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Attitude and Related Factors towards COVID-19 Prevention based on the Health Belief Model among the Rafsanjan Citizens

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ABSTRACT

Aims COVID-19 is rapidly expanding around the world and is one of the most important health problems. The purpose of the study was to determine preventive behaviors from COVID-19 and its determinants based on some constructs of the Health Belief Model.

Instrument & Methods This cross-sectional study was conducted on 2504 citizens of Rafsanjan in 2020 that were randomly selected by cluster sampling method. Data were collected using a behavior and Health Belief Model constructs (HBMs) researcher-made questionnaire based on the Internet. The validity of the questionnaire was evaluated by ten specialists, and its reliability was assessed by Cronbach's alpha coefficient. Data analysis was conducted in SPSS 18 by applying statistical tests such as Pearson's correlation coefficient, independent t-test, One-Way ANOVA, and linear regression.

Findings The means score of knowledge, attitude, perceived susceptibility, severity, benefits, barriers, and preventive behavior were 83.13±10.72, 81.17±8.55, 79.28±17.19, 74.47±14.65, 84.32±16.11, 69.27±14.31, and 87.35±11.16, respectively. There was a significant correlation between preventive behaviors with knowledge, attitude, and HBMs ($p<0.001$). The attitude was the strongest predictor for adopting preventive behaviors ($B=0.446$, $p<0.001$). In total, knowledge, attitude, and HBM constructs predicted 36.8% of the preventive behaviors for COVID-19.

Conclusions There is a significant correlation between adopting preventive behaviors for COVID-19 with knowledge, attitude, and HBM constructs.

Keywords COVID-19; Knowledge; Attitude to Health; Health Belief Model

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[1] Emerging novel coronavirus (2019-nCoV)-current ... [2] Severe acute respiratory syndrome coronavirus ... [3] Which lessons shall we learn from the 2019 novel ... [4] COVID-19: a fast evolving ... [5] Coughs and sneezes: their role in transmission of ... [6] The symptoms, contagious process, prevention ... [7] COVID-19 preventive behaviors and its related beliefs ... [8] Dataset on the fear, preventive behaviour ... [9] Health behavior and health education: Theory, research ... [10] Health belief model for coronavirus infection risk ... [11] Knowledge, risk perception, and behavioral intention about ... [12] A survey of knowledge, risk perceptions and behavioral ... [13] Factors affecting parental intention to vaccinate ... [14] Effect of educational intervention based on the health ... [15] Assessment of knowledge, attitude, and factors ... [16] Public perception and preparedness for the pandemic ... [17] The survey of attitude in health ... [18] Factors affecting nurses' decision ... [19] The use of the health belief model to assess predictors ... [20] The behaviour change wheel: a new method ... [21] Middle east respiratory syndrome (MERS) ... [22] MERS-CoV infection: Mind the public knowledge ... [23] Severe acute respiratory syndrome (SARS): Knowledge ... [24] An assessment of parental knowledge, attitudes ... [25] Global challenge of health communication: Infodemia ... [26] Fear control and danger control amid ... [27] Factors influencing the wearing of facemasks to prevent ...

Introduction

Coronavirus is a large family of viruses that bring about a wide range of health problems ranging from minor diseases such as cold to more severe diseases like Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) [1]. COVID-19 results from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This systemic disease manifests itself as a severe form of pneumonia [2]. A severe type of COVID-19 associated with severe respiratory disease and multiple organ failure (as its main complications) can result in acute disease and end in intravascular coagulation [3]. According to the report released by the World Health Organization, The disease is spreading rapidly around the world, and its pandemic has been confirmed [4].

The virus can spread in different ways; it can spread through the infected person's respiratory droplets or from contact with surfaces or objects contaminated by infected people [5].

Thus, the most important activities recommended by the Center for Disease Control and Prevention include avoiding contact with the infected people and contaminated objects and surfaces, regular handwashing, disinfecting surfaces and objects, covering mouth and nose when you cough and sneeze, staying home, and wearing a mask when you are at risk for infection [6]. Khazaei *et al.* reported that 57.26% and 5976% of Hamadan health workers use masks and gloves, respectively [7]. In the study of Qureshi *et al.*, 77.4% of people of Pakistan did protective and preventive behaviors [8]. However, despite the high prevalence of COVID-19, its fast and widespread, and recommendations are given by related organizations for adopting preventive behaviors; why do some people ignore preventive behaviors and do not follow the required precautions?

