

Participation Rate and Related Factors in Colonoscopy Screening Program in First-Degree Relatives of Patients Affected by Colorectal Cancer

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Abstract

Background: First-degree relatives (FDRs) of people diagnosed with colorectal cancer (CRC) have a two- to three-fold increased risk of developing disease. Colonoscopy screening test can be effective in prevention and early treatment.

Objectives: The purpose of this study was to determine the rate of participation in colonoscopy screening test and related factors in first degree relatives.

Methods: 200 FDRs of CRC cases were interviewed by the researchers. A reliable and valid questionnaire about undergoing colonoscopy screening test and barriers was filled via phone. To report qualitative data results, we used percent and proportion. Full (bytotal variables) and final (Forward LR) multiple logistic regression analysis were used to make a model which was executed using spss19.

Results: In total, 59% FDRs had undergone colonoscopy screening test to the time of interview. Major reasons for not participating were fear of pain (23%), concerns about complications and test positive result (21.5%), lack of health insurance (21.5%), not believing in the test effectiveness (17%), no need because of healthy feeling (13%), embarrassment (12%) and distrust to service provider skills (10%). Results of multiple logistic regression analysis indicated there is statistical significance between participating colonoscopy screening and variables "not affected with hypertension (95%CI: 0.4 - 2.04, OR = 3.7), believe in test effectiveness in FDRs (95%CI: 1.8 - 16.9, OR = 5.6), also age of diagnosis \geq 50 in CRC cases (95%CI: 1.7 - 2.3, OR = 2)". Finally, age below 50 (95%CI: 1.1 - 5.1, OR = 2.4), not being alive person affected by CRC (95%CI: 1.2 - 5.8, OR = 3.3), monthly family income \geq 10 million Rials (95%CI: 1.08 - 4.7, OR = 2.2) and belief in effectiveness of the test (95%CI: 2.61 - 12.55, OR = 5.7) were predictor factors to participate.

Conclusion: Future Interventions should focus on fostering positive attitudes, overcoming barriers, enhancing social and health insurance support and following medical recommendation consecutive to performing colonoscopy screening test.

Keywords: Colorectal Cancer, Colonoscopy, Screening, First Degree Relatives

1. Background

Colorectal cancer is the third most common cancer worldwide with 38% of the digestive tract cancers and 0.6% of the burden of non-communicable diseases (1, 2). In 2012, 1.4 million new cases were discovered around the world and it is predicted the total number will rise to 2.4 million cases until 2035 that 54% will occur in developed countries (3-6). The reported goal of the world health organization in healthy people 2020 is reduction of incidence rate of colorectal cancer from 45.5 (in 2007) to 38.7 (in 2020) in a hundred thousand people (7). According to the latest report by the Iran National Cancer Registry, colorectal cancer is the fifth most common cancer in men (8.3 percent), third in women (8.5 percent) and incidence was estimated 6 to 7.9 in 100,000 people. Over the last 25 years, this estimation has been a growing trend (6-9). Available data indicated Iranians at a younger age are more affected than European and American population, so approximately 43% of patients are under 50 years (8-12). Although risk of general population for colorectal cancer is 5% - 6%; people with

a first-degree relative affected case diagnosed before age of 50 years, are 2 to 3 times at higher risk of disease (12). So two or more of the first degree relatives diagnosed at any age increases the risk 4 to 6 fold. Thus the risk of cancer with positive family history, depends on age at diagnosis and number of relatives affected (13-17). Screening of people with positive family history must begin at age 40 or 10 years earlier than the youngest family member was diagnosed (6, 14). An Iranian study indicated the risk of colorectal cancer in people with at least one first-degree relative affected is 2 times more and their disease often occurs below age 40, in right colon, with a worse prognosis (18, 19). Therefore, the national protocol recommends people with positive family history participate in colonoscopy screening program interval. However, a large number do not undergo this effective test (8, 12). Reports from Foreign Studies indicated decision to participate colonoscopy screening in relatives was 25% - 79% (19, 20). Another study at Telavive reported only 23% first degree relatives participated in alternative colonoscopy screening and this adherence was higher among persons 40 to 59 years, women, sib-

