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Effect of Educational Intervention through a Campaign on Health Anxiety Caused by Cancer and the Participation Rate of Middle-Aged People in Colorectal Cancer Screening Using the Health Belief Mode

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ABSTRACT

Aims Colorectal cancer is a global health problem, but most of these patients are curable through early diagnosis. The present study aimed to investigate the effect of an educational intervention through a campaign on health anxiety and participation of middle-aged people (ages 50-70 years) in CRC screening based on the Health Belief Model in urban areas.

Materials & Methods A quasi-experimental study was conducted on 390 people in age range 50-70 years in Parsian in 2021. The participants were selected using convenience sampling. Champion's Health Belief Model Scale and Health Anxiety Questionnaire were used to collect data. The educational intervention was carried out in the form of a campaign through educational video clips and a banner for four weeks. Data analysis was done in SPSS 26 software using descriptive statistics and univariate analysis of covariance.

Findings There was a significant difference between the intervention and control groups in terms of the mean scores of the Health Belief Model scale (knowledge, perceived severity, perceived sensitivity, perceived benefits, perceived barriers, perceived self-efficacy, and action guide) and the health anxiety questionnaire (consequences of disease and probability of disease) after the intervention ($p<0.001$).

Conclusion The constructs of the Health Belief Model are good determinants of the action of high-risk individuals to undergo fecal occult blood testing. This highlights the necessity of implementing comprehensive educational programs focusing on the constructs of the Health Belief Model in this population.

Keywords Health Campaign; Colorectal Cancer; Health Belief Model; Anxiety

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Introduction

Colorectal Cancer (CRC), also known as bowel cancer, accounts for 10.2% of all cancers worldwide and 9.2% of all deaths. The highest rates of prevalence and mortality have been reported in countries with very high population growth rates [1]. Approximately one million people around the world are diagnosed with CRC annually, nearly half of whom die before the fifth year after the disease onset [2]. Epidemiological studies in Iran have indicated that although the rate of CRC is still relatively low, it has increased significantly over the past three decades [3]. However, free and affordable screenings and health units are available in most areas to help diagnose the disease and educate people about healthy living and disease prevention. Screening reduces the mortality caused by CRC. Based on the current guidelines, all people over the age of 50 should be regularly screened for colon polyps and cancer [4]. CRC screening may be one of the most effective ways to prevent its progression, which can reduce the suffering, mortality, and economic costs associated with the disease [1, 2]. However, the question is why most people do not use such services and do not change their lifestyle [5]. The cause of 60% of all deaths is chronic diseases, which are also responsible for 43% of the burden of diseases in the world [6]. Chronically ill patients must deal with persistent and unpredictable diseases. These patients usually complain of anxiety and worry about their condition or the recurrence or worsening of symptoms. This is the case with cancer survivors who imagine their worries about disease recurrence as the sword of Damocles [7]. Overall, health anxiety occurs when emotions or bodily changes indicate a serious disease [8].

One of the most serious threats to public health is cancer, which is the second cause of premature death after cardiovascular disease. Screening programs implemented for the general public mean that everyone is invited to be screened. Nonetheless, cancer screening may increase cancer anxiety [9]. Selecting the health education model is the first step of planning the process in the health education course and the appropriate model starts the course by choosing the right path and maintaining the proper path. The Health Belief Model is a model used in health education [10]. Based on this model, if people believe that they are prone to such diseases as cancer (perceived sensitivity), understand the depth of this risk and the severity of its various effects on their lives (perceived severity), and perceive the recommended behaviors to reduce the severity or risk of the disease (perceived benefits), they can eliminate the factors that prevent the operation such as cost and time (perceived barriers), and have the necessary confidence in their ability to conduct the behaviors to achieve the desired result (perceived self-efficacy), and are also more likely to engage in health-promoting behaviors [11]. Langroudi *et al*. carried out a research on the effect of education based on the Health Belief Model on health social workers' knowledge and attitude regarding CRC screening in Yazd and concluded that the constructs of the model can be used as a suitable framework for designing colon cancer screening training interventions to improve health-promoting behaviors [12].

