ORIGINAL ARTICLE

Addressing the COVID-19 Pandemic in an Iranian Sample: Health Beliefs and Respondent Characteristics Associated with Preventive Behaviors

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Key words

Coronavirus • COVID-19 • Preventive behavior • Health Belief Model

Summary

Background. *The COVID-19 pandemic has become a grave threat to public health. Along with vaccination, preventive behaviors are still an important part in controlling in controlling the COVID-19 pandemic. The present study aimed to investigate health beliefs and sample characteristics associated with COVID-19 preventive health behaviors among an Iranian sample. Preventive behaviors are still an important part in controlling in controlling the COVID-19 pandemic.*
Methods. *This is a cross-sectional study, using a multi-stage randomized sampling method. Participants (N = 250 males and 236 females) were recruited from health centers in Saveh, Iran. Self-administered questionnaires included sociodemographic information, health behaviors, and constructs associated with the Health Beliefs Model (HBM). Data were analyzed using independent t-tests, analysis of variance, and multiple regression with significance level set at $\alpha \leq 0.05$.*

Results. *Perceived disease susceptibility ($\beta = 0.44$, $P < 0.001$), self-efficacy to enact preventative behaviors ($\beta = 0.24$, $P < 0.01$), education ($\beta = 0.20$, $P < 0.001$), non-smoking status ($\beta = 0.14$, $P < 0.01$), marital status ($\beta = 0.10$, $P < 0.03$), and perceived barriers to disease preventative behaviors ($\beta = -0.10$, $P < 0.04$) were important predictors of prevention practices for COVID-19, and accounted for 61.4% (adjusted R^2) of the variance associated with preventive behavior for COVID-19.*
Conclusion. *As there is accepted therapy for COVID-19, it is especially important to control COVID-19 through behavior change. Results indicate that two behavioral constructs that have the most impact on prevention are perceived disease susceptibility and self-efficacy. Therefore, public health initiatives are needed to enhance perceived susceptibility to the disease and improve self-efficacy to perform preventative behaviors in spite of perceived barriers.*

Introduction

BACKGROUND

On December 29 of 2019, doctors from a hospital in Wuhan, China found non-normal cases of patients with pneumonia. On January 9, 2020, Chinese officials announced the cause as a new Coronavirus, called COVID-19 [1, 2], which stands for Corona Virus Disease-2019 [2]. The virus spread around the world, instilling fear and economic hardship. The World Health Organization announced world-wide public health warnings with the outbreak of the virus [3]. Infected persons can have mild or no symptoms, whereas others manifest severe respiratory illness resulting in shock, multi-organ dysfunction, and death [4, 5]. Complications of the disease are more severe in the elderly and those with chronic disease [6]. The virus, although perhaps less fatal than other emerging viruses in the Corona family, is very difficult to control and spreads rapidly, making it particularly dangerous [7]. Overall, the pandemic

has resulted in filled hospital beds, an exhausted health workforce, shortages of personal protective equipment, infected hospital staff, understaffing in care centers, and anxiety in various countries of the world [8, 9].
Along with vaccination, measures such as health education, increasing knowledge and information, and improving people's attitudes and perform preventive behaviors such as quarantining at home, using masks and gloves, washing hands and disinfecting surfaces play a very important role in controlling the COVID-19 pandemic [10, 11]. Despite the importance of these behaviors in the prevention and control of COVID-19, trending data in many areas of the world suggest such behaviors are not being utilized.. The results of a study in Iran showed that despite the positive attitude of women towards home quarantine, their performance was not reported as appropriate [12]. The results of another study in Australia showed that people (adults aged over 18 years) with inadequate health literacy had poor understanding of COVID-19 symptoms, were low able to identify behaviours to prevent infection,

and experienced high difficulty finding information and understanding government messaging about COVID-19 [13]. Therefore, it is necessary to identify factors affecting behavior change that will encourage use of preventive measures [14, 15].

