RESEARCH ARTICLE

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Health Beliefs Towards Colorectal Cancer and Associated Factors in a Three Muslim Countries (Turkey, Malaysia, and Saudi Arabia): A Screening Study of Men Aged between 50-75

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Abstract

Background: Despite a range of clinical practice guidelines and public health advisories promoting the use of colorectal cancer screening in the general population, screening rates remain less than ideal in many countries. **Aim:** This study evaluated the health beliefs regarding colorectal cancer and factors affecting the participation of men aged 50-75 in colorectal cancer screening in three selected Muslim countries (Turkey (TR), Saudi Arabia (SA), and Malaysia (MY)). **Methods:** This study employed a descriptive comparative design with stratified sampling, with the sample size of 540 participants. The Colorectal Cancer Health Belief Model (HBM) Scale and the Fatalism Tendency scale were used to evaluate men's health beliefs about colorectal cancer. The scales were in a 5-point Likert scale. The SPSS 22.0 statistical package program evaluated the data using descriptive statistics and ANOVA tests. **Results:** The average self-report risk in terms of cancer was 3.9 ± 2.20 (TR), 2.6 ± 2.69 (SA), and 3.9 ± 2.20 (MY), 75% don't know how to prevent colorectal cancer (TR) 84% (SA) and 82.2% (MY). The HBM Scale and sub-dimensions and Fatalism Tendency scale average scores of Malaysian participants were higher than Turkish and Saudi participants. A positive, statistically significant relationship existed between the scales and sub-scales mean score ($p < .01$). **Conclusion:** Interventions can be designed to address specific components of the HBM, such as promoting awareness campaigns, addressing cultural and psychological barriers, incorporating cues to action, and culture-sensitive colorectal cancer screening guides that should be prepared for Muslim men to increase participation in colorectal cancer screening.

Keywords: Health Belief Model (HBM)- Colorectal Cancer- Screening- Muslim Countries

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Introduction

Cancer incidence and mortality are rapidly growing worldwide. Cancer is the first or second leading cause of death before the age of 70 years in most countries, and colorectal cancer is one of the most commonly occurring cancers globally, with some 1.9 million incident cases [1, 2]. Race and ethnicity, sex, age, Inflammatory Bowel Disease (IBD), abdominal radiation, cystic fibrosis, previous history of colon cancer, colostomy, and androgen deprivation therapy are non-modifiable risk factors for colorectal cancer. Obesity and physical inactivity, diet, smoking, alcohol, medications, and diabetes and insulin resistance are modifiable risk factors for colorectal cancer [3, 4].

The prevalence of physical inactivity, diabetes, and obesity in Muslim countries is higher than in non-Muslim countries, and this rate is even higher in some Arab countries [5]. Changing eating patterns, widespread sedative lifestyle, and low health awareness in Muslim countries are also factors for colorectal cancer [2, 3, 6]. Colorectal cancer is among the most common cancers among men in Malaysia, Saudi Arabia, and Turkey. It is the second most common cancer among men in Malaysia,

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accounting for 15.6% of all cancers in men in this country; it is the most common cancer among men in Saudi Arabia, accounting for 17.2%, and it is the third most common cancer among men in Turkey, accounting for 8.8% of cancers [7].

Overall, the colorectal survival rate has improved over the years. This improvement has been attributed to advances in colorectal cancer screening, multimodality treatment, and surgical techniques over the years. Newer and better screening tools allow for early detection of the pathology and enable intervention before further progression. When detected early, the disease can be treated with a better prognosis and quality of life for patients. In addition, extant literature has demonstrated the cost-effectiveness of colorectal cancer screening [8-10].

Colorectal cancer screening is an important, effective preventive strategy [11]. Health authorities and the WHO recommend colorectal cancer screening as an effective way to reduce incidence and mortality [12-14]. Colorectal cancer screening; fecal occult blood testing every 2 years for men and women between the ages of 50-70; uptake of colonoscopy every 10 years between the ages of 50-70 [13].

