RESEARCH ARTICLE

Evaluation of the Knowledge, Behavior and Health Beliefs of Individuals over 50 Regarding Colorectal Cancer Screening

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Abstract

The aim of the study was to evaluate of the knowledge, behavior and health beliefs of individuals over 50 regarding colorectal cancer screening, with a descriptive and cross-sectional design at Karabuk Life and Health Center in Turkey. A total of 160 people meeting set criteria were included in the study. The questionnaire consisted of two parts. The first part was composed of questions on characteristics of participants and the second part of questions derived from the Champion's Health Belief Model Scale. Only 15.0% of participants (n=24) had undergone a fecal occult blood test (FOBT), 11.3% (n=18) had had colonoscopy and 4.4% (n=7) had had sigmoidoscopy. Some 90.6% of the participants had low levels of risk awareness about the colorectal cancer. It was found that the average point of severity subscale of participants over 65 is higher than that of participants under 65 ($p<0.05$). In conclusion, because of the many barriers and health beliefs for the colorectal cancer screening program, the rate of participation in screening programs is not sufficient. Healthcare providers have important responsibilities for increasing rate of attendance in colorectal cancer screening programs.

Keywords: Colorectal cancer - risk factors - health beliefs - elderly

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Introduction

Cancer is one of the most important health problems in the world. According to the World Health Organization, cancer constituted the reason of 13% of the total deaths (7.6 million) in the world in 2008 (http://www.who.int/gho/ncd/mortality_morbidity/cancer/en/). Cancer is the prime reason of deaths in economically developed countries and the second reason of all deaths in developing countries. Among the cancer types, colorectal cancer is the second widespread cancer among the males and the third among females in the world. According to the 2008 data, there are 1.2 million new patients who are diagnosed with colorectal cancer and 608.700 diseases (Jemal et al., 2011). Data obtained by Ministry of Health Department of Struggle with Cancer reveals that colorectal cancer is the third cancer after lung and breast cancer in Turkey. The research also revealed that 8.69 of 100.000 males and 6.31 of 100.000 females suffered from colorectal cancer in Turkey in 2005 (http://www.saglik.gov.tr Accessed by March 18, 2013).

Age, colorectal history in family, inflammatory bowel disease, persons with familial adenomatous polyposis, characteristics of nutrition, smoking and urban life is among the risk factors (Burke et al., 2011). Despite the fact that early diagnosis and treatment of colorectal cancer results with a 90% five-year survival rate, only more than half of the cases can be early detected (Burke et al., 2011). Disease and causality rates caused by the colorectal cancer can be significantly decreased through the screening programs for early detection. Fecal occult blood test (FOBT), barium enema test, sigmoidoscopy and colonoscopy are among the methods to be used for this aim (Janz et al., 2003; Burke et al., 2011). FOBT in every year and colonoscopy in every ten year is suggested for females and males within the scope of colorectal cancer screening programs in Turkey. The literature on involvement rates to the colorectal cancer screening programs is limited in case of Turkey. Existing studies found that the rate of participation to the colorectal cancer screening programs is about 10% (Gulten et al., 2012). Although primer protective health services are less costly and more efficient for treatment and care of patients, they are not widely used due to various factors. Revealing the factors behind low levels of participation to the colorectal cancer screening programs will contribute to the development of positive and protective health behavior.

Health Belief Model (HBM) is one of the psycho-social models employed in explaining attitudes and beliefs of individuals regarding health behavior. The model was developed by Hochbaum, Kegeles, Leventhal and Rosenstock in the 1950s in order to explain low levels of participation to screening and protective programs within the scope of health services in the USA. Basic concepts related with beliefs and behaviors in the model are perceived susceptibility (an individual's assessment of their risk of getting the condition), perceived severity (an individual's assessment of the seriousness of the

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condition and its potential consequences), perceived benefits (an individual's assessment of the positive consequences of adapting the behavior), perceived barriers (an individual's assessment of the influences that facilitate or discourage adaptation of the promoted behavior), and health motivation (an individual's general willingness to develop behaviors for developing health) (Rosenstock, 1966). This model demonstrates the degree of harmony among the individual's health behavior and the health care services (Rosenstock, 1974). The HBM is widely used in nursing studies since it contributes to the understanding of the individuals' usage of protective health services.

