Health Belief Model and its Relation to Age and Body Mass Index Considering Colorectal Examinations among Graduate Students
نموذج المعتقدات الصحية وعلاقته مع العمر ومؤشر كتلة الجسم
بخصوص فحوصات القولون والمستقيم بين طلبة الدراسات العليا

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المستخلص:

أهداف البحث: تهدف الدراسة إلى: (١) ايجاد العلاقة بين متغيرات الدراسة: العمر ، ومؤشر كتلة الجسم، نموذج المعتقدات الصحية المتعلقة بفحوصات القولون والمستقيم لطلبة الدراسات العليا (٢) ايجاد الاختلاف بين مفاهيم نموذج المعتقدات الصحية والمعلومات الاجتماعية والديموغرافية (العمر والجنس والحالة الاجتماعية والمستوى التعليمي) لطلبة الدراسات العليا.
منهجية البحث: دراسة ذات تصميم وصفي ارتباطي أجريت في كلية الفنون الجميلة ـ جامعة بغداد. عينة ملائمة ومكونة من ٨٠ طالب وطالبة دراسات عليا. تم جمع البيانات باستخدام استبيان التقييم الذاتي الذي يتألف من جزئين (I) الخصائص الاجتماعية والديموغرافية (II) مقياس التحري عن معتقدات سرطان القولون والمستقيم. تم استخدام برنامج الحزمة الإحصائية للعلوم الإنسانية – الإصدار ٢٤ لتحليل البيانات.

نتائج البحث:

اظهرت الدراسة أن متوسط العمر للمشاركين كان ٣٩,٨٢. حيث لاتوجد هناك علاقة ذات دلالة إحصائية بين جميع مفاهيم النموذج وكل من العمر ومؤشر كتلة الجسم. بينما كانت هناك علاقة ذات دلالة إحصائية بين قيمة الإستعداد المُدرَك للاصابة بسرطان القولون والمستقيم والخطورة المدركة للاصابة بسرطان القولون والمستقيم. علاوة على ذلك ، كان هناك فرق ذو دلالة إحصائية في الإشارات للقيام بالعمل لإجراء فحوصات القولون والمستقيم بين مجموعات المستوى التعليمي.
التوصيات: هناك حاجة إلى دراسات مستقبلية وبرامج تعليمية بالاعتماد على مفاهيم نموذج المعتقدات الصحية على شرائحٍ مختلفة من المجتمع العراقي بهدف تغيير معتقداتهم حول إجراء فحوصات القولون والمستقيم.
الكلمات المفتاحية: نموذج المعتقدات الصحية، فحوصات القولون والمستقيم

Abstract

Objectives: The study aims to: (1) Find out the relationship among participants' age, body mass index (BMI), and Health Belief Model (HBM) related to colorectal examinations among graduate students. (2) Investigate the differences in Health Belief Model constructs between the groups of age, gender, marital status, and education level among graduate students.

Methodology: A descriptive correlational study design which conducted in the College of Fine Arts – University of Baghdad. A convenience sample of 80 graduate students were included in this study. The data were collected by using **a** self-reported questionnaire which consisted of two parts (I) socio-demographic characteristics (II) Colorectal Cancer Screening Beliefs Scale. The statistical package for social science (SPSS) for windows Version 24 was used for data analyses.

Results: The study finding revealed that the participants' age mean was 39.82. There was no significant association between all Model constructs and each of age and BMI. While, there was a positive significant association between participants' perceived susceptibility of contracting colorectal cancer and their perceived severity of colorectal cancer. Furthermore, there was a statistically significant difference in the cues to action related to performing colorectal examinations between education level groups.

Recommendations: Future studies and instructional programs based on the Health Belief Model are needed on various segments of the Iraqi population with the goal of changing the public's beliefs about performing colorectal examinations.

Keywords: Health Belief Model, Colorectal Examinations

Introduction

Cancer is a considerable health concern in the United States with nearly 600,000 deaths in 2016 [1]. Colorectal cancer (CRC) is a disease characterized by the unchecked division and survival of abnormal cells. When this type of abnormal growth occurs in the colon or rectum, it is called colorectal cancer. Sometimes it is called colon cancer, for short.