Unfortunately, despite a range of clinical practice guidelines and public health advisories promoting the use of colorectal cancer screening in the general population, screening rates remain less than ideal in many countries [15]. For example, national screening programs are generally lacking in Middle Eastern countries. Moreover, participation rates in colorectal cancer screening are usually very low in the Middle East, and the uptake is low in Muslim countries in general [16]. For example, according to a National Health Morbidity Survey (NHMS) study in 2019, the national coverage for CRC screening using immunochemical fecal occult blood tests was 10.8% in Malaysia [17]. In Saudi Arabia, this rate has been reported to be as low as 6.7% [18]. Finally, Turkey's Ministry of Health Directorate General of Public Health estimated a national participation rate of between 20% and 30% in 2016 [19].

Despite its proven benefits, CRC screening remains underutilized in the Middle East for several reasons. One reason is that the knowledge and general awareness of CRC screening remains low. Studies from the UAE, Oman, Lebanon, Turkey, Iran, and Saudi Arabia demonstrated that only between 6.5% and 38% of the surveyed individuals were aware of CRC screening [16]. Furthermore, studies in Saudi Arabia have highlighted poor knowledge and misconceptions about screening. In one study, 42.9% of the respondents believed that screening should begin when symptoms appeared [20].

Cultural factors are also at play. Resilience and strength are among men's gender roles. For this reason, men utilize healthcare services only when they notice any disease symptom. At the same time, men's information-seeking levels about their health are very low. Indeed, men usually passively search for information and mostly use the Internet to search for information. Similarly, men's participation in health promotion programs and health protection programs is very low. Both behaviors contribute to the fact that colorectal cancer is more common among men than women.

Another risk behavior factor that adversely impacts colorectal cancer screening in Muslim countries is fatalism. The fatalistic beliefs of health behaviors of Muslim individuals appear to often negatively affect their health behavior, and the belief that death is inevitable impacts Muslim individuals' adoption of preventive health behaviors adversely. The rates of preventive health behaviors (i.e., colorectal cancer screening) are very low in individuals with a fatalistic belief [21, 22].

Because of the underutilization of screening, colorectal cancer is detected in the late period, and colorectal cancers not detected in the early period increase mortality [23-25]. Effective colorectal cancer screening programs are needed to decrease mortality from colorectal cancer in Muslim countries [3]. However, for colorectal cancer screening programs to be effective, these programs must be culture-sensitive programs that consider the men's health beliefs about colorectal cancer screening, men's fatalism beliefs, and factors affecting men's participation in colorectal cancer screening.

Individuals' health beliefs are an essential determinant of their participation in colorectal cancer screenings. The Health Belief Model (HBM) is one such framework that has been commonly applied to explain intrapersonal decision-making processes on a wide range of health behaviors, including vaccination and screening. The HBM is used to determine the perceived sensitivity and barriers individuals face when screening for colorectal cancer [26, 27]. In studies based on HBM for colorectal cancer screening of individuals, Individuals with low participation in colorectal cancer screening have a high perception of severity [28-30] and benefit [29-32].

In light of these factors, this study was conducted with men in Malaysia, Saudi Arabia, and Turkey because colorectal cancer is common among men, and the participation level of men in cancer screening is low. The study aims to evaluate the health beliefs towards colorectal cancer and cultural factors, including fatalism, affecting the participation of men aged 50-75 in colorectal cancer screening.

Materials and Methods

Study design

This study used a Descriptive Comparative Design to assess health beliefs about colorectal cancer and factors affecting participation in colorectal cancer screening among men aged 50-75 in Malaysia, Saudi Arabia, and Turkey, which have majority Muslim populations.

Research setting

The focus of the study was the health beliefs towards colorectal cancer and factors affecting their participation in colorectal cancer screening of men aged 50-75 in the countries mentioned above.