Although suggested for individuals over 50, there is low level of attendance to colorectal cancer screening programs. A study conducted by Shapiro et al. (2001) found that the rate of having FOBT 19.8% whereas the rate for having sigmoidoscopy was 30.5% (Shapiro et al., 2001). Another study conducted by Koo et al. (2012), analyzed knowledge, attitudes and behaviors of individuals living in 14 countries located in the Asia-pacific region regarding colorectal cancer screening programs. The study revealed that participation of the individuals over 50 to the colorectal cancer screening programs ranged from 1.5-69% (Koo et al., 2012).

Reports reveal that many barriers may prevent people from screening for CRC. These barriers include a lack of recommendation from healthcare providers for screening, embarrassment and pain accompanying some of the tests, feelings of anxiety about what the screening tests may reveal, a lack of understanding about the screening tests, high costs, a lack of time, following a special diet and taking a laxative to perform a colonoscopy, fear of undergoing a colonoscopy, and transportation problems (Klabunde et al., 2006; Longacre et al., 2006). Barriers perceived by physicians related to colorectal cancer screening programs include high costs, transportation problems, lack of recommendation from healthcare providers, and the time required for screening procedures (Greiner et al., 2004).

Colorectal cancer is a significant health problem; it is the most common malignancy of the gastrointestinal system. Screening of the individuals through existing methods and effective treatment of the patients will significantly decrease the deaths caused by colorectal cancer. Due to this, screening of the risk groups is vital. This study described the risk factors and the health beliefs of Turkish peoples' regarding colorectal cancer screening, which addressed the following two questions: *i*) Are Turkish people well informed about CRC screening? *ii*) What are the health beliefs of Turkish peoples regarding CRC screening?

Materials and Methods

Study design, the study was conducted as a descriptive and cross-sectional design.

Setting and sample, this study was performed at Karabuk Life and Health Center in Turkey. The study was conducted from June 2012, through August 2012. Participants were recruited from a family physician's clinic in a residential area of Karabuk City. Eligibility criteria for participants of this study were: *i*) people aged 50 and over who had visited the clinic for any reason; *ii*) willing to participate to study; and *iii*) able to read and write in Turkish. A total of 160 people meeting these criteria were selected from the clinic's computerized database to comprise the sampling frame. Prior to data collection, the study was approved by the Institutional Review Board for the protection of human subjects and the clinic administrator. The participants were informed about the purpose of the study, the length of time it would take, they were also informed that responses would be kept confidential, and that they would have the right to withdraw from the study at any time.

Measures and data collection, a data collection form prepared by the researchers was used to collect the data. This form was consisted of two parts. The first part of questionnaire is composed of 27 questions on general characteristics of participants and for determining risks related with colorectal cancer, attitudes and behaviors. Second part of the questionnaire is composed of questions derived from Champion's Health Belief Model Scale. Champion's Health Belief Model Scale which has been adapted by Jacop (2002) has been tested for its reliability and validity by Ozsoy et al. (2007) in Turkey (Jacobs, 2002; Ozsoy et al., 2007). The scale is composed of five sub-scales and 33 items. Confidence, benefits and health motivation (11 items), susceptibility (6 items), barriers (6 items), health motivation (5 items), and severity (5 items) are among the sub-scales. Cronbach alpha coefficients for internal reliability are between 0.54 and 0.88.

Verbal informed consent was obtained during data collection. Data for the study has been collected with face-to-face interviews. Participants were given a 4-page self-administered questionnaire. Those who had difficulty in reading the questionnaire were provided with assistance. The time for participants to complete the questionnaire was approximately 20 minutes.

Statistical analysis

The SPSS 15.0 (SPSS Inc., Chicago, IL, USA, 2006) software was used for analyzing the data. Descriptive statistics are shown in numbers (n) and percentages (%) for the variables obtained by counting and in mean±standard deviation (M±SD) for variables obtained by measurement. The appropriateness of the scale points to the normal distribution was investigated by a Single Sampling Kolmogorov-Smirnov test. The data were analyzed by using, Independent Samples T Test, Mann Whitney U test, one-way ANOVA, Kruskal Wallis Test and logistic regression analysis. A level of $p<0.05$ was set as statistically significant.

