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Research Article

Factors predicting nutritional behaviors related to gastric cancer: A model-guided study

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ABSTRACT

Background and Objectives: Gastric cancer is one of the common causes of death from cancers worldwide. It is the second most common cancer in Iran, and it has the highest prevalence in Gilan province. The objective of this study was to determine the predictive power of the health belief model (HBM) constructs in nutritional behaviors related to gastric cancer. **Methods:** This cross-sectional study was conducted on 250 rural women of Talesh county in Gilan province of north of Iran in 2017. They were selected using a multistage cluster random sampling method. Data collection instrument was a questionnaire including HBM constructs and nutritional behaviors related to gastric cancer. The results were analyzed using Pearson's correlation coefficients and multivariate linear regression method. **Results:** The mean age of women was 34.51 ± 9.16 years. About 39.2% of women and 34.4% of their husbands had high school degree. The results of regression analysis showed that HBM could predicted 28% of the variations of the nutritional behaviors with the constructs of perceived barriers (β = −0.40, 95% confidence interval [CI] = −0.53, −0.27, self-efficacy (β = 0.22, 95% CI = 0.09, 0.035), and severity (β = 0.25, 95% CI = 0.11, 0.38). There was a statistically significant negative correlation between self-efficacy and barriers ($P < 0.01$). **Conclusion:** According to the predictive power of the HBM, the educational interventions based on this model with emphasis on the construct of perceived barriers after that self-efficacy is suggested for this group.

KEY WORDS: Gastric cancer, Health belief model, Nutritional behaviors, Rural women

INTRODUCTION

Cancer is one of the leading causes of death with approximately 14 million new cases per year, and it is the second cause of death (8.8 million in 2015) in the world.[1,2] Gastric cancer is the third leading cause of cancer death (754,000 of the world's population in 2015).[2] A study of different cancers in Iran indicates that the gastric cancer has the highest incidence after breast cancer, and according to the estimates, by the year 2025, the rate of increasing gastric cancer risk would be 38%.[3] In the case of the prevalence of gastric cancer, Gilan province has the first place in the country.[4]

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Nearly half of the deaths from cancer can be prevented by promoting health behaviors and environmental factors.[5] A number of modifiable risk factors that are particularly relevant to the risk of gastric cancer include nutritional factors, smoking, alcohol consumption, and weight.[6-9] The relationship between excessive consumption of salt and the risk of gastric cancer is well known. In most western countries and Japan, daily intake of salt has severely reduced, partly is due to public health campaigns to reduce hypertension. This may be reducing the rate of gastric cancer at least in some extent. Epidemiological studies indicate that the increased consumption of fresh fruits and vegetables is associated with a reduction in gastric cancer.[10-12] According to the results of various studies, there are some kinds of environmental factors involved in gastric cancer, in which, carcinogenic food factors are important.[13] Salty and fermented meat,

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smoked, and fermented foods have been introduced that cause gastric cancer.[14,15] The association of this disease with *Helicobacter pylori* infection has also been confirmed.[16] Given the fact that by changing the pattern of food and lifestyle, it is easy to prevent at least half of gastric cancers, studies have focused on the necessity of designing appropriate educational interventions to increase people's awareness about lifestyle risk factors, healthy diet choices, and anticancer diet.[17-20] Due to the complex and real relationship between attitudes, beliefs, and behaviors, models of health education and health promotion are used.[21] The health belief model (HBM) is one of the models used in promoting health and preventive behaviors such as nutritional behaviors.[22] This model contains five main constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy. These were defined as: Perceived susceptibility: Subjective belief that a person may acquire a disease or enter a harmful state as a result of a particular behavior. Perceived severity: Belief in the extent of harm that can result from the acquired disease or harmful state as a result of a particular behavior. Perceived benefits: Belief in the advantages of the methods suggested for reducing the risk of seriousness of the disease or harmful state resulting from a particular behavior. Perceived barriers: Belief concerning actual and imagined costs of performing the suggested behavior. Self-efficacy: Confidence in one's ability to acquire a new behavior.[23]

Despite the prevalence of gastric cancer in the world as well as Iran, this study researcher could not find a study that determines the predictive power of the HBM in the nutritional behaviors associated with gastric cancer. However, previous studies in similar behavioral domains reveal different findings about the effect of constructs of the model on behaviors.[24-35] Considering the key role of women in feeding all family members, women were selected as a target group.[20] Therefore, the present study was conducted to determine the predictive factors of nutritional behaviors associated with gastric cancer, based on the HBM in rural women of Talesh country.