Health behaviors are influenced by knowledge, attitudes, beliefs, values and habits [16-18]. A person's health beliefs can increase motivation to enact self-protective behaviors to mitigate disease risk and strengthen disease preventive behaviors [19]. The Health Beliefs Model (HBM) is a psychological model to describe the relationship between health beliefs and healthy behaviors [20]. HBM is one of the most effective models for identifying factors affecting preventive behaviors [16-18]. Based on this model, such factors include that a person believes: 1) s/he is susceptible to the disease (perceived sensitivity); 2) the effects of the disease are serious (perceived severity); 3) behaviors to reduce the risk of disease are useful (perceived benefits); 4) s/he can perform preventive tasks (self-efficacy); 5) and s/he can overcome inhibitory factors (perceived barriers) [12]. A meta-analysis showed that HBM can be used to understand many types of health behaviors among people [21]. The results of a study showed that the HBM is a good tool to predict COVID-19-preventive behaviors in Iranian population [22]. Although vaccination is considered a key strategy to end the COVID-19 pandemic [23], it is important to control this pandemic through preventive behaviors such as quarantining, use of masks and gloves, washing hands and disinfecting surfaces [24]. HBM can assist in identifying health beliefs that may enhance preventative behaviors for the spread of COVID-19. This study aimed to investigate health beliefs and respondent characteristics associated with preventive health behaviors for COVID-19 among a sample of Iranian people. We expect that constructs within the HBM model significantly predicted the protective behaviors of the disease, therefore, planning and implementation of health education programs can be done in accordance with the results of the present study.

Methods

DESIGN, PROCEDURE AND SAMPLE

A cross-sectional study design was utilized and data were collected in 2020. Sample size needed to obtain effects was estimated at N = 400 with precision of 5%, confidence level of 95%, and perceived susceptibility of 63% based on previous studies [25]. N = 500 were initially targeted for recruitment. Inclusion criteria were as follows: Resident of Saveh City; 18 years or older; and participation in written informed consent. The Research Ethics Committee of the Saveh University of Medical Sciences approved the study.

Multi-stage sampling was performed, where Saveh City was divided into northern, central and southern areas, in order to cover cultural characteristics of the population in these regions. A healthcare center was selected from each region using simple random sampling. From the files of each healthcare center, 167 individuals meeting residence and age criteria were randomly selected for invitation to participate. Individuals were contacted by a researcher, who explained the study and consented participants. Following consent, data were collected in private using self-administered questionnaires, with private interviews used for illiterate persons.

MEASURES

Data were collected using questionnaires based on similar studies [14, 26-28] and that addressed constructs found in the HBM. There were three parts. 1) Demographics with 11 items (e.g., marital status). 2) HBM constructs (37 items) with responses rated using a Likert scale ranging from 1 (completely disagree) to 5 (completely agree): a) Perceived susceptibility with nine items such as, "If I do not follow health orders, I can get COVID-19.". b) Perceived severity with six items such as, "I worry about dying and losing loved ones because of coronavirus." c) Perceived benefit with six items such as, "If I follow health and personal protection instructions, I have contributed to the control of the COVID-19 in the community." d) Perceived barriers with nine items such as, "I must work to avoid financial problems and I cannot quarantine in-home." e) Self-efficacy with six items such as, "I can follow the care advice even if it is time-consuming or expensive.". f) Finally, a question was asked regarding the most important sources of information about COVID-19 to ascertain "cues to action," another important component of HBM. 3) Behaviors used to prevent COVID-19 were assessed via eight items such as, "I avoid shaking hands with others or kissing others." Preventive behaviors were assessed with a Likert scale ranging from, "I will definitely do this" (5) to "I will not do this at all" (1).

To develop the questionnaires, 10 experts, with knowledge of behavioral health models and with expertise in infectious disease and public health, were asked to generate and review items, using understandable language. Feedback was obtained and items were modified prior to deployment in the field. Cronbach's alpha was used to evaluate the internal consistency for scale. Cronbach alphas were as follows: Perceived susceptibility, $\alpha = .82$; perceived severity, $\alpha = .86$; perceived benefit, $\alpha = .79$; perceived barriers, $\alpha = .82$; self-efficacy, $\alpha = .81$; and COVID-19 preventive behaviors, $\alpha = .78$.

DATA ANALYSIS

The Kolmogorov-Smirnov test was used to determine the normal distribution of data. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) 21. A P-value of ≤ 0.05 was considered statistically significant. One-way analysis of variance (*ANOVA*) and *t*-tests were used to determine differences between the mean score of HBM constructs in two or more independent groups based on socio-demographic constructs (e.g., male vs female). Correlation among

variables was assessed with Pearson's *r*. To identify factors affecting COVID-19 preventive behaviors, multiple stepwise linear regression was used. The dependent variable was preventive behaviors and independent variables were demographics and HBM constructs. For analyses involving linear regression, the following were considered: Linear relationship among variables, multivariate normality, multicollinearity using a variance inflation factor < 5, and residual plot.