Generally, increasing screening rates in a population requires interventions that are widely performed on people through media and multimedia techniques [13]. Mobilizing information refers to a set of information, communication and educational activities using a combination of diverse information channels to convey the desired messages to a specific population in a specific and limited period of time in line with the goals of the program [14]. In this context, mass media can initiate campaigns that can lead to good changes or stop negative changes in health-related behaviors in large communities [15]. In a study on the effectiveness of informing mobilization in preventing cholera amongst students, Morowati *et al*. concluded that holding informing mobilization at the time of health problems could result in positive changes in the target population, improve the current situation, or prevent the occurrence of further problems [14].

Considering the importance of the early diagnosis of CRC and since CRC screening is an effective and affordable way to control and prevent this disease, the current paper aimed to assess the effect of an educational intervention through a campaign on health anxiety and participation of middle-aged people (age 50-70 years) in CRC screening based on the Health Belief Model in the urban areas (Dashti and Kushkenar) of Parsian, Hormozgan Province, Iran.

Materials & Methods

The present quasi-experimental work was carried out on people aged 50 to 70 from Dashti and Kushkanar cities in Parsian, Hormozgan Province in 2021. According to Cochran's formula, the sample size was determined to be 342 people, which increased to 390 people with 15% dropout. Convenience sampling method was used to select the participants and then they were randomly divided into two intervention and control groups. At the beginning, the names of the people aged 50-70 years under the coverage of the health unit and their contact numbers were extracted using the integrated electronic health system. Then each person was assigned a code. Afterwards, the inclusion and exclusion criteria were evaluated based on the information in the individuals' electronic health records. The inclusion criteria

consisted of: 1) age 50-70 years, 2) lack of diagnosis of CRC, 3) living in the study area for more than six months, 4) not having a family history of CRC, and 5) willingness to participate in the study. The exclusion criteria included: 1) unwilling to continue cooperation in the study, 2) failure to attend all sessions, 3) not completing the questionnaires, and 4) moving to another city.

A questionnaire was used to collect data, which was completed through interviews. The questionnaire included: 1) Champion's Health Belief Model Scale (CHBMS) and 2) Health Anxiety Questionnaire that consisted of three sections. The first section included 22 questions related to demographic characteristics. The second section consisted of 14 questions related to knowledge about CRC. Finally, the third section included 60 questions related to the constructs of the Health Belief Model and individual beliefs about CRC screening. The reliability and validity of the original version of the questionnaire was confirmed by Jacobs *et al*. with Cronbach's alpha of 0.60-0.78. Cronbach's alpha of the questionnaire equal to 0.78 was obtained by Bidgoli *et al*. (n=30) [16].

The second data collection instrument was the Health Anxiety Questionnaire. This questionnaire was first designed by Salkovskis and Warwick in 1989. This form was based on the cognitive model of health anxiety and hypochondriasis. The 18-item short form of this questionnaire was developed by Salkovskis and Warwick [17]. Nargesi *et al*. confirmed the construct validity and approved its reliability using Cronbach's alpha equal to 0.75 [18].

After the pre-test for both groups, the participants of the intervention group received the intervention of ways to prevent and control CRC and anxiety caused by the disease through the campaign, which was the best way to convey information to many people during the COVID-19 pandemic. This program was implemented through posters, billboards, banners and educational messages via the SMS system for four weeks. After eight weeks, the post-test was conducted for both groups. It is worth noting that the participants ensured the confidentiality of the information and sent a written consent form. The Ethics Committee of Shiraz University of Medical Sciences approved the study (IR.SUMS.REC.1399.1207).

Data analysis was done using descriptive statistics and inferential statistics in SPSS 26 software. To investigate the effect of training on the scores of the participants in the research, analysis of covariance was used to control the effect of the scores before training and to compare the effect of training in two groups.

Findings

In the pre-test, there was no significant difference between the intervention and control groups in terms of demographic variables (gender, age, and marital status, and economic status). However, the intervention and control groups had a significant difference in terms of occupation; the majority of the participants (47.0%) were homemaker. Additionally, 86.9% of the participants had a diploma and 13.1% had a academic degree (Table 1).