The Health Belief Model (HBM) is one of the models investigating the concept of perceived barriers for conducting health-related behaviors [9, 10]. This model indicates the relationship between the person's beliefs and perception toward the threat arising from risks, benefits, and barriers of behaviors. According to this model, for adopting preventive behaviors, it is primarily required that individuals perceive the risk of a health problem (perceived susceptibility) and then perceive the seriousness of a given health problem and its serious complications in terms of physical, psychological, economic, and social aspects (perceived severity); the individuals perceive the issue as a perceived threat and adopt the required preventive behaviors [9, 10]. Different studies have reported that perceived threat is an important variable for adopting Hepatitis B and C preventive behaviors and vaccination against the flu [11-13]. In their study, Khani-Jeihooni *et al.* reported that students' perceived severity of influenza A was about 60% [14].

Therefore, given the significance of the issue, the purpose of the study was to determine preventive behaviors from COVID-19 and its determinants based on some constructs of the Health Belief Model; the present study results were applied for planning and designing evidence-based interventions.

Instrument and Methods

The cross-sectional study was conducted among 2504 among the Rafsanjan Citizens in 2020, the sample size taken from Nasirzadeh & Aligol study [15] (σ based on the Nasirzadeh & Aligol study [15] was inserted as 10.1. The estimate's accuracy (d) was set at 0.4 (variance was assumed to be 102.01), and the Confidence Interval was 95%. Then, the non-response error of 10% and design effect of 240 was added. The samples were selected by the random cluster sampling method. For determining the clusters, the northern, southern, central, eastern, and western cities and their affiliated villages were specified by using a map. Then, their postal codes of some areas were selected randomly, and the link of the questionnaire and electronic cooperation requests were sent via Short Message Service (SMS) to nationally registered phone users. Around 6800 SMSs were sent to people in different areas proportionally to their population, and the questionnaire link was available and active only for four days. The most important inclusion criteria were as follows: being Iranian; living in Rafsanjan; having the willingness to cooperate, and having access to the Internet. An incomplete response to the questionnaire was one of the exclusion criteria of the present study.

Knowledge and attitude were also examined based on the behavior change process [10] and evaluating beliefs based on the HBM. The data collection tool was a researcher-made questionnaire extracted from the guidelines provided by the Centers for Disease Control and Prevention (CDC) and the views of related Infectious Diseases Specialist, health education and promotion experts, and literature [5, 6, 15, 16]. This questionnaire includes six demographic questions (age, gender, marital status, history of underlying diseases, e.g., cardiovascular diseases, high blood pressure, diabetes, renal diseases, and pulmonary/respiratory diseases, occupation, and educational level), 20 knowledge questions (symptoms, transmission ways, prevention ways, and necessary actions to be taken), six attitude questions and five perceived susceptibility, severity, barriers and benefits questions as HBM constructs, and 13 preventive behaviors questions such as using a mask, observing physical distance, washing hands regularly, disinfecting surfaces. The response scale of knowledge questions is three-optional, correct answer score 2, incorrect score zero, and I do not know score one. According to scientific sources [17], the response scale of attitude and HBM constructs was a five-point Likert scale ranging from completely

agree (Score 5) to disagree (Score 1). The response scale of preventive behaviors questions always frequently includes, sometimes, seldom, and never. The score has been reported from 100. Except for perceived barriers, obtaining higher scores indicates a higher level of knowledge, attitude, and perceptions and adopting more preventive behaviors by the people of Rafsanjan about this disease. Sample questions in each HBM construct include: I believe that washing my hands for at least 20 seconds is effective in preventing coronavirus (attitude), I may get this disease too (perceived susceptibility), I believe that coronavirus is a serious disease (perceived severity), keeping a physical distance from others (at least 1.5 meters) plays an important role in preventing the disease (perceived benefit), I do not wear a mask due to shortness of breath and suffocation (perceived barrier). Due to the nature of the research topic and the need to adopt preventive behaviors, the structure of self-efficacy was not measured [18, 19]. The validity of the questionnaire was analyzed by ten specialists (Infectious Diseases Specialists, health education, and promotion experts); the content validity ratio (CVR) and content validity index (CVI) of the tool were confirmed. For determining the reliability of the tool, Cronbach's alpha coefficient (α) was investigated. The CVR total=0.87 and the CVI total=0.93, α=0.81 for knowledge, α=0.73 for attitude, α=0.81 for susceptibility, α=0.71 for severity, α=0.81 for benefits, α= 0.80 for the barrier, and α=0.79 for behavior.

This study was approved by Rafsanjan University of Medical Sciences. The questionnaire was completed online on 20-24 March 2020, and there was no need for the participants' presence.

After conducting the normality test on the data, data analysis was conducted in SPSS 18 by applying statistical tests such as Pearson's correlation coefficient, independent t-test, One-Way ANOVA, and linear regression. Path analysis was performed to identify direct and indirect factors affecting behavior.