METHODS

This cross-sectional study was performed on 250 rural women in Talesh county of Gilan province in 2017. In the first stage, the list of comprehensive centers for rural health services in Talesh was prepared, and five centers were randomly selected. Then, according to the list of rural households, eligible families were identified and the samples were selected by systematic random sampling. Entry criteria include willingness to participate in the program, women in the age group of 18–60-year old,[20] non-infected themselves their spouse, or one of the first grade relatives to gastric cancer.[20] Those women who did not complete the questionnaire were excluded from the study. The questionnaire was designed by modifying previous tool used by Alidousti *et al*.[20] The validity and reliability of questionnaire was determined through a pilot sample of eligible women in the community. To assess the face validity of the questionnaire, it was reviewed by 15 rural women in terms of clarity and required applying changes applied to the questionnaire. Content validity was assessed based on expert opinions (two dieticians, three health education specialist, and two statisticians and epidemiologists). The calculated content validity index was 0.8. Reliability of the questionnaire was measured by calculating the Cronbach's alpha coefficient on 15 women in the pilot sample. The Cronbach's alpha for the construct of perceived susceptibility was 0.71, perceived severity 0.72, perceived benefits 0.85, perceived barriers 0.75, perceived self-efficacy 0.86, and performance 0.73. The questionnaire consisted of 36 questions of HBM constructs on the five Likert scale (I fully agree, agree, I have no idea, I disagree, and totally disagree): Perceived susceptibility contained 15 questions scoring from 0 to 4, with a minimum and maximum achievable scores of 0–60, perceived severity with five questions and scoring from 0 to 4 with a minimum and maximum achievable score of 0–20, perceived barriers with six questions and scoring from 0 to 4 with a minimum and maximum score of 0–24, perceived benefits with four questions and scoring from 0 to 4, with a minimum and maximum achievable score of 0–16, and perceived self-efficacy with six questions and scoring from 0 to 4 with a minimum and maximum achievable score of 0–24. The third section included 16 questions for measuring performance, which was self-reporting five options (at all, rarely, sometimes, most times, and always) and scoring from 0 to 4 with a minimum and maximum score of 0–64, including salt, marinade, canned goods, sausages and meat, fruits and vegetables, grains and dairy products, and how to prepare and store food.

Data were described as the mean and standard deviation. The normality of data was assessed using Kolmogorov–Smirnov test. Pearson's correlation coefficient was used to assess the relationship between constructs. The adjusted association between each construct and nutritional function was determined using forward method in multivariate linear regression analysis was used. The model goodness of fit was determined by R^2 index. Data were analyzed using SPSS software version 19.

RESULTS

A total of 250 rural women with the mean age of 34.51 ± 9.16 years participated in this study. The average number of family members was four. The

majority of women (89.2%) were married. In this study, 39.2% of women and 34.4% of their spouses had a high school degree. 82.8% of women had no history of diet. 30.8% of women had a history of cancer in the family. The most common cancer in the family history was gastric cancer (11.6%).

Table 1 summarizes the mean and maximum-minimum values of model constructs and nutritional performance that according to this table, the highest mean is for perceived susceptibility construct (38.82) and the lowest mean for the perceived barriers construct (8.93).