Legal ethical consent

Ethical permission for the study was obtained with approval of appropriate management authority prior to data collection. The subjects have been reminded that participation in the investigation was strictly voluntary and have been told that data collected would not be used for anything except the research aim. Participants were assured of confidentiality of their responses and were provided informed verbal consent.

Results

Characteristics of participants

All of the 160 participants completed the questionnaires, with no discarded questionnaires or missing information. The characteristics of the respondents are shown in Table 1. The age ranged from 50 to up years (mean 60.51, SD±8.22). 63.1% of the participants are male and 36.9% are female. Of the participants, 80.6% are married, 72.5% had completed elementary school, 94.4% had health insurance, 89.4% were not use alcohol, 73.1% were non-smokers. Regarding exercise, 86 (53.8%) patients had no exercise at all and only 17 (10.6%) participants had always exercised. It was observed that more than half of the participants (51.3%) were having a diet of proteins with low fiber and rich in fat. The mean body mass index of the participants was 25.59±4.63. 30.6% of the participants were either underweight (BMI<25 kg/m^2), 43.8% were normal weight (BMI: 25-30 kg/m^2) and 25.6% were overweight (BMI>30 kg/m^2).

Participants' health behaviors and health history

Table 2 provides data on health stories of the participants regarding their general health and colorectal cancer screening programs. Accordingly, the majority of the participants (n=128; 80%) have family physicians and nearly a quarter of the participants (n=38; 23.8%) have visited physicians more than ten times in the last year. 53.1% (n=85) of the participants have fair/poor health situation. 6.9% (n=11) of the participants stated that they have one of the colorectal intestinal diseases (cancer, chron disease, polyp, ulcerative colitis) whereas 14.4 (n=23) of them stated that one of their relatives have been diagnosed with one of these colorectal diseases. Only 15.0% (n=24) have had FOBT, 11.3% (n=18) have had colonoscopy and 4.4% (n=7) have had sigmoidoscopy. Nearly all of the participants (n=145; 90.6%) have low levels of risk awareness about the colorectal cancer. It has been found that only one-tenth of the participants (N=17) have knowledge related to the colorectal cancer screening programs and that the source of knowledge has been the family physicians. Barriers for participation to the colorectal cancer screening programs include lack of knowledge (81.3%), embarrassment (22.5%), pain (5.6%) and feelings of anxiety about screening results (3.8%).

Table 1. Characteristics of Participants (n=160)

Characteristics		N	%
Age(years)	50-64	118	73.8
	≥65	42	26.3
	M±SD	60.51	8.22
Sex	Female	59	36.9
	Male	101	63.1
Marital status	Married	129	80.6
	Single	31	19.4
Education	Elementary school	116	72.5
	High school	22	13.8
	Graduate level or higher	22	13.8
Healthcare	Yes	151	94.4
Coverage	No	9	5.6
Alcohol use	Yes	17	10.6
	No	143	89.4
Smoking	Yes	43	26.9
	No	117	73.1
Exercise	Never	86	53.8
	Occasionally	57	35.6
	Regularly	17	10.6
Nutrition			
Lots of fruits and vegetables		78	48.8
Low-fiber, high-protein and fat		82	51.3
Body mass index (BMI)			
<25 (underweight)		49	30.6
25-30 (normal weight)		70	43.8
>30 (overweight/obese)		41	25.6
Mean body mass index (M±SD)		27.60	4.68

*Mean±Standard Deviation

Regression analysis of the factors influencing having FOBT and colonoscopy

In Table 3, one-variable and multivariable factors influencing having FOBT and colonoscopy are evaluated

Table 2. Participants' Health Behaviors, and Health History (n=160)