The colon and rectum, which combined are referred to as the large intestine, are the final part of the gastrointestinal (GI) system. The colon is the first part of the large intestine. The rectum is the passageway that connects the colon to the anus. Sometimes abnormal growths, called polyps, form in the colon or rectum. Over time, some polyps may turn into cancer [2]. Colorectal cancer (CRC) is the third most common cancer and the fourth leading cause of death from cancer worldwide [3].

Colorectal cancer incidence rates approximately 30% higher in men than in women, differences in risk factors and biology are assumed to be variables that account for the higher rates in males versus females. Approximately 75% of Colorectal cancer cases occur sporadically in the average risk population; while, the remaining 25% are associated with high risk factors such as, a history of adenomatous polyps, hereditary or genetic syndromes, and inflammatory bowel disease (IBD).

The mortality rates of colorectal cancer can be prevented or delayed with awareness about colorectal cancer risk factors and symptoms, followed by preventing screening. Regular screening should begin at age 50 for those at normal risk and before age 50 for those at higher risk. [4].

Recommended Options for Colorectal cancer Screening:
(a) Yearly fecal occult blood test.
(b) Barium enema, x-ray of the colon with barium contrast, performed every 5 years.
(c) Computed tomographic colonography (CTC), virtual colonoscopy, performed every 5 years.
(d) Flexible sigmoidoscopy, to view the lower portion of the colon only; every 5 years.
(e) Colonoscopy, to view the entire colon; every 10 years.

The HBM was developed in the 1950s by Hochbaum, Kegeles, Leventhal, and Rosenstock, psychologists for the U.S. Public Health Service as a theory to address the phenomenon of why healthy individuals did not take advantage of preventive health screenings [5].

The HBM has six constructs that explain or predict why people will take action to prevent, to control, or to screen for a disease, these constructs include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy [6]. The Health Belief Model was developed in response to the failure of a free tuberculosis (TB) health screening program. Since then, the Health Belief Model has been adapted to explore a variety of long-term and short-term health behaviors, including sexual risk behaviors and the transmission of HIV/AIDS. Furthermore, HBM is the most common health behavior model used in research examining colorectal cancer screening behaviors [6].

Objectives of the study

The study aims to: (1) find out the association among study variables: age, body mass index, and HBM related to colorectal examinations. (2) investigate the differences in the constructs of the HBM between the groups of age, gender, marital status, and education level.

Methodology

A descriptive correlational design was conducted in the College of Fine Arts – University of Baghdad. The descriptive correlational design explores the relationship among variables without the researcher's intervention. The strength of correlational research is its efficiency in

collecting a large amount of data about a phenomenon [6].

The study included a convenience sample of 80 graduate students. Data were analyzed by using the statistical package for social science (SPSS) for windows Version 24.

Study Instrument

The study questionnaire consists of two part; (I) socio-demographic characteristics (II) Colorectal Cancer Screening Beliefs Scale. The colorectal cancer screening belief scale was developed by combination of questions based on HBM's constructs in previous studies [7]. This scale includes 55 questions and 6 sub-scales including perceived susceptibility scale (4 items), perceived severity scale (14 items), perceived benefits Scale (8 items), perceived barriers Scale (16 items), cues to action scale (7 items) [8], and self-efficacy scale (6 items). Cronbach's alpha (Perceived Susceptibility = 0.69, Perceived Severity Scale = 0.87, Perceived Barriers Scale = 0.87, Perceived Benefits Scale = 0.89, Self-Efficacy Scale = 0.90, and Cues to Action Scale = 0.96) [7] [9].

Research hypotheses

Null Hypothesis 1. There will be no significant association between the HBM model constructs and students' age.

Alternative Hypothesis 1. There will be significant positive association between the HBM model constructs and students' age.

Null Hypothesis 2. There will be no significant association between the HBM model constructs and students' BMI.

Alternative Hypothesis 2. There will be significant positive association between the HBM model constructs and students' BMI.

Null Hypothesis 3. There will be no difference in the model constructs and socio-demographic characteristics.

Alternative Hypothesis 3. There will be a significant difference in the model constructs and socio-demographic characteristics.