Sample and sampling techniques

The study sample of respondents was selected among the selected study cohorts in each country who met the inclusion criteria set. To ensure consistency in the study

sample and to capture a representative cross-section of the population from each country, participants were selected using stratified sampling methods. This approach ensured that the sample was reflective of demographic factors such as age, region (urban vs. rural), and socioeconomic status, which are important factors in understanding health beliefs and screening behaviors. A sample size calculator program was used to determine the number of participants to be included in this study, and it was planned to include 180 men from each country in the study [33]. The total number of participants for the study was 540 men who met the inclusion criteria. The researchers gathered data through a self-made questionnaire that seven experts validated. The survey tool was converted into a web-based survey, an online tool for easy access.

Inclusion and Exclusion Criteria

The inclusion criteria specify that participants must be Muslim male individuals between the ages of 50 and 75 who are residents of one of the three selected countries. They should be in generally good health without a current diagnosis of colorectal cancer, although those in remission or with a past history may be included for certain aspects, but excluded from questions regarding diagnosis or screening. Participants must be capable of providing online informed consent, and they should be able to communicate in the relevant languages of the study (Turkish, Malay, or Arabic) or have access to a translator. The study requires participants to have access to healthcare facilities offering colorectal cancer screening services, as the focus is on understanding health beliefs related to screening. Additionally, participants must be willing to engage with the study through online surveys related to their health beliefs, attitudes, and behaviors regarding colorectal cancer.

Exclusion criteria include males who are non-Muslim younger than 50 or older than 75 years, those with a previous diagnosis of colorectal cancer, or individuals who have severe cognitive impairments that prevent them from understanding the study or providing informed consent. Participants with serious acute or chronic health conditions that could affect their ability to engage with the study are also excluded. Additionally, individuals who are not residents of the three countries under study or those who cannot communicate in the study's languages and do not have a translator will be excluded. Those who have already undergone a colorectal cancer screening (such as colonoscopy or fecal occult blood test) in the past six months will also be excluded as the focus is on initial attitudes and screening experiences.

Ethical Considerations

The study gained approval from Ondokuz Mayis University in Turkey, with IRB approval number 182 dated 26/02/2021. The participants' identities and personal information were not disclosed. Blinded tallying was used to secure privacy and maintain participant anonymity using codes. Accordingly, the research was conducted on the basis of voluntary and informed consent. A cover letter in the online version explains to participant research objectives and indicates clearly that completion of the tool is voluntary and asked the participant to provide consent.

Data Collection Procedure

The corresponding co-researchers served as focal points in the selection of the study participants based on the inclusion and exclusion criteria. A web-based online tool (Google Forms) was forwarded as a link to study participants for easy access. The data for this study were collected between April and September 2023. At the data collection stage of the research, we did not create any list to collect data; we sent the data collection link to the people we were in contact with who met the inclusion criteria.

A crucial element in this study was ensuring that the participants from Turkey, Malaysia, and Saudi Arabia were comparable in terms of their health beliefs, cultural context, and socio-demographic characteristics. This was achieved through several steps:

Standardized Surveys

The same Colorectal Cancer Health Belief Model (HBM) Scale and Fatalism Tendency Scale were used across all three countries to measure participants' health beliefs, perceived cancer risk, and fatalistic tendencies. These scales were translated into the local languages (Turkish, Malay, and Arabic) and culturally validated to ensure they were suitable for each population. This allowed for direct comparisons of health beliefs across the countries.

Stratified Sampling

Stratified sampling ensured that the sample in each country reflected a range of ages (within the 50-75 age group), geographic locations (urban vs. rural), and socioeconomic backgrounds. By using these stratification variables, the study was able to account for diversity within each country and draw comparisons between countries while minimizing the risk of bias in recruitment.

Data Collection Consistency

Although the recruitment methods differed across countries (social media, health center recruitment, and email invitations), the data collection process was standardized. All participants were asked to complete an online questionnaire that included questions about their health beliefs, attitudes toward CRC screening, perceived cancer risk, and any fatalistic tendencies. The responses were collected anonymously and securely to preserve confidentiality.