Characteristics		N	%
Have a family doctor	Yes	128	80
	No	32	20
Frequency of visiting a physician within the last one year			
	Never	20	12.5
	1-2	34	21.3
	3-4	31	19.4
	5-6	20	12.5
	7-8	17	10.6
	≥10	38	23.8
Latest Checkup date	Within 1 year	115	71.9
	Within ≥2 years	45	28.1
Self-perceived health	Fair/Poor	85	53.1
	Good/Excellent	75	46.9
Frequency of defecate	1/day	106	66.3
	2-3/day	46	28.8
	≥2/week	8	5
Suggestion by doctor	No	146	91.3
	Yes	14	8.8
Existence of any colorectal disease			
	No	149	93.1
	Yes	11	6.9
Existence of any colorectal disease among relatives			
	No	137	85.6
	Yes	23	14.4
Having FOBT	No	136	85
	Yes	24	15
Having colonoscopy	No	142	88.8
	Yes	18	11.3
Perceived risk for colorectal cancer risk*			
	Usual	145	90.6
	Moderate	11	6.9
	Strong	4	2.5
Having information for colorectal cancer and its screening methods			
	No	143	89.4
	Yes	17	10.6
Source of information			
	Physician	17	10.6
	Radio/Television	14	8.8
	Friend/family member/other people	6	3.8
	Nurse	2	1.3
	Internet	1	0.6
Barriers regarding CRC screening test			
	No information	130	81.3
	Embarrassment	36	22.5
	Pain	9	5.6
	Fear of cancer	6	3.8

*Participant having colorectal cancer was not included

Table 3. Evaluating with Logistic Regression Analysis the Factors Contributing to the Not Making FOBT and Colonoscopy (N=160)

			First Step				Terminal Model			
					95.0% CI				95.0% CI	
					Lower	Upper			Lower	Upper
FOBT:	Gender	Female	r				r			
		Male	2.096	0.092	0.886	4.961				
	Marital status	Married	r				r			
		Unmarried	0.276	0.006	0.109	0.697	0.278	0.009	0.107	0.722
	History of intestinal disease	Yes	r				r			
		No	0.186	0.01	0.052	0.667	0.188	0.014	0.05	0.709
	Suggestions by physicians	No	r				r			
		Yes	0.42	0.173	0.121	1.463				
	Information	No								
		Yes	0.65	0.409	0.234	1.806				
	Age		0.973	0.277	0.925	1.023				
	Benefits		1.01	0.779	0.944	1.079				
	Susceptibility		0.963	0.382	0.886	1.047				
	Barriers		1.014	0.765	0.923	1.115				
	Health motivation		1.021	0.77	0.889	1.172				
	Severity		1.048	0.384	0.943	1.165				
Colonoscopy:	Gender	Female	r				r			
		Male	1.101	0.851	0.402	3.016				
	Marital status	Married	r							
		Unmarried	0.538	0.343	0.191	1.778				
	History of intestinal disease	No	r				r			
		Yes	0.046	0	0.012	0.18	0.188	0.014	0.05	0.709
	Suggestions by physicians	No	r				r			
		Yes	0.119	0.001	0.036	0.401	0.049	0.001	0.008	0.291
	Information	No	r				r			
		Yes	0.217	0.004	0.077	0.613				
	Age		0.951	0.078	0.899	1.006	0.92	0.049	0.846	1
	Benefits		0.854	0.002	0.772	0.945	0.786	0.001	0.68	0.909
	Susceptibility		0.977	0.643	0.887	1.077				
	Barriers		1.029	0.603	0.924	1.147				
	Health motivation		0.988	0.879	0.843	1.157				
	Severity		0.977	0.721	0.862	1.108				

with logistic regression analysis. According to the logistic regression analysis, risk of non-having FOBT is 0.28 times higher for single participants compared to married ones whereas the same risk is 0.19 times higher for participants without any intestinal diseases compared to those with intestinal diseases. Being single (OR=0.28) and intestinal disease history (OR=0.19) statistically significantly influence risk of non-having FOBT test after being corrected according to gender, age, knowledge on screening methods, recommendation from healthcare providers and HBM sub-scales.

According to logistics regression analysis, risk of non-having colonoscopy is 0.05 times higher for those with intestinal disease, 0.12 times higher for those with recommendation from healthcare providers and 0.22 times higher for those with knowledge on screening tests. Age (OR=0.92), history of intestinal disease (OR=0.06), suggestions of physician (OR=0.05) and perceived benefit (OR=0.79) is found statistically significant for non-having colonoscopy after being corrected according to age, marital status and knowledge on screening procedures.