Results

Table (1): Participants' Socio-Demographic Characteristics

Age Groups Mean (SD) 39.8250 (6.43128)	Frequency	Percent
23-30 31-39 40-49	10 22 48	12.5 27.5 60.0
Total	80	100.0
Gender	Frequency	Percent
Male	38	47.5
Female	42	52.5
Total	80	100.0
Marital Status	Frequency	Percent
Unmarried	46	57.5
Married	34	42.5
Total	80	100.0
Level of Education	Frequency	Percent
Master	58	72.5
Doctorate	22	27.5
Total	80	100.0

SD= standard deviation

The mean (SD) of age of the participants was 39.82 ± 6.43; more than a half of participants were within the age group of 40-49 years-old age ($n = 48$; 60.0%), followed by those of the 31-39 years-old age ($n = 22$; 27.5%), and those of the 23-30 years-old age ($n = 10$; 12.5%).

Concerning gender, more than a half of participants were females ($n = 42$; 52.5%) and less than a half were males ($n = 38$; 47.5%).

Regarding marital status, most of participants were unmarried ($n = 46$; 57.5%) and a lesser proportion were married ($n = 34$; 42.5%). Ultimately, most of participants were enrolled in the master program ($n = 58$; 72.5%) and a lesser proportion were enrolled in the doctorate program ($n = 22$; 27.5%).

Table (2): Correlations among Participants' Age, Body Mass Index, and Health Belief Model Constructs

	1.	2.	3.	4.	5.	6.	7.	8.
1. Age	-							
2. Body Mass Index	.050	-						
3.Perceived Susceptibility	-.062	.042	-					
4. Perceived Severity	.010	.082	.450**	-				
5. Cues to Action	.114	.175	.047	.543**	-			
6. Perceived Barriers	.154	.016	.215	.227*	.216	-		
7. Perceived Benefits	-.041	.132	-.013	.240*	.351**	.140	-	
8. Self-Efficacy	-.110	.068	.099	.187	.298**	.009	.802**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

There was a positive significant correlation between participants' perceived susceptibility of contracting CRC and their perceived severity of CRC ($r = .450$; at p-value < 0.05). Furthermore, there was a positive significant correlation between participants perceived severity of CRC and their cues to action of performing CR examinations ($r = .543$; at p-value < 0.05). Moreover, there were positive significant correlations between participants' cues to action and each of perceived benefits and their self-efficacy of performing colorectal examinations ($r =. 351$ at p-value < 0.05, $r =. 298$; at p-value < 0.05) respectively.

Ultimately, there was positive significant correlation between participants' perceived benefits and their self-efficacy of performing CR examinations ($r = .802$; at p-value < 0.05).

Table (3): Differences in the HBM Constructs among Graduate Students' Age Groups

HBM Construct		Sum of Squares	df	Mean Square	F	Sig.
Perceived Susceptibility	Between Groups	43.404	2	21.702	2.393	.105
	Within Groups	335.571	37	9.069		
	Total	378.975	39			
Perceived Severity	Between Groups	289.697	2	144.849	1.420	.255
	Within Groups	3775.403	37	102.038		
	Total	4065.100	39			
Cues to Action	Between Groups	332.014	2	66.007	3.678	.062
	Within Groups	799.961	37	21.621		
	Total	1431.975	39			
Perceived Barriers	Between Groups	12.511	2	6.255	.037	.963
	Within Groups	6209.889	37	167.835		
	Total	6222.400	39			
Perceived Benefits	Between Groups	460.173	2	93.087	2.082	0.071
	Within Groups	1053.327	37	28.468		

	Total	1513.500	39			
Self-Efficacy	Between Groups	474.956	2	87.478	3.190	0.063
	Within Groups	1014.44	37	27.420		
	Total	1589.500	39			

df: degree of freedom, F: F-Statistics, Sig: Significant

The perceived susceptibility of contracting CRC was higher for participants who were within the age group of (31-39) years-old, than other groups.

Concerning the perceived severity of CRC, cues to action, and perceived barriers to perform CR examinations were higher for participants who were within the age group of (40-49) than other groups.