lings, married, high income and education level. Family physicians consultation, Positive attitude to colonoscopy and social support were the most effective incentives to participate (21). The main causes for not participating in foreign studies was fear of pain and test positive result but an Iranian study indicated cost of colonoscopy screening was the first cause (22). There was not official statistics about the participation rate of first-degree relatives in colonoscopy screening test in Iran. Thus in this study, we investigated the participation rate of first-degree relatives and related factors in the population covered by Shahid Beheshti University of Medical Sciences, Tehran, Iran from 1386 to 1392.

2. Methods

This descriptive cross-sectional study was conducted on 200 eligible first degree relatives of patients affected by colorectal cancer in 2014. These samples were selected randomly by $P = 50\%$ and $\alpha = 0.05$ from total participants in counseling sessions held for participation in colonoscopy screening program between 2007 - 2013 in research institute for gastroenterology and liver diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran. The eligible FDRs had received counseling face to face by gastroenterologist. Then, they were recommended to participate in colonoscopy screening program. Although the number of cases needed for this study was 200, due to unwillingness of some FDRs to cooperate we had to call more than 300 FDRs to find 200 sample needed in this study. After that, the participation rate and related factors were evaluated in 2014. To fulfill these goals, we designed a questionnaire after literature review using variables in previous studies. The questionnaire was piloted between 20 FDRs, 2 times with one month interval. Then, reliability was confirmed by calculated Intra class correlation ($ICC = 1$). To test face and content validity of the questionnaire, we used opinions of experts (professors of Shahid Beheshti Medical Sciences and Gastroenterology and liver diseases research center) and it was revised before using in the present study. The major questions in this survey were "Have you ever participated in colonoscopy screening program?" and "Would you like to participate in colonoscopy screening program in future?". If the answers were negative, we would ask about probable reasons. The other section was about demographic data, socioeconomic and health status. Knowledge and attitude about colonoscopy screening test among first degree relatives was assessed with two questions "Did the information presented at the consulting session increase your awareness about colorectal cancer and methods of prevention

(in this survey, colonoscopy)?" and "Do you believe that colonoscopy screening tests can prevent colon cancer?".

Furthermore, some questions were about colorectal cancer affected cases in family. Finally, the questionnaire was filled via phone interview with first degree relatives. This study was approved by the ethical committee. To report qualitative data results, we used percent and proportion. For multiple regression analysis, at first, total variables such as demographic and socioeconomic status, healthy behavior and health status, knowledge and attitude about colonoscopy screening in FDRs, and colorectal cancer cases characteristics entered in multiple logistic regression model. Secondly, the forward likelihood ratio (Forward LR), Stepwise procedure method with entry testing based on the significance of the score statistic, and removal on the probability of a likelihood-ratio statistic based on the maximum partial likelihood were selected. The variables at the level of $P < 0.05$ were inserted into the Forward LR model. The multivariate analysis was performed on a database with no missing data. Finally, full (by total variables) and final model (Forward LR) results were reported. All statistical analyses were carried out using spss19. Differences were considered statistically significant at $P < 0.05$.

3. Results

Of 200 first-degree relatives, 59% had participated in colonoscopy screening program to the time of interview. 58.5% had a decision to undergo colonoscopy screening test in future. Reasons for not participating or no decision to participate in colonoscopy screening program were as follows: 23% fear of pain or feeling discomfort, 21.5% concern about complications, 21.5% worry about test positive result, 21.5% cost of screening test or lack of health insurance, 17% not believing in the test effectiveness, 13.5% no need because of healthy feeling, 12% embarrassment, and 10% distrust to service provider skill. Only 6.5% FDRs mentioned lack of knowledge about colonoscopy test, difficulty of traveling and long waiting time were reasons for not participating. Frequency of variables studied in this survey are indicated (Table 1). None of the interviewees had participated in any screening program of other diseases. In full model of multiple logistic analysis, association between these variables "no cigarette consumer ($P = 0.04$, $OR = 1.1$, $95\%CI: 1.05 - 1.6$), no affected with hypertension disease ($P = 0.003$, $OR = 1.2$, $95\%CI: 0.4 - 3.7$), high and very high belief in positive effect of colonoscopy screening test ($P = 0.002$, $OR = 5.6$, $95\%CI: 1.8 - 16.9$) in first degree relatives also age of diagnosis in patients 50 and over ($P = 0.001$, $OR = 2.95$, $95\%CI: 1.7 - 2.3$)" and variable undergoing colonoscopy screening test to time of interview were significant (Table 2). So in the