Measures

A three-part questionnaire was used to gather data in this study. Part I was about the socio-demographic characteristics of the participants and their knowledge and thoughts about colorectal cancer screening. The evaluation of thinking about being at risk in terms of cancer in men was made using a visual numbers scale. The visual scale had points ranging from 0, which refers to never thinking oneself at risk, to 10, which refers to always thinking oneself at risk. See supplementary Table 1.

Part II was about men's health beliefs towards

colorectal cancer. The Colorectal Cancer HBM Scale that Jacobs developed in 2002 was used [34]. Appropriate approval was taken from the original author to use this scale. The scale was used to evaluate men's health beliefs about colorectal cancer. The scale has five dimensions (Sensitivity, Severity, Barriers, Health Motivation, and Benefit) and makes use of a 5-point Likert scale. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The responses are 5 = strongly agree, 4 = agree, 3 neutral, 2 disagree, and 1 = strongly disagree. See supplementary Table 2.

Part III was about the tendency toward fatalism in men, using the Fatalism Tendency scale that Kaya and Bozkur developed in 2015. The tendency toward fatalism increases with the increase in the score [35]. Appropriate approval was taken from the original author to use this scale. The scale was used to determine men's tendency toward fatalism, which originally included 24 items and four sub-scales. The "Predetermination" sub-scale (Items 1, 4, 12, 15, 18,19, 22, and 24) and "Luck" sub-scale (Items 7, 9, 13, and 16) were used in this study. The scale uses a 5-point Likert scale with answers ranging from Strongly Agree = x and Strongly Disagree = x. See supplementary Table 3.

Analyses

The Statistical Package for Social Sciences (SPSS 22.0) was used to evaluate the data obtained in the study. The descriptive data was expressed as numbers, percentages, mean, and standard deviation. Descriptive statistics and ANOVA tests were used in the analysis of the data. The statistical significance level was $p < 0.05$.

Results

The sociodemographic characteristics of the participating men showed that the average age was 59.85 ± 8.40 (Turkey), 60.28 ± 9.19 (Saudi Arabia), and 60.51 ± 5.95 (Malaysia). The average BMI was 28.18 ± 5.60 (Turkey), 28.98 ± 5.80 (Saudi Arabia), and 22.82 ± 1.29 (Malaysia); 43% have chronic diseases (Turkey), 37% (Saudi Arabia), and 40% (Malaysia) See Table 1.

Analyzing the characteristics of the participants regarding cancer-related situations of the participating men showed that the average self-report risk in terms of cancer was 3.9 ± 2.20 (Turkey), 2.6 ± 2.69 (Saudi Arabia), and 3.9 ± 2.20 (Malaysia), 18% did not hear of colorectal cancer (Turkey), 17% (Saudi Arabia) and 20% (Malaysia), 23% had a colonoscopy (Turkey), 25% (Saudi Arabia) and 23.4% (Malasia), 75% don't know how to prevent colorectal cancer (Turkey), 84% (Saudi Arabia) and 82.2% (Malaysia) See Table 2.

Table 6 compares the Colorectal Cancer HBM Scale, sub-dimensions, and Fatalism Tendency scale mean scores according to their countries, showing that the mean scores were significantly higher in Malaysian participants ($p<0.05$). See Table 3.

An analysis of the relationship between the Colorectal Cancer HBM Scale, risk in terms of cancer, and the Fatalism Tendency scale showed a positive, statistically significant relationship between the scales and sub-scales mean score ($p<.01$). See Table 4.

Discussion

This study aimed to explore health beliefs towards colorectal cancer (CRC) and associated factors in three Muslim-majority countries Turkey, Malaysia, and Saudi Arabia among men aged 50-75. The results of the analysis shed light on the differences in health beliefs regarding CRC screening across the countries under study, as well as the significant relationship between health beliefs, perceived risk of cancer, and fatalism tendencies.

One of the most striking findings of this study was the significantly higher mean scores on the HBM Scale and Fatalism Tendency Scale in the Malaysian participants, compared to those from Turkey and Saudi Arabia. This suggests that Malaysian participants, on average, have stronger beliefs about the importance of CRC prevention and are more likely to believe in the concept of fatalism (the belief that outcomes, such as cancer diagnosis, are determined by fate or external forces). This finding is consistent with previous studies that suggest that cultural and social factors can significantly influence health perceptions and behaviors, particularly in the context of cancer screening [28, 29].