Results

Sample

Of N = 500 questionnaires distributed, N = 486 were returned completed (250 males; 236 females; response rate = 97.2%). Mean (M) age of respondents was 32.8 years with standard deviation (SD) of 13. Table I presents descriptive data for the sample. Important sources for information about COVID-19 were radio and TV, cyberspace, friends and acquaintances, and health system staff at 67%, 53%, 42% and 39%, respectively.

Univariate Tests

The independent sample *t*-test showed that women and men had no significant difference in preventive behaviors for COVID-19 (Tab. I), but women had fewer perceived barriers and higher perceived susceptibility ($P < 0.05$). Married individuals had better preventive behaviors, fewer perceived barriers, and higher perceived benefit and susceptibility than widows and unmarried individuals ($P < 0.05$). University education was related to fewer perceived barriers, higher perceived susceptibility and more preventive behaviors as compared to illiterate persons or persons with only primary education ($P < 0.05$). No statistically significant differences were found among HBM constructs or preventive behaviors based on economic status. Job status was related to perceived susceptibility to COVID-19 ($P < 0.05$), with employees having the highest scores. Non-smokers had higher perceived benefits, self-efficacy, and better preventive behaviors compared to smokers ($P < 0.05$).

Tab. I. Differences in Health Belief Model Constructs by Socio-Demographics Variables.

Preventive behavior	Perceived Self efficacy	Perceived Barriers	Perceived Benefits	Perceived Severity	Perceived Susceptibility	N	Variables
M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)		
							Gender
16.3 (5.5)	13.9 (4.7)	29.8 (7.7)	12.3 (3.9)	18.1 (5.2)	21.3 (4.7)	236	Female
14.7 (6.1)	13.3 (5.1)	34.8 (6.6)	11.3 (4.6)	17.9 (4.8)	18.2 (5.6)	250	Male
0.07	0.46	0.001	0.14	0.82	0.001		P value[a]
							Marital status
16.2 (5.8)	13.8 (4.8)	30.6 (8.2)	12.2 (4.3)	17.7 (4.3)	18.8 (5.3)	189	Single
19.8 (3.1)	16.2 (4.2)	26.5 (10.2)	16.8 (3.3)	18.3 (5.6)	20.3 (5.3)	278	Married
15.0 (6.0)	13.5 (4.9)	34.2 (8.5)	11.4 (4.0)	16.2 (4.5)	13.1 (2.2)	19	Divorced/ widow
0.02	0.18	0.01	0.001	0.69	0.001		P value[b]
							Level of Education
14.7 (5.4)	12.9 (4.9)	33.7 (7.1)	11.2 (4.2)	16.2 (3.7)	16.9 (4.8)	45	Illiterate/ primary
15.7 (5.3)	13.6 (4.7)	33.0 (8.2)	12.0 (4.4)	17.6 (4.0)	17.6 (5.0)	102	Middle school
16.6 (5.5)	14.2 (5.9)	28.3 (8.3)	13.1 (4.3)	19.6 (10.2)	18.1 (5.8)	250	High school
19.1 (5.6)	14.9 (4.6)	25.6 (9.7)	13.8 (3.7)	20.0 (3.0)	20.5 (5.0)	89	University
0.01	0.15	0.003	0.12	0.18	0.01		P value[b]
							Economic Status
16.0 (5.7)	13.1 (4.6)	31.6 (8.6)	11.8 (4.4)	16.8 (3.6)	18.8 (5.7)	141	good
17.3 (6.8)	13.4 (4.9)	30.7 (7.1)	11.6 (4.0)	18.4 (5.1)	19.4 (5.1)	243	medium
15.1 (5.1)	13.9 (4.8)	32.0 (7.5)	12.2 (4.3)	18.6 (6.1)	18.1 (5.9)	102	weak
0.14	0.64	0.27	0.45	0.09	0.41		P value[b]
							Job
14.2 (4.6)	12.9 (5.1)	33.2 (7.5)	11.6 (4.4)	17.1 (3.7)	17.7 (5.2)	159	Housewife
18.8 (7.7)	14.8 (4.8)	28.7 (8.0)	13.8 (4.2)	19.2 (7.8)	20.3 (5.1)	86	Employee
15.5 (5.1)	12.8 (5.2)	32.2 (5.7)	11.3 (4.1)	16.9 (5.2)	15.7 (5.0)	101	worker
16.9 (5.8)	14.7 (5.0)	31.3 (7.5)	12.5 (5.0)	18.7 (5.1)	19.5 (5.3)	92	Free
15.6 (6.1)	13.5 (4.5)	32.5 (8.9)	12.2 (5.2)	17.9 (4.5)	17.8 (5.7)	48	Retired
0.09	0.30	0.07	0.29	0.46	0.003		P value[b]
							Smoking
14.2 (6.3)	13.7 (5.0)	32.6 (7.3)	11.9 (4.3)	16.8 (4.1)	16.7 (5.4)	73	Yes
18.9 (4.6)	14.1 (4.5)	29.6 (8.2)	12.8 (4.2)	18.5 (5.3)	20.1 (5.2)	413	No
0.04	0.01	0.12	0.01	0.21	0.17		P value[a]