same analysis, there is a significant association between high and very high belief in effectiveness of colonoscopy screening ($P=0.001$, $OR=7.5$, $95\%CI:2.4-4.23$) and tendency to participate in this program (Table 1). In final model of multiple logistic regression (forward LR), association between variables: age of diagnosis 50 years and older in colorectal cancer cases ($P=0.01$, $OR=3.3$, $95\%CI:1.25-5.8$), non-smokers, not affected by hypertension ($P=0.004$, $OR=5$, $95\%CI:1.4-9.09$), high belief in effectiveness of colonoscopy in first degree relatives ($P=0.001$, $OR=4.6$, $95\%CI:2.14-9.29$) and participating in colonoscopy screening test to interview time were significant (Table 3). Also, some variables such as age below 50 years ($P=0.01$, $OR=2.45$, $95\%CI:1.18-5.10$), monthly family income of ten million Rials and more ($P=0.02$, $OR=2.27$, $95\%CI:1.08-4.70$) and high belief in positive effect of colonoscopy as a screening test of colorectal cancer ($P<0.001$, $OR=5.72$, $95\%CI:2.61-12.55$) in first Degree Relatives as well as not being alive colorectal cancer affected case ($P=0.01$, $OR=3.3$, $95\%CI:1.20-5.86$) are predictor factors to participate in colonoscopy screening program in future (Table 4).

4. Discussion

In this research, we determined participation rate of colonoscopy screening program and related factors in first degree relatives. Although the knowledge about effectiveness of screening colonoscopy test was high, about 40% of first degree relatives had not participated in this screening program. Major reasons for not undertaking were (respectively): fear of pain or feeling discomfort, concern about complications or test positive result, high cost of screening test or lack of health insurance, lack of belief in the test effectiveness, feeling no need because of healthy feeling, embarrassment and distrust to service provider skills.

One published study in France showed the rate of undergoing colonoscopy test at least once among siblings was 66%; $95\%CI:59-73\%$. Five variables were independently associated with colonoscopy screening: perceiving fewer barriers to screening ($OR=3.2$; $95\%CI:1.2-8.5$), having received the recommendation to undergo screening from a physician ($OR=4.9$; $95\%CI:1.7-13.7$), perceiving centers practicing colonoscopy as more accessible ($OR=3.2$, $95\%CI:1.3-7.8$), having discussed screening with all siblings ($OR=3.9$; $95\%CI:1.6-9.6$) and being a member of an association ($OR=2.6$; $95\%CI:0-6.6$) (22).

Karen Bronner indicated Adherence to interval colonoscopy was low with only 23.0%. Greater adherence was associated with socio-demographic variables (older age, siblings, having spouse, higher level of education and income) and behavioral variables (healthier lifestyle, utilization of preventive health services) (21).

Table 1. Frequency of Variables Studied in First Degree Relatives

Variables	No. (%)
Age	
≥ 50	115 (57.5)
Gender	
Male	103 (51.5)
Marital status	
Married	20 (10)
Single	171 (85)
Divorced/widowed	9 (5)
Education	
≤ Diploma	152 (76)
Monthly family income, million Rials	
≥ 10	94 (53.7)
Health insurance coverage	
Yes	179 (89.5)
Age of diagnosis CRC case	
≥ 50	128 (63.8)
CRC case alive	
No	125 (62.5)
Cigarette consumer	
No	165 (82.5)
BMI	
Fit	78 (38)
Overweight	100 (50)
Obese	22 (12)
Hypertension (HTN)	
No	165 (82.5)
Elevation of knowledge about Colonoscopy screening in consultation by physician	
High, very high	121 (60.5)
Belief in effectiveness of colonoscopy screening	
High, very high	116 (58.3)