Findings

The mean age of the respondents was 33.90±10.1 years (ranging from 15 to 86 years). As many as 1559 participants (62.3%) were female, and 945 participants (37.7%) were male. There was a significant direct relationship between the mean score of preventive behavior and age (r=0.11, p<0.001). There was a significant difference between gender groups, marital status, education level, and job in preventive behaviors mean score (p< 0.05; Table 1). Scheffe's post hoc test showed a significant difference between the mean score of students' preventive behaviors with other groups (p=0.023) and employed with self-employed jobs (p=0.031).

The mean±SD score of the preventive behavior, Barrier, Benefit, Severity, Susceptibility, Attitude, and Knowledge was 87.35±11.16, 69.27±14.31, 84.32±16.11, 74.47±14.65, 79.28±17.19, 81.17±8.55, and 83.13±10.72, respectively. There was a significant correlation between behavior with attitude and HBM constructs (Table 2).

The attitude was the strongest predictor for adopting preventive behaviors (B=0.446, p<0.001). For one score of attitude change, the behavior increases to a 0.44 score. In total, knowledge, attitude, and HBM constructs predicted 36.8% of the preventive behaviors for COVID-19 (Table 3).

Table 1) Mean±SD of preventive behaviors from COVID-19 according to demographic variables

Variable	Number	Mean±SD	p-value
Gender			
Male	943	86.52±12.60	0.004
Female	1556	87.85±10.15	
Marital status			
Married	2027	87.73±10.50	<0.001
Single	472	85.71±13.52	
Education			
Primary	113	85.52±16.64	0.004
Guidance	277	85.81±12.82	
Diploma	839	87.08±11.29	
Academic	1270	88.02±9.97	
Job			
worker	151	86.62±13.35	<0.001
Retired	65	89.13±7.72	
Self-employed	370	86.98±11.71	
Employed	649	88.52±9.92	
Housewife	871	87.91±10.11	
student	310	83.12±13.42	
Farmer	83	86.40±10.97	
Underlying disease			
Yes	436	87.86±11.31	0.32
No	2065	86.78±1.58	

Table 2) Correlation between knowledge, attitude and HBM constructs with COVID-19 preventive behaviors

Constructs	1	2	3	4	5	6	7
7-Behavior	0.346[a]	0.452[a]	0.155[a]	0.239[a]	0.211[a]	-0.198[a]	1
6-Barrier	-0.311[a]	-.427[a]	0.184[b]	0.208[b]	-.358[a]	1	
5-Benefit	0.354[a]	0.294[a]	0.261[a]	0.194[b]	1		
4-Severity	0.065[b]	0.202[a]	0.301[a]	1			
3-Susceptibility	0.222[a]	0.287[a]	1				
2-Attitude	0.424[a]	1					
1-Knowledge	1						

a= p<0.001; b= p<0.01

Table 3) The linear regression analysis of constructs predicting the adoption of preventive behaviors for COVID-19

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	23.33	2.41			
Knowledge	0.12	0.02	0.21	9.15	<0.001
Attitude	0.44	0.02	0.31	10.88	<0.001
Susceptibility	0.02	0.02	0.02	1.77	0.337
Severity	0.10	0.02	0.13	15.49	<0.001
Benefit	0.11	0.02	0.13	7.45	<0.001
Barrier	-0.12	0.02	0.12	-9.28	<0.001

a. Dependent Variable: Behaviour; R=0.49; R Square= 0.35; Adjusted R Square= 0.36; Std. Error of the Estimate= 9.03

Knowledge, attitude, severity, benefits, and barriers directly influenced the adoption of preventive behaviors from COVID-19. Based on the behavior change process, knowledge and perceived severity were the factors that affected the attitude and in this process both directly and indirectly affected the process of adopting the behavior.

Discussion

Behavior change is a complicated process that is likely to occur in different phases through increasing awareness and knowledge, making and improving beliefs, perceptions, and attitudes, and providing behavioral facilitators [9, 20]. In the present study, the people of Rafsanjan about the disease (symptoms, transmission ways, and proper and preventive measures and behaviors) were 83 out of 100. Given the pandemic of the disease worldwide, the daily data and information provided by mass media, proper and comprehensive information given by the Ministry of Health across the country, the people's level of knowledge was predictable. It seems that with the outbreak of emerging diseases and the fast spread of information in different societies, most of the target groups had a desirable level of information about these diseases, such as SARS and MERS [21-23]. However, raising awareness is a prelude to behavior change that needs to be presented by competent educators.