In Malaysia, where the healthcare system has been evolving rapidly, and health awareness campaigns are more widespread, it is possible that public health initiatives have effectively raised awareness about CRC, resulting in stronger health beliefs and a higher perception of cancer risk. At the same time, Malaysia's mixed cultural and religious background may contribute to a higher degree of fatalism, where certain populations may see cancer diagnosis and treatment outcomes as outside of their control. This sense of fatalism could be tied to religious or spiritual views, where individuals may believe that "fate" or "divine will" plays a significant role in their health outcomes, which has been reported in previous studies in Southeast Asia [36, 37].

On the other hand, Turkish and Saudi participants had lower mean scores on both the HBM and Fatalism Tendency Scale, suggesting that in these countries, health beliefs about CRC may be less emphasized or influenced by different socio-cultural factors. This could be due to variations in public health campaigns, education systems, or healthcare accessibility between the countries. In Saudi Arabia and Turkey, while awareness of CRC has been increasing, there may still be barriers such as cultural stigma or misinformation that affect health beliefs and practices, particularly related to preventive behaviors like screening.

Another key finding of this study is the positive, statistically significant relationship between the HBM Scale, perceived cancer risk, and the Fatalism Tendency Scale. The analysis indicates that participants who scored higher on the HBM (indicating stronger beliefs in the benefits of CRC screening and perceived susceptibility to CRC) also exhibited higher levels of fatalistic attitudes. This suggests that, for many participants, beliefs about the inevitability of cancer and the role of fate may be

Table 1. Socio-Demographic Characteristics of the Study Sample (n = 540)

Characteristics	Turkey (n = 180)		Saudi Arabia (n = 180)		Malaysia (n = 180)	
Average of age	59.85 ± 8.40 (min 50, max 84) years old		60.28 ± 9.19 (min 50, max 82) years old		60.51 ± 5.95 (min 50, max 81) years old	
Body Mass Index(BMI)	28.18 ± 5.60 (min 16.33, max 63.21) kg/m^2		28.98 ± 5.80 (min 17.01, max 64.57) kg/m^2		22.82 ± 1.29 (min 19.88, max 25.59) kg/m^2	
	n	%	n	%	n	%
BMI Categories						
<18.5	2	1.1	1	0.6	0	0
18.5-24.9	43	23.9	40	22.2	174	96.7
>25	135	75	139	77.2	6	3.3
Marital situation						
Single	13	7.2	36	20	0	0
Married	167	92.8	144	80	180	100
Education status						
Primary school	49	27.2	2	1.1	0	0
College	34	18.9	33	18.3	42	23.4
University	97	53.9	145	80.6	138	77.6
Economic situation						
Poor	14	7.8	13	7.2	15	8.3
Middle	122	67.8	137	76.1	31	17.2
Good	44	24.4	30	16.7	134	74.5
Having chronic illness						
Presence	78	43.3	67	37.2	72	40
Absence	102	56.7	113	62.8	108	60
Chronic illness type						
Diabetes mellitus	26	33.3	31	46.3	28	15.5
Hypertension	16	20.5	14	20.9	12	6.6
Heart disease	14	17.9	6	9	8	4.4
COPD (chronic obstructive pulmonary disease)	10	12.8	1	1.5	6	3.3
Thyroid	6	7.7	0	0	4	2.2
Other	5	6.4	14	20.9	12	6.6
Cerebrovascular disease	1	1.3	1	1.5	2	1.1

intertwined with their understanding of their personal risk for CRC.