Ultimately, the perceived benefits and self-efficacy of performing CR examinations were higher for participants who were within the age group of (23-30) years-old, than other groups. There were no statistically significant differences among the six constructs of the model among the age groups.

Table (4): Differences in the HBM Constructs among Graduate Students' Gender Groups

HBM Construct	Gender	No.	M	SD	Independent Test		
					t-value	P ≤ 0.05	Sig.
Perceived Susceptibility	Male	19	10.58	2.893	.678	.476	N.S
	Female	21	9.90	3.345			
Perceived Severity	Male	19	44.32	7.874	- .487	.183	N.S
	Female	21	45.90	12.091			
Cues to Action	Male	19	21.00	5.477	- .303	.899	N.S
	Female	21	21.52	5.428			
Perceived Barriers	Male	19	53.53	11.749	.106	.565	N.S
	Female	21	53.10	13.667			
Perceived Benefits	Male	19	23.95	5.542	-2.349	.760	N.S
	Female	21	28.33	6.199			
Self-Efficacy	Male	19	15.26	4.931	-2.277	.948	N.S
	Female	21	19.05	5.518			

No: Number, M: Mean, SD: Standard deviation, t: t-test, Sig: Significance, p: Probability value, N.S: Not significant

The perceived susceptibility of contracting CRC and the perceived barriers to perform CR examinations were higher for female participants than males. Concerning the perceived severity of CRC, cues to action, perceived benefits and self-efficacy were higher for male participants than females. There were no statistically significant differences in the six constructs of the model between gender groups.

Table (5: Differences in The HBM Constructs among Graduate Students' Marital Status Groups

| HBM Construct | Gender | No. | M | SD | Independent Test | | |
					t-value	P ≤ 0.05	Sig.
Perceived Susceptibility	Unmarried	14	8.57	3.106	-2.967	.150	N.S
	Married	23	11.35	2.534			
Perceived Severity	Unmarried	14	45.50	11.487	- .059	.954	N.S
	Married	23	45.70	8.736			
Cues to Action	Unmarried	14	22.07	7.184	.806	.426	N.S
	Married	23	20.57	4.230			
Perceived Barriers	Unmarried	14	53.00	15.802	- .139	.890	N.S
	Married	23	53.61	10.799			
Perceived Benefits	Unmarried	14	27.36	7.479	.668	.511	N.S
	Married	23	25.96	5.347			
Self-Efficacy	Unmarried	14	17.57	7.293	.159	.874	N.S
	Married	23	17.26	4.614			

No: Number, M: Mean, SD: Standard deviation, t: t-test, Sig: Significance, p: Probability value, N.S: Not significant

The perceived susceptibility of contracting CRC, perceived severity of CRC, cues to action, and self-efficacy of performing CR examinations were higher for married participants than unmarried. While, the perceived barriers to perform CR examinations and perceived benefits were higher for unmarried participants than married. There were no statistically significant differences in the six constructs of the model among marital status groups.

Table (6): Differences in the HBM Constructs between Graduate Students' Education Level Groups

| HBM Construct | Gender | No. | M | SD | Independent Test | | |
					t-value	P ≤ 0.05	Sig.
Perceived Susceptibility	Master	26	9.92	2.841	- .831	.411	N.S
	Doctorate	14	10.79	3.620			
Perceived Severity	Master	26	46.23	9.693	.910	.368	N.S
	Doctorate	14	43.14	11.197			
Cues to Action	Master	26	20.92	5.824	.558	.050	S
	Doctorate	14	21.93	4.599			
Perceived Barriers	Master	26	53.88	12.738	.395	.695	N.S
	Doctorate	14	52.21	12.831			
Perceived Benefits	Master	26	26.96	6.618	.984	.331	N.S
	Doctorate	14	24.93	5.413			
Self-Efficacy	Master	26	17.42	6.159	.267	.791	N.S
	Doctorate	14	16.93	4.287			

No: Number, M: Mean, SD: Standard deviation, t: t-test, Sig: Significance, p: Probability value, N.S: Not significant, S: Significant

The perceived susceptibility of contracting CRC was higher for master students than doctorate. While, the perceived severity of CRC was higher for doctorate students than master.