Table 2 summarizes the correlation coefficient between HBM constructs and nutritional function. Based on the results, there is a positive significant correlation between the four constructs of perceived severity, perceived benefits, perceived susceptibility, and perceived self-efficacy with nutritional function. However, there is a moderate negative significant correlation between perceived barriers and nutritional function. Perceived self-efficacy was inversely correlated with perceived barriers with a moderate correlation coefficient of −0.42.

The results of multivariate-adjusted association between HBM constructs and nutritional function are shown in Table 3. The model accounted for 28% of the variance of nutritional function, most of which was related to the perceived barrier construct with 20%. The perceived severity and perceived self-efficacy construct each accounted for 4% of nutritional performance variations.

According to the results of Table 3, increasing the score of perceived barriers is associated with a significant decrease in nutritional function. Perceived severity and perceived self-efficacy were positively associated with nutritional function. The positive relationship indicated that women who had higher perceived severity and perceived self-efficacy scored higher on nutritional function.

There was a significant relationship between nutritional function and each item of perceived barriers including not enough information about nutrition related to gastric cancer, high intake of salt due to food tasting, delicious taste of fried and grilled foods, choice of food based on the desire of family members, and long time-consuming process of healthy vegetables food ($P < 0.05$).

DISCUSSION

In this study, the HBM could predict 28% of the variance of nutritional behaviors associated with gastric cancer in surveyed rural women. This finding is consistent with the results of studies by Skinner *et al*.,[36] Jalilian *et al.*,[37] Kasmaei *et al.*,[33] Vazini *et al.*,[25] Aflakseir *et al*.,[34] and Karimy *et al.*[35] Concerning the application of the HBM in predicting behaviors associated with non-communicable diseases is reported to be <30%. Based on the findings of this study, perceived barriers construct had the most predictive power of behaviors in the study population so that it explaining 20% of the variance of behaviors. Given the inaccessibility of a similar study on the role, the HBM in predicting nutritional behaviors associated with gastric cancer, in analyzing the results of this study with different studies in cases that are somewhat similar to this behavior; in

Table 1: The score of HBM constructs and nutritional function in the study population and nutritional function

Variable	Mean±SD	Min-Max
Perceived susceptibility	38.82±6.76	17–54
Perceived severity	12.12±3.88	0–20
Perceived benefits	12.70±2.55	4–16
Perceived barriers	15.93±4.35	0–24
Perceived self-efficacy	10.91±4.51	0–24
Nutritional function	28.34±4.78	15–43

SD: Standard deviation, HBM: Health belief model

Table 2: Pearson's correlation coefficient matrix between constructs of HBM and nutrition function

Variable	1	2	3	4	5	6
1-Perceived severity	1					
2-Perceived benefits	0.31**	1				
3-Perceived susceptibility	0.31**	0.48**	1			
4-Perceived barriers	0.03	−0.21**	−0.14*	1		
5-Perceived self-efficacy	0.04	0.21**	0.20**	−0.42**	1	
6-Nutritional Function	0.18**	0.21**	0.23**	−0.45**	−0.35**	1

***P*<0.01, **P*<0.05. HBM: Health belief model

Table 3: Adjusted association of each construct of HBM model and nutritional function score

Constructs	β-coefficient	95% CI		P
		Lower limit	Upper limit	
Perceived barriers	−0.40	−0.53	−0.27	0.001
Perceived severity	0.25	0.11	0.38	0.001
Perceived self-efficacy	0.22	0.09	0.35	0.001