This relationship between fatalism and health beliefs could have profound implications for health promotion and screening programs. It suggests that individuals who believe strongly in fatalism may perceive CRC as an inevitable part of life, which might discourage them from participating in early screening and preventive measures. On the other hand, those who believe they are at risk of developing CRC (even due to factors beyond their control) may be more inclined to adopt preventive behaviors, but these behaviors could be strongly influenced by fatalistic beliefs that screening outcomes or treatment efficacy may not change their fate. This paradox highlights a need for targeted interventions that address not only health education about the importance of screening but also work to reframe fatalistic beliefs in a way that empowers individuals to take control of their health.

Understanding this relationship is critical because it underscores that health beliefs, while essential for encouraging screening, may not be sufficient on their own if the underlying fatalistic attitudes are not addressed. Public health interventions in these countries should, therefore, aim to provide a balanced perspective that not only educates the population about the benefits of early detection and screening but also challenges the fatalistic attitudes that may hinder action.

The positive relationship between the perceived risk of cancer and health beliefs also suggests that interventions targeting the perceived susceptibility to colorectal cancer may be particularly effective in encouraging behavior change. For example, providing clear information about the increased risks of CRC due to lifestyle factors (e.g., diet, lack of exercise, family history) might help individuals see the relevance of screening in preventing or detecting cancer early

What does the study add to the current literature?

This study contributes to the existing body of knowledge by providing insights into health beliefs

Table 2. Characteristics of the Participants Regarding Cancer-Related Situations (n = 540)

Self-report risk in terms of cancer	Turkey		Saudi Arabia		Malaysia	
	3.9 ± 2.20 (min 0, max 10) level		2.6 ± 2.69 (min 0, max 10) level		3.9 ± 2.20 (min 0, max 10) level	
Characteristics	n	%	n	%	n	%
Doing screen for cancer before						
Doing	43	23.9	31	17	35	19.4
Not doing	137	76.1	149	83	145	80.6
Heard of colorectal cancer						
Heard	147	81.7	148	82.5	144	80
Not heard	33	18.3	32	17.5	36	20
Source of information						
Friends	57	31.7	26	16.3	33	18.3
Television	52	28.9	9	6.5	18	1
Internet	29	16.1	50	33.3	47	26.1
Relative	15	8.3	17	10.5	23	12.7
Healthcare professionals (Nurse, docto,etc.)	15	8.3	42	26.8	37	20.5
Family	12	6.7	9	6.5	16	8.8
Colorectal cancer in the family						
Presence	16	8.9	42	22.9	31	17.2
Absence	164	91.1	138	77.1	149	82.8
Affinity level						
Sibling	6	37.5	6	8.2	5	16.1
Mother	5	31.3	6	9.2	4	12.9
Me	3	18.8	1	1.5	2	6.4
Father	2	12.5	4	6.2	3	9.6
Other Status of uptaking of colonoscopy			48	73.8	17	54.8
Uptake	43	23.9	45	25	42	23.4
Not uptake	121	67.2	121	67.2	118	65.5
Not know anything about colonoscopy	16	8.9	14	7.8	20	11.1
Status of undergoing fecal occult blood testing						
Undergoing	50	27.2	49	26.7	45	25
Not undergoing	130	72.8	131	73.3	135	75
Status of information about how to prevent colorectal cancer						
Yes	46	25.6	29	16.1	32	17.8
No	134	74.4	151	83.9	148	82.2
Status of knowing where to apply for colorectal cancer screening						
Know	70	38.9	50	27.3	63	35
Not know	110	61.1	130	72.7	117	65
Status of giving information about colorectal cancer screening by GP or family health nurse						
Yes	28	15.6	21	11.2	25	13.8
No	152	84.4	159	88.8	155	86.1
Status of knowing which tests should have for colorectal cancer screening						
Know	32	17.8	37	20.2	28	15.6
Not know	148	82.2	143	79.8	152	84.4
Status of thinking to participate in colorectal cancer screening in the future						
Think	140	77.8	109	65.3	120	66.6
Not think	40	22.2	58	34.7	60	33.4

Tablo 3. Comparison of the Means of the Colorectal Cancer HBM Scale and Sub-dimensions and the Fatalism Tendency According to the Participants' Countries