The cues to action was higher for doctorate students than master, and there was a statistically significant difference in the cues to action between the education level groups (Mann-Whitney U = 429.000, P-value = 0.05).

The perceived barriers, perceived benefits, and self-efficacy of performing CR examinations were higher for doctorate students than master. There was no statistically significant difference in the constructs of the model, except for the cues to action between the education level groups

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Discussion

The mean age of the participants was 39.82. More than a half of participants were within the age group of 40-49 years-old age, this result was consistent with the study in which the researcher found that the mean of age of the participants was 41.0 years [10].
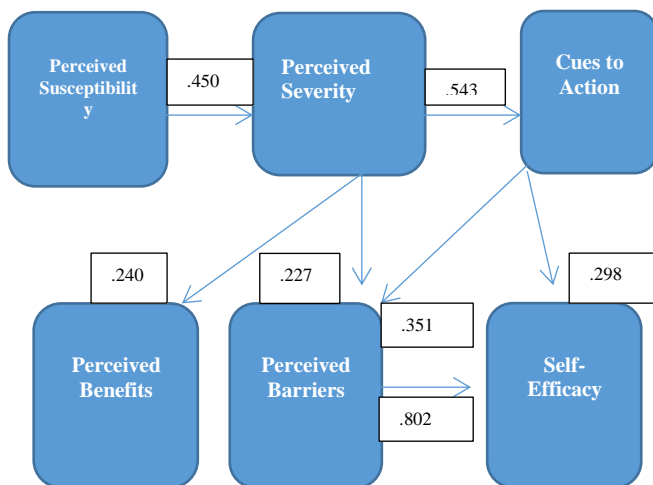

Figure (1) Relationships between Health Belief Model Constructs

Pertaining to the correlations among study variables (age, body mass index, and HBM constructs)

There was no significant association between all Model constructs and participant's age. So, null hypothesis 1 was accepted and alternative hypothesis 1 was rejected.

There was no significant association between all Model constructs and participant's and body mass index. So, null hypothesis 2 was accepted and alternative hypothesis 2 was rejected.

There was a positive significant correlation between participants' perceived susceptibility of contracting colorectal cancer and their perceived severity of colorectal cancer. This implies that participants who perceive that they are highly susceptible to develop colorectal cancer view colorectal cancer as more severe. This finding was consistent with the study in which the researcher found that there was a positive significant correlation between participants' perceived susceptibility and their perceived severity of colorectal cancer [11].

Furthermore, there was a positive significant correlation between participants' perceived severity of CRC and their cues to action of performing colorectal examinations. This finding implies that individuals, who perceive colorectal cancer as severe, could seek more strategies that enhance their inclination to perform colorectal examinations.

Moreover, there were positive significant correlations between participants' cues to action and each of perceived benefits and their self-efficacy of performing colorectal examinations. This implies that individuals, who use strategies to activate readiness to perform colorectal examinations, have a better assessment of the value or efficacy of engaging in a health-promoting behavior to decrease the

risk of a disease, and they were more confident to perform such examinations.

Ultimately, there was a positive significant correlation between participants' perceived benefits of performing colorectal examinations and their self-efficacy of performing colorectal examinations. This could be explained as individuals who perceive colorectal examinations as beneficial enjoy a better self-efficacy of performing such examinations. This finding was consistent with the study in which the researcher found that there was a positive significant correlation between participants' perceived benefits of performing colorectal examinations and their self-efficacy of performing colorectal examinations. [4]

This finding was congruent with the study in which the researcher found that perceived benefits had a direct association with intent to colorectal examinations [12].

Concerning the differences of the HBM constructs between graduate students' education level groups, there was a statistically significant difference in the cues to action of performing colorectal examinations between education level groups and it was higher for doctorate participants. So, null hypothesis 3 was rejected and alternative hypothesis 3 was accepted.

This implies that the higher education level, the greater the cues to action related to perform colorectal examinations.

Recommendations:

Future studies and instructional programs are needed based on the HBM on various segments of the Iraqi population with the goal of changing the public's beliefs about performing colorectal examinations.

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