HBM: Health belief model, CI: Confidence interval

some studies, perceived barriers were the determining factor of behavior,[24-32,38] but in some others did not play a decisive role in behavior.[33-35] According to Janz, Champion, and Strecher, perceived barriers are the strongest predictor of behavior in the HBM, and its reducing is one of the best strategies for interventions in self-care behaviors including healthy nourishment. Of course, it should be noted that the impact on barriers is often not simply possible.[22] Based on this model, the barriers of health promotion behaviors may be abstract or real, as Pender says the barriers include perception related to the lack of access, inappropriateness, costly, difficulty, or time consumed.[38] To reduce target barriers, educational interventions should identify and focus on the real obstacles to behavior. It is advisable that people have to think about all the true and conceivable barriers and then discuss how they can overcome each one.[22] In this study, the perceived barriers affecting healthy nutrient function include not enough information about nutrition related to gastric cancer, high salt intake due to food tastes, long and time consuming of healthy vegetable preparing, delicious flavor of fried foods, and also choosing the type of food based on the desire of family members. To use the ways to overcome obstacles, it should be noted that according to the results of this study, the level of perceived severity is not high, while the increased perceived severity can indirectly reduce the perceived barriers and is also a prerequisite for increased perceived susceptibility.[22] In addition, the perceived severity construct has a strong knowledge-dependent cognitive component that varies from one person to another.[23] Therefore, when planning and implementing educational interventions for this group, it is necessary to raise the level of knowledge, perception the serious consequences of the disease, and sensitize individuals to be at risk of gastric cancer and should consider the role of nutritional behaviors. For example, in the case of frying foods, it is necessary to use frying oils and not to reuse fried oil, and about barbecues, the right way to barbecue and about the use of vegetables should raise awareness of the consequences of not consuming or reducing their consumption. Concerning coping with high salt intake due to food tasting that is common in Gilan province, the disadvantages of high consumption of salt and the use of other food flavors, such as fresh lemon juice, sumach, or other suggestions that can be made through the brainstorming of target group and supply of ideas, and then discussed by them.

On the other hand, despite the fact that the results of regression analysis in this study indicate poor predictive power of self-efficacy and perceived severity constructs in gastric cancer nutritional performance, the reverse correlation observed between self-efficacy and perceived barriers reflects the indirect effect of perceived self-efficacy on preventive nutritional behaviors associated with gastric cancer. What should be considered about self-efficacy is that this construct is not related to the skill of a person, it is related to his judgment of what he can do (taking into account all the skills he has). The sense of efficiency and skill against when feeling inefficiency and lack of skill is likely to encourage the person to be more involved in the target behavior. Typically and according to the results of this study, self-efficacy has a reverse effect on perceived barriers; thus, higher self-efficacy reduces perceived barriers and thus can indirectly promote the target behavior by influencing perceived barriers.[38,39] Since the progress of medical students is associated with public health, it is recommended that medical education managers and planners pay more attention to motivational factors. It is also recommended that planning strategies for increasing motivation and academic achievement be placed at top priority along with continuing education, which can be addressed by officials and educationalists.[40] In the present study, the low level of perceived self-efficacy suggests that feeling disability and inefficiency in different situations can make people think of their problems more difficult than they are. Hence, instead of confronting them, they will surrender in front of them or avoid them; therefore, in an individual with low self-efficacy, the likelihood of trying to do a new behavior or change in habit is less. It is hoped that more effects into these patients bring appropriate treatment methods to promote the patients' life quality.[41] The results of this study indicate the need to pay attention to promoting perceived self-efficacy in the women of the study group. This strategy can strengthen their role and ability to overcome barriers to appropriate nutritional behaviors and also overcome the lack of power in women to choose food through awareness and influence on the beliefs of family members and justify them when they oppose. Therefore, the need to emphasize self-efficacy after barriers is recommended in planning educational interventions for the study group. Success or failure in education is one of the major concerns of every educational system. Educational success and progress in every society represent the success of the educational system regarding targeting and paying attention to meeting individual needs.[42]

The limitations of this study are self-reporting and the need to be literate, so this group cannot be representative of the whole society.

CONCLUSION

The findings of this study showed that the HBM has a high predictive power in nutritional behaviors associated with gastric cancer in rural women. The most important construction predicting was perceived barriers, after that perceived self-efficacy and perceived severity had limited prediction. In addition, the reverse correlation observed between constructs of perceived self-efficacy and perceived barriers

reflects the indirect role of perceived self-efficacy on these nutritional behaviors. Therefore, the necessity of educational interventions based on this model with emphasis on perceived barriers and then perceived self-efficacy is suggested.

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