So interventions should focus on changing attitudes to overcome barriers of colonoscopy screening program. To this purpose, medical staff can play a key role in increasing adherence to colonoscopy screening test. One American study reported 31% recommended persons had undergone colonoscopy screening test at least once and worry about pain were the main causes for not participating. Another problem was bowel preparation before colonoscopy test (23). One study in Iran indicated the main barriers to participation colonoscopy screening test in relatives were high costs, fear of pain and embarrassment (22). According to the high cost of colonoscopy screening test even in public centers, the health system should provide appropriate insurance coverage to reduce cost of screening test.

In the current study, age 50 years and over in colorectal cancer cases, age below 50 years in first degree relatives, not alive colorectal cancer affected cases in family, monthly income 10 million (Rials) and over, and high belief in

Table 2. Results of Full Model Multiple Logistic Regression Analysis for Participation in Colonoscopy Screening Test to Time of Study and Tendency to Participation in Future in First Degree Relatives^a

Full Model	Participation		OR (95%CI)	P Value	Tendency		OR (95%CI)	P Value	
	Yes 118 (59)	No 82 (41)			Yes 117 (58)	No 83 (42)			
Age			0.8 (0.3 - 2)				1.8 (0.7 - 4.8)	0.1	
< 50	60.8	39.2		0.6	66	34			
≥ 50 (reference)	57.3	42.7			54.5	45.6%			
Gender			0.4 (0.1 - 1.7)	0.2			2.4 (0.5 - 8.3)	0.2	
Female	56.5	43.5			59.1	40.9			
Male (reference)	62.4	37.6			61.2	38.8			
Marital status			0.5 (0.1 - 2.1)	0.4			0.7 (0.1 - 2.7)	0.6	
Married	58.5	41.5			60.2	39.8			
Single, divorced, widowed (reference)	62.1	37.9			58.6	41.4			
Education			1.3 (0.3 - 3.4)	0.6			0.8 (0.2 - 3)	0.8	
≤ Diploma	56.5	34.4			54.6	45.4			
Academic (reference)	66.7	33.3			77.1	22.9			
Monthly family income, million Rials			0.6 (0.2 - 1.6)	0.3			1.6 (0.6 - 2)	0.3	
≥ 10	68.1	31.9			71.3	28.7			
< 10 (reference)	55.6	44.4			50.6	49.4			
Health insurance coverage			0.1 (0.02 - 1.4)	0.1			0.3 (0.1 - 2.6)	0.3	
Yes	59.8	40.2			60.3	39.7			
No (reference)	52.4	47.6			57.1	42.9			
Age of diagnosis CRC case			2 (1.7 - 2.3)	0.001			0.6 (0.2 - 1.9)	0.4	
≥ 50	66.1	33.9			63	37			
< 50 (reference)	45.8	54.2			54.2	45.8			
CRC case alive			0.8 (0.3 - 2.2)				35.2	4 (3.2 - 7.1)	0.05
No	62.4	37.6			0.7	64.8			
Yes (reference)	53.3	46.7			52	48			
Cigarette consumer			1.1 (1.05 - 1.6)	0.04			0.6 (0.1 - 2.6)	0.5	
No	60	40			60.6	39.4			
Yes (reference)	54.3	45.7			57.1	42.9			
BMI			0.5 (0.1 - 1.8)	0.3			2.2 (0.7 - 7)	0.1	
Fit	57.9	42.1	0.6 (0.1 - 1.9)		65.8	34.2	1.9 (0.6 - 5.7)		
Overweight	55.8	44.2		0.4	60.5	39.5		0.2	
Obese (reference)	71.4	28.6			51.4	48.9			
Hypertension (HTN)			1.2 (0.4 - 3.7)	0.003			0.5 (0.1 - 1.6)	0.2	
No	61.8	38.2			61.8	38.2			
Yes (reference)	45.7	54.3			51.4	48.6			
Elevation of knowledge about Colonoscopy screening in consultation by physician			1.2 (0.4 - 3.7)	0.6			0.9 (0.3 - 2.8)	0.9	
High, very high	67.8	32.2			71.1	28.9			
low, very low (reference)	45.6	54.4			43	57			
Belief in effectiveness of colonoscopy screening			5.6 (1.8 - 16.9)	0.002			7.5 (2.4 - 23)	0.001	
High, very high	70.7	29.3			75	25			
Low, very low (reference)	42.2	57.8			39.8	60.2			