		Country				
		Turkey	Malaysia	Saudi Arabia	All	
		X̄±SS	X̄±SS	X̄±SS	X̄±SS	
The Colorectal Cancer HBM Scale and sub-dimensions	Sensitivity (min-max:6-30)	13.01±5.83	17.80±0.91	15.76±4.75	15.52±4.79	F: 54.214 p:0.00
	Severity (min-max:5-25)	15.43±5.50	18.10±6.66	17.01±3.98	16.85±5.59	F: 10.758 p:0.00
	Barriers (min-max:6-30)	15.02±5.22	22.26±2.72	19.01±4.28	18.76±5.14	F: 133.685 p:0.00
	Health Motivation (min-max:5-25)	15.20±4.25	19.00±5.56	17.75±2.99	17.31±4.66	F: 34.893 p:0.00
	Benefit (min-max:11-55)	46.02±9.29	41.04±0.92	47.14±5.88	44.73±6.89	F: 46.667 p:0.00
Fatalism Tendency scale	Predetermination sub-scale (min-max:8-40)	24.49±7.43	29.15±10.30	27.58±5.98	27.07±8.32	F: 15.382 p:0.00
	Luck sub-scale (min-max:4-20)	11.10±3.95	14.57±5.15	10.21±3.48	11.96±4.64	F: 52.837 p:0.00

Table 4. The Relationship between the Colorectal Cancer HBM Scale Mean Score and the Fatalism Tendency Scale

	Self-report risk		Predetermination sub-scale		Luck sub-scale	
	r	p	r	p	r	p
Sensitivity perception	0.052	0	0.044	0	0.059	0
Severity	0.012	0.01	0.131	0	0.122	0
Barriers	0.03	0	0.062	0	0.115	0
Health Motivation	0.004	0.147	0.87	0	0.094	0
Benefit	0.007	0.057	0	0.805	0.035	0

regarding colorectal cancer (CRC) and associated factors specifically in the context of three Muslim-majority countries: Turkey, Malaysia, and Saudi Arabia. While there is substantial research on colorectal cancer screening and health beliefs in Western countries, there is limited literature exploring these factors within the cultural and religious contexts of Muslim-majority nations. This study adds to the literature by examining how cultural, religious, and socio-economic factors influence the health beliefs and screening behaviors of men aged 50-75 in these regions. Additionally, it provides valuable cross-national comparisons that could help in understanding the variations and commonalities in health beliefs across different Muslim countries. By focusing on the beliefs, attitudes, and practices related to CRC screening, it addresses a significant public health issue by focusing on colorectal cancer, a prevalent and preventable form of cancer.The study utilizes established frameworks like the HBM and explores the impact of fatalism on cancer screening participation among Muslim men.

Limitations

This study has several limitations. The reliance on self-reported data could introduce the potential for response bias, as participants may provide socially desirable answers. The study's scope was limited to Muslim men aged 50-75, which may not fully capture the diverse population that colorectal cancer affects. Furthermore, the cross-sectional design limits the establishment of causal relationships between health beliefs, fatalism, and screening participation.

Previous reports of the prevalence of colorectal cancer indicated a range of factors, including genetics, lifestyle, and healthcare access, as issues [1]. Differences in diet, cultural practices, and genetic predispositions may contribute to variations in colorectal cancer rates among populations [38, 30]. However, no specific data on Muslim countries are mentioned in this literature. Thus, considering regional and individual differences when examining health trends is questionable.

However, this study's findings reveal crucial insights into the health beliefs and factors influencing colorectal cancer screening participation among Muslim men. Analyzing the sociodemographic characteristics highlighted variations among countries, emphasizing the need for culturally sensitive interventions [29, 28]. The higher mean scores in Malaysia suggest a distinctive health belief pattern, possibly influenced by cultural and regional factors.

The study's identification of a positive, statistically

significant relationship between HBM scores, risk perception, and fatalism tendency aligns with existing literature. It underscores the intricate interplay of psychological factors shaping individuals' decisions regarding colorectal cancer screening [33].