Attitude had the highest correlation coefficient with the adoption of preventive behaviors, and it was the strongest predictor of preventive behaviors. In different studies, the researchers have emphasized the effect and importance of attitude on adopting preventive behaviors, especially for receiving the vaccination against the flu [13, 24]. According to Goss *et al.*, parents' most important negative barriers to their children's vaccination include doubts about the side effects, concerns about the complications, and the belief that the vaccine is unnecessary [24]. Thus, it is recommended to involve others, including family members and friends, to form attitudes and beliefs.

According to the current situation, 79% of the people of Rafsanjan were likely to get the disease, and 74% reported that if they did, there would be other consequences such as absenteeism, depression, and stress. According to the path analysis, perceived severity was the factor that, in addition to having a direct impact on behavior, by influencing attitude, indirectly influenced the process of adopting the behavior. Similar to the results of this study, in Nasirzadeh & Aligol's study in Qom people, the perceived susceptibility was 76 points, the severity was 72, and the perceived threat was 58 points [15]. The Zeng *et al.* study reported that parents with high scores of perceived susceptibility perceived benefits and cues to action (are more willing to vaccinate their children against influenza [13]. Promoting the perceived severity of a minority of people who refuse social norms and health rules are recommended by providing the required education, producing educational content and clips about the complications of being infected with COVID-19 in different aspects, and sharing the experiences of infected people and their families.

The mean score of perceived benefits was 84 out of 100 and was in the desired range, in the sense that the majority of society had accepted that if they follow and adopt preventive behaviors, their incidence of Covid-19 disease will be lower. The majority (74%) accepted that observing the safety distance and not handhshake or kissing are more preventive than other behaviors. In a study by Jose *et al.*, it was reported that a good proportion of Indian citizens in Kerala (61%) accepted that preventive behaviors would reduce the risk of developing the disease [16]. In Khazaei *et al.* study, response efficacy reports 21 out of 25; in this study, more than 90% of health workers believed that hand washing, disinfection, and masks could prevent COVID-19 [7].

Perceived barriers examine the most important barriers to adopting behavior; the mean score of perceived barriers people in Rafsanjan was 69 out of 100. Create heat and a feeling of asphyxia were the most important reasons for not using the mask. Other behavioral barriers were reported to lack access and high cost of preventive equipment, such as masks and disinfectants. In a study by Jose *et al.*, the mean score of the barriers was 65, and the presentation of contradictory information through various communication channels was reported as the most important barrier [16]. Also, the simultaneous rapid and widespread spread of the virus with false information about the spread of the disease makes fear and panic among the people and could be a barrier to performing preventive behaviors [25].

As many as 87% of the people followed the recommended preventive behaviors that include not contacting the infected people, keeping at least one and a half meters of physical distance, wearing masks, disinfecting surfaces, and proper washing of hands; these behaviors have resulted from their attitude and knowledge, and they were based on their behavior change procedure. The most frequent preventive behaviors were avoiding kissing and handshakes (92.4%), and the least frequent preventive behavior was regular use of masks (68%) and regular disinfection of surfaces (62%), similar to Khazaei *et al.* study [7] and Nasirzadeh & Aligol study [15]. The study of Shirahmadi *et al.* reported that 93% of oral health care providers washed their hands regularly [26].

With aging, the adoption of preventive behaviors is promoted, and married individuals are more serious and willing about adopting preventive behaviors. In their study, Tang and Wong reported that as many as 61.2% of the respondents regularly wear masks for preventing SARS [26]. Women in the age group of 50-59 and married people follow the preventive behaviors more frequently than the others [27]. The change in the behavior of married people towards singles is probably due to the influence of the spouse and other family members and the solidarity of family members. Also, fear of serious consequences of the disease, such as hospitalization and death at an older age, maybe a key factor in adopting the behavior.

In the end, since behavioral adoption is complicated and some people are careless about following the

guidelines and recommendations, in designing educational interventions and programs, it is recommended to give due attention to the most important determinants of behaviors based on behavioral change procedure, models of behavioral change, and the formation of proper behavioral attitudes and perceptions.

The strengths of the present study were the high sample size, evaluation of people's beliefs based on the health belief model and attitude as key factors in the formation of behavior. Lack of objective observation of preventive behaviors in society and electronic accountability can be considered limitations of research. Another limitation of the study was that it did not measure cues to action.

Conclusion

There is a significant correlation between adopting preventive behaviors for COVID-19 with knowledge, attitude, and HBM constructs. If people have more informed about the disease and have proper attitudes and beliefs, they are more likely to adopt preventive behaviors.

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Ethical Permissions: The Research Ethics Committee of Rafsanjan University of Medical Sciences approved this study with the ID IR.RUMS.REC.1399.003.

Conflicts of Interests: The present study has been extracted from a research project coded 99000 in Rafsanjan University of Medical Sciences.

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