Comparison of health beliefs according to some characteristics of participants

In Table 4, some of the characteristics of the participants are compared with the average points of the HBM subscales. Accordingly, the difference between the average points of HBM subscales and participants' characteristics, including gender, marital status, smoking, alcohol consumption, nutrition characteristics, health insurance and history of intestinal disease is not found statistically significant. It is seen that the average point of severity subscale of participants over 65 is higher than that of participants under 65 ($p<0.05$). According to education level, the difference between average points of the subscales of benefits, barriers and health motivation are statistically significant. Advanced analysis reveals that differences between groups stems from the differences between the graduates of primary school and higher education.

According to the exercise situation of the participants, the difference between average points of the health motivation subscale is statistically significant. Advanced analysis reveals that the difference between groups is a consequence of the difference between those that never do exercise and those that sometimes or regularly do exercise. It is also seen that susceptibility subscale points are higher for those with intestinal disease history in their family and for those that consider themselves as under risk in terms of colorectal cancer ($p<0.05$). Advanced analysis to find out the reason behind the differences between groups in terms of risk perception reveals that the difference stems from the difference between those who do not consider themselves under risk and those who consider themselves

Table 4. Comparison of Health Beliefs According to Characteristics of Participants (n=160)

Characteristics		Confidence, Benefits and Health Motivation	Susceptibility	Barriers	Health Motivation	Severity
		M±SD	M±SD	M±SD	M±SD	M±SD
Age	50-64	45.57±6.04	12.01±4.57	17.63±4.66	16.17±3.13	17.47±3.94
	≥65	43.43±6.95	12.17±5.84	17.86±4.17	15.55±3.04	15.95±3.88
		t=-1.893[a]; p=0.686	z=-.246[b]; p=0.806	t=-0.282[a]; p=0.234	t=-1.115[a]; p=0.857	z=-2.246[b]; p=0.025
Education	Elementary	44.09±6.36	11.96±4.95	18.42±4.53	15.58±2.98	17.26±3.99
	Highschool	46.18±6.30	12.68±5.43	16.64±3.98	16.91±3.50	17.00±3.55
	University and higher	48.64±4.89	11.91±4.33	14.86±3.76	17.36±2.89	16.18±4.30
		F=5.471[d]		F=6.894[d]	F=4.304[d]	
		X^2=10.416[c]; p=0.005	X^2=.310[c]; p=0.857	X^2=15.502[c]; p=0.001	X^2=8.355; p=0.015	X^2=1.105[c]; p=0.576
Exercise	Never	44.24±6.68	12.47±5.22	18.02±4.75	15.28±3.12	16.95±3.87
	Sometimes	45.63±6.00	11.81±4.64	17.63±4.22	16.60±2.90	17.42±4.18
	Regularly	46.76±5.39	10.76±4.13	16.18±4.25	17.71±2.73	16.53±3.90
		X^2=3.374[c]; p=0.185	X^2=1.797[c]; p=0.407	X^2=2.075[c]; p=0.354	X^2=12.128[c]; p=0.002	X^2=1.837[c]; p=0.399
Family history of colorectal disease						
	No	44.78±6.48	11.66±4.59	17.61±4.55	16.10±3.21	16.84±4.03
	Yes	46.35±5.39	14.39±6.13	18.17±4.42	15.43±2.39	18.48±3.32
		z=-1.008[b]; p=0.313	z=-1.965[b]; p=0.049	z=-0.795[b]; p=0.427	z=-0.919[b]; p=0.358	z=-1.762[b]; p=0.078
Perceived colorectal cancer risk						
	Usual	44.94±6.16	11.68±4.74	17.66±4.60	15.99±3.14	16.72±3.92
	Moderate	44.64±8.74	13.55±3.98	17.55±3.59	16.73±3.07	20.82±3.03
	Strong	48.25±6.19	21.25±4.57	19.00±4.55	14.50±1.92	19.75±.96
		X^2=1.278[c]; p=0.528	X^2=10.288[c]; p=0.006	X^2=.437[c]; p=0.804	X^2=1.600[c]; p=0.449	X^2=14.065[c]; p=0.001
BMI[e]	<25 (underweight)	46.33±5.66	11.14±5.16	16.39±5.26	16.80±3.30	16.63±4.00
	25-30 (normalweight)	44.89±5.82	12.70±5.10	17.91±4.23	16.10±2.97	17.23±3.96
	>30 (overweight/obese)	43.63±7.68	12.02±4.17	18.85±3.69	14.90±2.84	17.34±4.00
		F=2.061[d]; p=0.131	X^2=3.593[c]; p=0.166	F=3.590[d]; p=0.030	F=4.380[d]; p=0.014	X^2=1.234[c]; p=0.539
Status of in formation receiving						
	Yes	44.67±6.43	11.73±4.79	17.71±4.56	16.06±3.13	16.75±4.03
	No	46.52±5.77	13.48±5.31	17.59±4.40	15.76±3.06	18.55±3.38
		z=-1.369[b]; p=0.171	z=-1.603[b]; p=0.109	z=-.056[b]; p=0.956	z=-.606[b]; p=0.545	z=-2.243[b]; p=0.025