Implications

The study's outcomes have practical implications for public health initiatives in Muslim countries. Culturally sensitive colorectal cancer screening programs tailored to address health beliefs and fatalism could enhance participation rates [23, 24]. Understanding the differences among countries enables the development of targeted interventions, considering regional variations in health beliefs and practices [25].

This study assesses participants' awareness of colorectal cancer, providing insights into the perceived susceptibility and severity of the disease in line with the HBM [39]. The study introduces modifying variables by comparing health beliefs, fatalism, and screening participation across three culturally diverse Muslim countries Malaysia, Saudi Arabia, and Turkey. This adds a cultural dimension to the HBM, acknowledging that sociodemographic and cultural factors influence beliefs and behaviors.

Moreover, this study investigates health beliefs, including perceived benefits and barriers to colorectal cancer screening [40]. The Colorectal Cancer HBM Scale assesses participants' views on sensitivity, severity, barriers, health motivation, and benefits related to colorectal cancer. Identifying these factors contributes to understanding the cognitive processes that influence screening participation, aligning with the HBM's emphasis on perceived benefits and barriers. Additionally, the study recognizes the role of online health promotion as a potential cue to action for cancer screening [41]. This aligns with HBM's concept of cues to action, where external stimuli or internal factors prompt individuals to act regarding their health. The study's identification of the fatalism tendency can function as a significant cue affecting participants' engagement with screening behaviors.

While the study does not explicitly assess self-efficacy, it indirectly touches on men's participation in health promotion and protection programs. Men's passivity, low information-seeking behavior, and low participation levels in health-related activities suggest potential challenges related to self-efficacy, aligning with the HBM's consideration of individuals' confidence in their ability to take action [42]. This study sheds light on the complex interplay of health beliefs, fatalism, and colorectal cancer screening participation among Muslim men.

The findings offer valuable insights for designing effective, culturally tailored interventions aimed at reducing colorectal cancer mortality in Muslim countries. The study's focus on health beliefs, fatalism, and colorectal cancer screening participation aligns well with the core principles of the HBM. By exploring these dimensions, the study contributes valuable insights to the understanding of factors influencing health-related behaviors in the context of colorectal cancer screening among Muslim men.

Future Studies

Based on the study findings, interventions can be designed to address specific components of the HBM. Promoting awareness campaigns to enhance perceived susceptibility and severity, emphasizing the benefits of screening, addressing cultural and psychological barriers, and incorporating cues to action in public health initiatives are all strategies aligned with the HBM to improve colorectal cancer screening participation. A culture-sensitive colorectal cancer screening guide should be prepared for Muslim men to increase their involvement in colorectal cancer screening. Future research should consider longitudinal designs to establish causation and explore the impact of cultural nuances on health beliefs. Investigating the perspectives of healthcare providers and the role of religious leaders in promoting colorectal cancer screening could provide a holistic understanding. Additionally, expanding the study to include a wider age range and diverse populations within Muslim countries would contribute to a more comprehensive overview.

In conclusion, although the incidence of colorectal cancer is high in Muslim countries, the rate of participation in cancer screening is low. In this study, which consists of a sample of Muslim men living in three Muslim countries, the colorectal cancer HBM scale scores of Muslim men are at a moderate level, while the Malaysian participants have higher scores than Turkish and Saudi men. The same situation applies to the tendency toward fatalism. The participants' perceptions of themselves as at risk for cancer and the level of their fatalism tendencies affect the colorectal cancer HBM sub-dimension variables.

Author Contribution Statement

All authors contributed equally in this study.

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Ethical Statement

The study gained approval from Ondokuz Mayis University in Turkey, with IRB approval number 182 dated 26/02/2021

Informed consent/ Patient consent

The participants' identities and personal information were not disclosed. Blinded tallying was used to secure privacy and maintain participant anonymity using codes. Accordingly, the research was conducted on the basis of voluntary and informed consent.

Availability of data

Data available upon request from the Corresponding Author.

Conflict of interest statement

The authors declare no conflict of interest.

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