[a] Independent Samples t-test. [b] Analysis of Variance (ANOVA). M: Mean; SD: Standard Deviation.

Tab. II. Final Model in a Step-Wise Regression Analysis Predicting Preventive Behaviors for COVID-19.

Variables	Unstandardized Coefficients		Standardized Coefficients		95.0% CI for B		
	B	SE	Beta (b)	t-test	Lower Bound	Upper Bound	P Value
(Constant)	2.32	1.04		2.21	0.25	4.39	0.02
Marital status (Married = 1, Unmarried = 0)	0.42	0.20	0.10	2.07	0.02	0.83	0.03
Education (University = 1, Illiterate/ Primary = 0)	0.76	0.22	0.20	3.47	0.33	1.20	0.001
Non-Smoking (Yes = 1, No = 0)	0.50	0.20	0.14	2.45	0.09	0.91	0.01
Percieved Susceptilility	1.95	0.25	0.44	7.79	1.45	2.44	0.001
Percieved Self-Efficacy	0.16	0.03	0.24	4.73	0.09	0.23	0.01
Percieved Barriers	-0.31	0.15	-0.10	-2.01	-0.62	-0.006	0.04
Model Adjusted R2	0.614						

SE: Standard Error; CI: Confidence Interval.

The Pearson's correlation coefficient indicated that preventive behaviors had a statistically significant ($P < 0.05$) positive association with perceived susceptibility ($r = 0.43$), perceived severity ($r = 0.32$), perceived benefits ($r = 0.33$), and self–efficacy ($r = 0.41$), whereas perceived barriers had a negative association ($r = -0.36$).

Multivariate Tests

Assumptions for regression were considered. Linearity was confirmed with an analysis of residuals; collinearity was checked and result was negative. Multiple stepwise linear regression (see Tab. II) showed that perceived susceptibility ($\beta = 0.44$, 95% CI: 1.45, 2.44), compared to other independent variables, had a greater impact on protective health behaviors for COVID-19. Self-efficacy ($\beta=0.24$, 95% CI: 0.09, 0.23), education ($\beta = 0.20$, 95% CI: 0.33, 1.20), non-smoking ($\beta = 0.14$, 95% CI: 0.09, 0.91), marital status ($\beta = 0.10$, 95% CI: 0.02, 0.83), and perceived barriers ($\beta = -0.10$, 95% CI: -0.62, -0.006) were significant predictors of preventive behaviors. Together, these constructs accounted for 61.4% (adjusted R^2) of the variance in preventive behaviors.

Discussion

Summary of Findings and Relation to Prior Studies

The aim of this study was to assess the relationships between health beliefs, sample characteristics and COVID-19 preventive behaviors in an Iranian city. Sampling within the targeted region was robust with response rate of 97.2%. The most frequently endorsed sources of information on COVID-19 were radio and TV (67%) with relative less endorsement of healthcare staff (39%). The results of a study in another Iranian city showed that 37.5% of the population received most of their information about Coronavirus from TV and 53.9% received most of their information from social networks and the Internet [29]. In another study in Iran, internet and virtual social networks (49.8%), broadcast (33.5%),

and healthcare professionals (15.8%) were the main sources of people's information related to COVID-19, respectively [30]. Which are somewhat inconsistent with the results of the present study. Perhaps this difference is due to cultural and contextual differences.

Univariate tests indicated that HBM constructs (e.g., perceived disease severity) were significantly related to COVID-19 preventive behaviors (e.g., washing hands), and that being married, better educated and non-smoking related significantly to preventive behaviors. Further, being female, married, university-educated and non-smoking were significantly related to multiple constructs of the HBM, such as perceived barriers for health behaviors and perceived susceptibility. Results of univariate tests informed variable selection for multivariate analyses. Results of multivariate analyses are discussed below.