*[a]Student t test, [b]Mann-Whitney U Test, [c]Kruskal Wallis Test, [d]Anova, [e]BMI= Body Mass Index

under heavy risk. According to colorectal cancer risk perception of the participants, difference between average point of the severity subscale is found statistically significant ($p<0.05$). Advanced analysis reveals that the difference is a consequence of the difference between those that do not perceive themselves under risk and those having medium levels of perceived risks.

According to body weight index, difference between average points of barriers and health motivation subscales is found statistically significant ($p<0.05$). Advanced analysis reveals that the difference stems from the participants with BKI fewer than 25 and the participants with BKI over 30. It is also found that severity subscale average point of the participants with knowledge on colorectal cancer screening programs is higher compared to participants without knowledge on the issue.

Discussion

Results of this research assert the risk factors for individuals over 50 in Turkey, their beliefs about health and factors influencing their beliefs. When data on colorectal cancer risk factors is evaluated, it has been found that most of the participants do not consume alcohol or smoke and only one-tenth of them exercise regularly. One-fourth of the participants have overweight and more than half of them consume foods that are rich in terms of fat and protein. It is asserted that individuals with positive health behaviors have higher levels of having FOBT and sigmoidoscopy (Shapiro et al., 2001). Another study has found that smokers are less attending to cancer screening programs (Byrne et al., 2010). In another study, it has been found that obese women participate less in colorectal cancer screening programs compared to women with normal BMI (Messina et al., 2012). Considering that the colorectal cancer can be prevented with proper diet and life style, education, consulting and guidance services will be helpful for individuals under risk to attain healthy life practices (Causey and Greenwald, 2011).

In this research, it has been found that participation rates to colorectal cancer screening programs are low. Participants mostly have FOBT (15%), colonoscopy (11.3%) and sigmoidoscopy (4.4%) respectively. Existing studies also reveal that the rate of participation of individuals over 50 to the colorectal cancer screening programs ranges from 1.5-78% (Clavarino et al., 2004; Dolan et al., 2005; van Dam et al., 2010; Koo et al., 2012; Messina et al., 2012). A study conducted in Turkey found that women mostly attend to breast cancer screening programs and that FOBT ration is 12% (Gulten et al., 2012). Healthcare providers and media have important responsibilities for increasing rate of attendance to colorectal cancer screening programs. It is argued that enlightenment of the masses about the importance of colorectal cancer and the role of screening programs for early diagnosis and treatment by healthcare providers and that identification of these programs by the media for increasing social awareness will be beneficial.

It is seen that only one-tenth of the participants have knowledge on the colorectal cancer and screening programs and that their source of information are the physicians. According to the study of Omran and

Ismail (2010), three-fourth of the participants had no ideas regarding colorectal cancer screening programs. Besides, they also found that the source of information for those with knowledge on the screening programs were the family members (Omran and Ismail, 2010). Our study found that only 9% of the participants had information derived from doctors and nurses. Existing studies underline that the source of information about the colorectal cancer screening programs are primarily physicians and that physicians suggestions are crucial for regular participation to screening programs (Janz et al., 2003; Greiner et al., 2004; Dolan et al., 2005) The study of Fenton et al. (2001) emphasize that counseling services provided by physicians increase the susceptibility of individuals regarding colorectal cancer screening programs (Fenton et al., 2011). Another study searched for the reasons behind the reluctance of the physicians for promoting the patients to involve in CRC screening programs. Regarding this subject, lack of sufficient knowledge, problems of patient referrals for the poor and for those without health insurance, low reliance to the FOBT and low levels of awareness about the screening tests and protective treatment are emphasized (Jo et al., 2009).