Table 1) The frequency distributions of demographic variables

Variable	Control group, No. (%)	Intervention group, No. (%)	Total, No. (%)	Pearson χ^2 test
Level of education				
Illiterate	57 (29.4)	26 (13.3)	83 (21.3)	
Primary school	60 (30.9)	81 (41.3)	141 (36.3)	
Secondary school	41 (21.1)	74 (37.8)	115 (29.5)	χ^2=32.813; p<0.001
Academic degree	36 (18.6)	15 (707)	51 (31.1)	
Total	194 (100)	196 (100)	390 (100)	
Marital status				
Single	3 (1.5)	7 (3.6)	10 (2.6)	
Married	192 (93.8)	176 (89.8)	358 (91.8)	
Divorced or widowed	9 (4.6)	13 (6.6)	22 (5.6)	χ^2=2.418; p=0.299
Total	194 (100)	196 (100)	390 (100)	
Occupation				
Employee	17 (8.8)	32 (16.3)	49 (12.6)	
Worker	10 (5.2)	7 (3.6)	17 (4.4)	
Self-employed	31 (16.1)	49 (25)	80 (20.6)	
Homemaker	93 (48.2)	90 (45.9)	183 (47.0)	χ^2=43.987; p<0.001
Unemployed	3 (1.6)	6 (3.1)	9 (2.3)	
Retired	33 (17.1)	3 (1.5)	36 (9.3)	
Fisherman	2 (1)	7 (3.6)	9 (2.3)	
Sailor	0 (0)	2 (1)	2 (0.5)	
Farmer	4 (2.1)	0 (0)	4 (1)	
Total	193 (100)	196 (100)	389 (100)	
Gender				
Male	101 (52.1)	100 (51)	201 (51.5)	
Female	93 (47.9)	96 (49)	189 (48.5)	χ^2=0.042; p=0.837
Total	194 (100)	196 (100)	390 (100)	

The mean scores of the constructs of the Health Belief Model and the health anxiety questionnaire in the control and intervention groups, before and after the intervention, are presented in Table 2.

The control and intervention groups were significantly different in terms of participation in CRC screening before and after the intervention.

In the pre-test phase, the mean scores of knowledge, perceived severity, perceived sensitivity, perceived barriers, perceived benefits, perceived self-efficacy, as well as the scores of the probability of contracting the disease and the negative consequences of contracting the disease were significantly different between the two control and intervention groups. By controlling the effect of pre-training scores, the p-

value for the group factor was less than 0.001 for all hypotheses. Therefore, it was confirmed that training had a positive effect on increasing the scores of the constructs (Table 3).

Table 2) The mean scores of the Health Belief Model constructs and the Health Anxiety Questionnaire before and after the intervention

Variable	Before intervention (mean±SD)	After intervention (mean±SD)	Difference between before and after the intervention
Knowledge			
Control	10.423±2.853	12.299±2.98	1.867±2.869
Intervention	11.913±3.546	22.306±3.093	10.393±4.447
Perceived sensitivity			
Control	15.067±3.067	18.134±3.496	3.067±2.709
Intervention	14.872±2.992	26±4.751	11.128±5.572
Perceived severity			
Control	38.186±6.814	41.356±8.079	3.17±9.749
Intervention	36.811±6.756	66.556±9.567	29.745±12.008
Perceived barriers			
Control	62.289±12.676	66.912±13.44	4.624±7.337
Intervention	72.745±7.234	39.633±11.491	33.112±13.993
Perceived benefits			
Control	25.629±5.982	28.761±5.281	3.088±3.998
Intervention	20.679±5.261	41.821±6.335	21.143±8.836
Perceived self-efficacy			
Control	17.175±5.229	18.758±5.009	1.528±3.263
Intervention	15.934±4.943	27.168±6.505	11.235±7.754
Health anxiety			
• Probability of disease			
Control	25.479±4.457	25.701±4.478	0.222±3.915
Intervention	27.786±5.73	16.184±6871	-11.602±8.45
• Negative consequences of the disease			
Control	7.464±2.663	6.278±2.082	-1.186±1.973
Intervention	7.235±2.837	4.49±2.673	-2.745±3751

Before the intervention, only 1.8% of the participants had heard or read about colon cancer screening. In this regard, there was no significant difference between the two groups (p=0.713). After the intervention, 94.9% of the participants in the intervention group had heard or read about colon cancer screening and there was a significant difference between the two groups (p<0.001). Most of the participants received 47.2% of their information from health care personnel, and the two groups were significantly different in this regard. Besides, the majority of the participants (55.6%) stated their reason for doing the screening test was the physician's recommendation, and the two groups had a significant difference in this respect (Table 4).