Perceived susceptibility was the most important construct for predicting behaviors in preventing COVID-19. This finding is consistent with a study by Kwok et al. [31] in Hong Kong and Lin et al. [32] in China that also found perceived susceptibility was an important factor in behavior. According to HBM, people must first perceive themselves to be at risk for a disease before acting to mitigate risk.

Self-efficacy was a significant factor in predicting preventive behavior. This finding was expected since self-efficacy is one of the most important factors explaining human behaviors and provides a good framework for understanding and predicting new behaviors [28]. Self-efficacy for preventive behaviors, or a belief that one can engage effectively in accomplishing goals, is critical in overcoming obstacles [28]. This result is consistent with a study by Karimy et al. [26], which showed that low self-efficacy is associated with reduced likelihood to change health behaviors. This is similar to a study by Elgzar et al. [20] that found self-efficacy was an important factor in overcoming perceived barriers to COVID-19 preventive behaviors. Similarly, a study in South Korea [33] found that perceived susceptibility and self-efficacy were important variables in determining preventive behaviors from COVID-19.

The current study found that perceived barriers significantly predicted preventive behaviors for COVID-19. Previous studies [26, 28] have documented that perceived barriers may act as a deterrent to performing recommended health behaviors, so health planners should consider ways to reduce perceived barriers. Understanding barriers to healthy behaviors is vital [34]. In particular, Maguire and colleagues [34] suggested identifying and overcoming perceived barriers are protective against COVID-19. Similarly, studies by Nowak et al. [35] and Elgzar et al. [20] found that individuals who perceived barriers as high were less likely to engage in COVID-19 preventive behavior.

In relation to socio-demographic factors, results showed that having a university degree significantly predicted preventive behaviors for COVID-19. Consistent with our findings, previous studies have highlighted the role of education as an important variable in health behaviors [36-38]. Our results showed that non-tobacco use was a significant predictor for preventive behavior; non-smokers may simply be more health-conscious. This finding is consistent with a study in Japan that also found smoking behavior appeared as a factor characterizing subjective prevention actions with non-smokers or less-frequent smokers more compliant to the protection behaviors [39].

Although previous studies have not shown a significant relationship between smoking and increased risk of severe COVID-19 [40], smoking can provide a favorable condition for virus transmission. Married individuals had better preventive behaviors than widows and unmarried individuals. This may be due to their higher perceived susceptibility for disease, greater perceived benefits of acting, and fewer perceived barriers to acting. At least one other study found a significant relationship between marital status and COVID-19 preventive behaviors [37].

Study Limitations and Strengths

The study has several limitations. This was a cross-sectional study and therefore does not allow causal inference. Second, data collection was based on self-report, not observation. Finally, the study was conducted in one city in Iran and hence cannot be generalized to the entire population; replication is recommended in other regions. However, the study has several strengths. Response rate was high. Procedures were designed to access a representative sample from the target city in terms of region (northern, central and southern). Although data were based on self-report, this method is often necessary to collect data on perceptions of risk, self-efficacy and other constructs of the HBM. Further, persons were not eliminated due to illiteracy, and trained interviewers gathered data in a private and confidential manner to enhance veridicality of self-report. Finally, the constructs under study were based on a well-validated model of health behaviors, namely the Health Beliefs Model. Results can inform interventions, and interventions based on well-validated models may be more effective than models based on best-guess alone.

Conclusion

Results suggest targeting unmarried persons, those who smoke and those with less than a university degree may be important to enhance COVID-19 preventive behaviors. Disseminating public health messages regarding susceptibility to COVID-19, and enhancing efficacy to overcome common barriers to safety behaviors appears to be in order. The study identified several important avenues to provide such intervention including radio and TV, cyberspace, and health system staff.

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Ethics approval and consent to participate

The Research Ethics Committee of the Saveh University of Medical Sciences approved the study (Number: IR.SAVEHUMS.REC.1399.001). All participants provided written informed consent.

Conflict of interest statement

The authors declare that they have no competing interest.

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Authors' contributions

MK conceived the study. MA, HRK, LS, MRR and MM designed the study, collected the data, interpreted the results, contributed to writing the Article, and approved the final version for submission. MK supervised the study.

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