In this study, it is found that severity subscale average points of the participants who have knowledge on colorectal cancer screening programs are higher than those without sufficient knowledge. The study of Omran and Ismail (2010) also found a positive relationship between the perceived susceptibility, severity and barrier for individuals with knowledge on CRC screening. The level of knowledge about CRC and screening tests affects the population's utilization of the available screening tests. Increased knowledge about CRC and screening possibilities encourages people to use the service, whereas a lack of knowledge discourages people for undergoing screening for this type of cancer. In Turkey, physicians, nurses and other healthcare providers are regarded as authority and their suggestions are fulfilled. Lack of sufficient knowledge of the physicians and nurses working the field of primer health services regarding the CRC screening programs, insufficient enlightenment of the individuals on the CRC screening programs by healthcare provides are especially important for screening individuals under risk.

In this study, barriers on participation of the individuals to colorectal cancer screening programs are found as lack of knowledge (81.3%), embracement (22.5%), pain (5.6%) and feeling of anxiety about what the screening tests may reveal (3.8%). Barriers dealt in the literature are lack of sufficient knowledge, finding unnecessary, embracement, pain, bowel preparation, role of physician, length of screening interval and anxiety about negative side effects colorectal cancer screening tests (Janz et al., 2003; Green and Kelly, 2004; Greiner et al., 2004; Klabunde et al., 2006; Dam et al., 2010; Jones et al., 2010; Messina et al., 2012). The study of Greiner et al. (2004), emphasizes the patient motivation as the most important factor and states that the most important barrier is the agreement of the patient to the colorectal cancer screening tests. It is visible that the barriers on participating to the colorectal cancer screening programs are universal. Knowledge about the barriers influencing behaviors of the individuals regarding the protective health measures will aid the healthcare providers in determining the methods to be employed. Emphasis on the importance of subject and revealing the issues that are perceived as barriers in education programs to be employed by the healthcare providers is highly important for increasing rate of participation to the screening programs.

In this study, it is found that the older participants have higher levels of perceived severity compared to the younger participants. It is also seen that participants with college or higher education levels have higher health motivation and perceived benefits and lower levels of perceived barriers. Studies conducted have found a significant relationship between increase in age and participation to the CRC screening tests (Janz et al., 2003; Le Retraite et al., 2010). In a similar vein, Greiner et al. (2004) have found that older people and individuals with higher levels of education tend to participate more to the CRC screening programs. In another study, it has been found that individuals with lower levels of education have lower rates of awareness on CRC screening programs and that they are less likely to grasp the importance of early diagnosis of the colorectal cancer (Arnold et al., 2012).

In this study, it is found that individuals with colorectal disease history have higher levels of awareness. The study of Omran and Ismail (2010) also found positive correlation between CRC history in the family and perceived susceptibility, severity, benefits and barrier. It is emphasized that individuals with CRC history in their family are more likely to involve in CRC screening tests and that they are more compliant (Shah et al., 2007; Martínez-Ochoa et al., 2012; So et al., 2012). This situation might be related with higher knowledge and awareness gained during their involvement in the treatment process and their interaction with the healthcare providers.

Most of the participants stated that they have low levels of awareness regarding the colorectal cancer risk. In addition to this, it is seen that susceptibility and severity average points of the participants who consider themselves as under risk in terms of colorectal cancer are statistically significantly high. A study has found that individuals who perceive themselves as under risk are more likely to have sigmoidoscopy compared to those who do not consider themselves as such (Codori et al., 2001). Risk perception of the individuals regarding the CRC is one of the facilitators for their involvement in screening tests (Vedel et al., 2011). Contributions of the healthcare providers to the awareness of the individuals under CRC risk and to their participation to the CRC screening programs are vital.

In conclusion, HBM is highly influential in explaining the beliefs and attitudes of the individuals regarding the CRC screening programs. This work has found that lack of knowledge is the most important barrier for their involvement in CRC screening programs. Susceptibility of the individuals regarding the screening programs can be increased through structured and continuous education programs and through more emphasis on the importance and severity of these programs.

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