Table 3) The mean scores of the Health Belief Model constructs and the Health Anxiety Questionnaire before and after the intervention

Variable	Sum of squares	Statistics*
Knowledge		
Pre-test	289.775	34.06
Group	8538.855	1003.651
Error	8.508	-
Perceived severity		
Pre-test	47.673	0.607
Group	61630.96	784.651
Error	78.546	-
Perceived sensitivity		
Pre-test	569.176	35.577
Group	6446.155	384.176
Error	15.998	-
Perceived benefits		
Pre-test	1053.511	33.543
Group	17292.408	550.585
Error	31.407	-
Pre-test	17204.819	153.387
Group	89733.871	800.01
Error	112.166	-
Perceived self-efficacy		
Pre-test	2179.574	77.289
Group	7761.939	275.244
Error	28.2	-
Probability of disease		
Pre-test	1044.301	33.584
Group	9753.495	313.668
Error	31/095	-
Negative consequences of the disease		
Pre-test	238.164	46.275
Group	289.035	56.159
Error	5.147	-

Table 4. Frequency and percentage of participation in screening in the control and intervention groups before and after the intervention

Variable	Control group, No. (%)		Intervention group, No. (%)		Total, No. (%)		Pearson X^2 test	
	Before	After	Before	After	Before	After	Before	After
Taking the fecal occult blood test								
Yes	1 (0.5)	1 (0.5)	3 (1.5)	90 (45.9)	4 (1.0)	91 (23.3)	χ^2=0.990; p=0.320	χ^2=112.351; p<0.001
No	193 (99.5)	193 (99.5)	193 (93.5)	106 (54.1)	368 (99)	299(76.7)		
Total	194 (100)	194 (100)	196 (100)	196 (100)	390 (100)	390 (100)		
Intention to take the fecal occult blood test within the next five years								
Yes	12 (6.2)	12 (6.2)	42 (21.4)	172 (87.7)	54(13.8)	184 (47.2)	χ^2=18.99; p<0.001	χ^2=260.311; p<0.001
No	182 (93.8)	182 (93.8)	154 (78.6)	24 (12.2)	336 (86.2)	206 (52.8)		
Total	194 (100)	194 (100)	196 (100)	196 (100)	390 (100)	390 (100)		

Discussion

There was a significant difference between the control and intervention groups in terms of the mean score of knowledge after the intervention. The results of the univariate analysis of covariance on the post-test scores in the intervention and control

groups show that educational programs have increased the knowledge score in the intervention group compared to the control group. Therefore, education had a positive effect on increasing knowledge scores. These findings were in line with the findings of Gimeno-García *et al*. [19], Maxwell *et al*. [20], Mojica *et al*. [21], and Langroudi *et al*. [12].

The findings indicated that there is a significant difference between the groups in terms of perceived sensitivity score after the intervention. Accordingly, the results of univariate analysis of covariance indicated that the increase in perceived sensitivity scores was more prominent in the intervention group than in the control group. Hence, training had a positive effect on increasing perceived sensitivity scores. These findings are in line with the findings of Kouhpayeh *et al*. [22], Jeihooni *et al*. [23], Alidosti *et al*. [24], and Roozitalab *et al*. [25].

The findings of the present study showed that there is a significant difference between the two groups in terms of the average score of perceived severity after the intervention. The results of univariable analysis of covariance on the post-test scores in the intervention and control groups indicated that the educational programs increase the perceived severity score in the intervention group compared to the control group. Thus, education had a positive impact on increasing the perceived severity scores. These findings are in agreement with the findings of Farmanfarma *et al*. [26], Kolutek *et al*. [27], and Wang *et al*. [28].

