relate to screening behavior. *Cancer Epidem Biomar*, 11, 529-34.

Janz NK, Wren PA, Schottenfeld D, Guire KE (2003). Colorectal cancer screening attitudes and behavior: a population-based study. *Prev Med*, 37, 627–34.

Javadzade SH, Mostafavi F, Hasanzade A, et al (2012). Factors associated with the fecal occult blood testing for colorectal cancer screening based on health belief model structures in moderate risk individuals, Isfahan 2011. *J Edu Health Promot*, 1, 18 - 27.

Khazaeni N, Golshiri P, Farajzadegan Z, et al (2014). Evaluating the validity and reliability of persian version of The european organization for research and treatment of cancer quality of life questionnaire for colorectal cancer. *IUMS*, 32, 276-87.

Kim HS, Ahn J, No JK (2012). Applying the Health Belief Model to college students’ health behavior. *Nutr Res Pract*, 6, 551-8.

Koo JH, You MK, Liu K, et al (2012). Colorectal cancer screening practise is influenced by ethnicity of medical practitioner and patient. *J Gastroen Hepatol*, 2, 390-6.

Levin B, Lieberman DA, McFarland B, et al (2008). Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps 2008: a joint guideline from the american cancer society, the US multi-society task force on colorectal cancer, and the American College of Radiology. *CA Cancer J Clin*, 58, 130–60.

Menon U, Victoria L, Champion DNS, et al (2003). Beliefs associated with fecal occult blood test and colonoscopy use at a worksite colon cancer screening program. *J Occup Environ Med*, 45, 891-8.

Mohgimi-Dehkhordi B, Safaei A (2012). An overview of colorectal cancer survival rates and prognosis in Asia. *World J Gastrointest Oncol*, 4, 71-5.

Moshfeghi K, Mohammad-Beigi A, Hamedi-Sanani D, Bahrami M (2011). Evaluation the role of nutritional and individual factors in colorectal cancer. *Zahedan J Res Med Sci*, 13, 12-7.

Pignone MP, Flitcroft KL, Howard K, et al (2011). Costs and cost-effectiveness of full implementation of a biennial faecal occultblood test screening program for bowel cancer in Australia. *Med J Aust*, 194, 180-5.

Powe BD, Cooper DL, Harmond L, et al (2009). Comparing knowledge of colorectal and prostate cancer among African American and Hispanic men. *Cancer Nurs*, 32, 412-7.

Rex DK, Johnson DA, Anderson JC, et al (2009). American college of gastroenterology guidelines for colorectal cancer screening. *Am J Gastroenterol*, 104, 739-50.

Ruffin MT, Creswell JW, Jimbo M, Fetters MD (2009). Factors influencing choices for colorectal cancer screening among previously unscreened African and Caucasian Americans: findings from a triangulation mixed methods investigation. *J Community Health*, 34, 79-89.

Sadjadi A, Nouriaie M, Mohagheghi MA, et al (2005). Cancer occurrence in Iran in 2002, an international perspective. *Asian Pac J Cancer Prev*, 6, 359-63.

Satia JA, Galanko JA (2007). Demographic, behavioral, psychosocial, and dietary correlates of cancer screening in African Americans. *J Health Care Poor Underserved*, 18, 146-64.

Shokar NK, Carlson CA, Weller SC (2008). Factors associated with racial/ethnic differences in colorectal cancer screening. *J Am Board Fam Med*, 21, 414-26.

Shouri Bidgoli AR, Taheri Kharame Z, Asayesh H, et al (2015). Study of knowledge, attitude, and practice on colorectal cancer screening among individuals older than 50 years based on health belief model. *Qom Univ Med Sci J*, 9, 59-65.

Sylvia C, Carolyn M, Timothy RB (2011). Knowledge, Attitudes, and Demographic Factors Influencing Cervical Cancer Screening Behavior of Zimbabwean Women. *J Womens Health*, 20, 943-53.

Tahmasbeyi R, Noroozi A, Ghobadi Dshahki K (2016). Psychometric evaluation of colorectal cancer screening belief scale based on health belief model's constructs for the fecal occult blood test. *Asian Pac J Cancer Prev*, 17, 225-9.

Tastan S, Iyigun E (2013). Evaluation of the knowledge, behavior and health beliefs of individuals over 50 regarding colorectal cancer screening. *Asian Pac J Cancer Prev*, 14, 5157-63.

Winawer SJ, ZA, Ho MN, O’Brien MJ, et al (1993). Prevention of colorectal cancer by colonoscopy polpectomy. *N Engl J Med*, 329, 1977-81.

Wong RK, Wong ML, Chan YH (2013). Gender differences in predictors of colorectal cancer screening uptake: a national cross sectional study based on the health belief model. *BMC Public Health*, 13, 677- 89.