^a Values are expressed as %.

test effectiveness were predictors to undergo colonoscopy screening test.

One study indicated age of diagnosis in patients below 35 years was an effective factor in relative's participation (24). An Australian study reported sibling with high level of education and income also private insurance are more

volunteer to participate (25).

In the present study, none of participants had undergone other diseases screening program, such as breast or prostate cancer. It means diseases screening programs are in inappropriate status which can be due to lack of public awareness, inadequate physician's guidance or follow

Table 3. Results of Final Model (Forward LR), Multiple Logistic Regression analysis for participation in Colonoscopy screening program to time of study in First Degree Relatives^a

Final Model	Participation to Time of Study		OR (95% CI)	P Value
	Yes 118 (59)	No 82 (41)		
Affected by HTN disease			5 (1.4 - 9.09)	0.004
No	61.8	38.2		
Yes (reference)	45.7	54.3		
Age of diagnose of colorectal cancer case			3.33 (1.25 - 5.80)	0.01
≥ 50	66.1	33.9		
< 50 (reference)	45.8	54.2		
Belief in effectiveness of colonoscopy screening test			4.61 (2.14 - 9.29)	0.001
High and very high	70.7	29.3		
Little and very little (reference)	42.2	57.8		

^aValues are expressed as %.**Table 4.** Results of Final Model (Forward LR), Multiple Logistic Regression analysis for Tendency to Participate in Colonoscopy Screening Program in Future in First Degree Relatives^a

Final Model	Tendency to Participate in Future		OR (95% CI)	P Value
	Yes117 (58.)	No 83 (41.5)		
Age			2.45 (1.18 - 5.10)	0.01
< 50	66	34		
≥ 50 (reference)	54.5	45.6		
Monthly family income, million Rials			2.27 (1.08 - 4.70)	0.02
≥ 10	71.3	28.7		
< 10 (reference)	50.6	49.4		
CRC case alive			3.3 (1.20 - 5.86)	0.01
No	64.8	35.2		
Yes (reference)	52	48		
Belief in effectiveness of colonoscopy screening test			5.7 (2.61 - 12.55)	< 0.001
High and very high	75	25		
Little and very little (reference)	39.8	60.2		

^aValues are expressed as %.

by health care providers. Also, family economic difficulties can be important barrier. Therefore, applied strategies to increase public knowledge about screening tests in high risk persons are recommended. Also, Cultural interventions should be designed to change attitudes of first-degree relatives to participate in colonoscopy screening test. Finally, considering the high costs (direct and indirect) of treatment, health system should plan to make available this cost effective screening test at least for first degree relatives.

There were some limitations in this study. We had to rely to FDRs answers about participation in colonoscopy screening test because our interview was via phone and no document was available. Therefore, recall bias in some questions might have happen. Additionally, this research was conducted in a university (teaching) hospital in Tehran, so the results might not be extended to all first degree relatives in Iran.

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Footnotes

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for important intellectual content: Arezoo Chouhdari, Mohammad-Amin Pourhoseingholi, Parvin Yavari Statistical analysis: Arezoo Chouhdari, Mohammad-Amin Pourhoseingholi Administrative, technical, and material support: Arezoo Chouhdari, Parvin Yavari, Mohammad-Amin Pourhoseingholi, Mohammad-Reza Zali; Study supervision: Parvin Yavari.

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