It was also indicated that the two groups were significantly different in terms of the mean score of perceived barriers following the intervention. The results of the univariate analysis of covariance on the post-test scores in the intervention and control groups show that educational programs have decreased the perceived barriers score in the intervention group compared to the control group. Therefore, education had a positive impact on reducing the score of perceived barriers. These results were similar to those obtained by Langroudi *et al*. [12] and Gimeno-García *et al*. [19], and inconsistent with the research performed by Pirzadeh *et al*. [29].

The findings of the present study revealed that the two groups were significantly different in terms of the mean score of perceived benefits following the intervention. In the same way, the results of the analysis of covariance showed that the mean score of perceived benefits in the intervention group was significantly higher than the control group. Therefore, education had a positive effect on the score of perceived benefits. These findings are in line with the findings of Grace X Ma *et al*. [30], Alidosti *et al*. [24], Rakhshandehrou *et al*. [31], and Abood *et al*. [32], but not with the the findings of of Hay *et al*. [33].

The findings indicated that the two study groups were significantly different concerning the mean score of perceived self-efficacy. The results of the analysis of covariance indicated that the mean score in the intervention group was significantly higher than the control group. Thus, education had a positive impact on increasing the perceived self-efficacy scores, which was consistent with the findings of Langroudi *et al*. [12], Broun *et al*. [34], Gholampour *et al*. [35], Khani Jeyhooni *et al*. [23], and Wong *et al*. [36].

The most important action guide for doing the screening test was the physician's recommendation in the intervention group (56.6%), which was consistent with the findings of Javadzadeh *et al*. [37], Shokar *et al*. [38], Cyr *et al*. [39], Khani Jeyhooni *et al*. [23], and Moghimi-Dehkordi *et al*. [40].

The results of the analysis of covariance showed that the intervention and control groups have a significant difference in terms of the mean score of probability of disease following the intervention. In the same way, this mean score in the intervention group was lower compared to the control group. Therefore, education positively affect on reducing the score of the disease risk. Literature review revealed no similar studies to compare the results.

The findings of the study showed that the two groups were significantly different in terms of the negative consequences of the disease after the intervention. The decrease in the score of negative consequences of the disease was more in the intervention group than in the control group. However, no similar studies were found to compare the findings.

Comparison of the two groups in terms of participation in CRC screening after the intervention showed that the percentage of participants in the intervention group undergoing fecal occult blood testing in the past year (45%) increased. There was also a significant difference between the control and intervention groups in this regard, which was in line with the results of Moattar *et al*. [41], Khani Jeihooni *et al*. [23], and Bae *et al*. [42].

One of the strengths of this research was its comparative design, which increased the reliability of the work and achieved more accurate results. Another strength of the research was the use of all the constructs of the Health Belief Model, which led to more comprehensive findings.

One of the limitations of the study was the impossibility of holding a face-to-face meeting for the intervention group due to the COVID-19 pandemic. Furthermore, considering the age of the participants, access to social networks was difficult in some cases.

Since middle-aged people are among the high-risk groups, the implementation of educational interventions using the Health Belief Model should be considered as an efficient strategy to increase the participation of these people in cancer screening.

Conclusion

Education using the Health Belief Model is successful in cancer screening and health anxiety caused by this disease. Implementation of an educational program for people aged 50 to 70 years leads to increased participation in CRC screening and reduced health anxiety.

The results of this study can be widely used to improve the activities of health care professionals including doctors, nurses and health care providers. By using the results of this study in developing appropriate educational programs at the community level, it is possible to increase people's participation in colorectal cancer screening programs. The findings of this study suggest that managers of health care centers and educational institutions take appropriate action regarding the necessity of screening by improving the health status of the society.

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Authors' Contribution: Nazari M. (First author), Introduction author/Methodologist/Original researcher/Discussion author (50%); Shafiei M.H. (Second author), Introduction author/Original researcher/ Statistical analyst/Discussion author (30%); Ghahremani L. (Third author), Methodologist/Assistant/ Statistical analyst (20%)

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