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Evaluation of Compliance with Preventive Behaviors of Corona Disease Based on Health Belief Model

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Abstract

Objective: Following the pandemic of corona disease in Iran and around the world, the most important goal of health policies focused on compliance with prevention behaviors, and its evaluating. One of the most effective model based on social psychology is Health Belief Model that has been employed in many studies as different aspects of preventive behaviors. The main purpose was study the relationship between compliance with preventive behaviors of corona disease with health belief model, and predicting the high level and low level of compliance with these behaviors based on health belief model variables.

Method: The present study was a descriptive-correlational study in terms of its method. The statistical population consisted of all adults aged +20 who lived in Tehran. 472 voluntary subjects were selected through online recall method. The instruments of the study included the compliance with preventive behaviors of corona scale (CPBC), and the corona health belief model inventory (CHBM). Both measures were developed and standardized by the researchers. Data were analyzed by using regression analysis.

Result: The Means of CPBC in all participants was 3.38 ± 0.83, thereupon two groups were formed accordingly, as high group (4.18±0.17) and low group (1.92±0/28). The findings show that high level of compliance could be predict by severity, benefits; and barriers; and low level of compliance by age, benefits, and barriers.

Conclusion: Since preventive behaviors were known as the best way to control of corona virus outbreak, there is a great value of identifying variables that might mitigate or exacerbate compliance could contribute greatly to the development of more effective health planning in Iranian society. Therefore, increase the benefits and reduce the barriers of prevention behaviors could be effective, and consequently, corona virus transmission could be decreased.

Keywords: Health Belief Model, Preventive Behavior, Compliance, Corona Disease.

Introduction

In December 2019, novel corona virus has been seen in Wuhan and rapidly spread in China and other countries around the world from Southeast Asia to America (Hui, Azhar, Madani, Ntoumi & et al., 2020). Its common symptoms are fever, dry cough, and shortness of breath. Other symptoms like as Muscle pain, sputum production, diarrhea, and sore throat are less common. Fortunately the most cases show mild symptoms, but some patients, however, get worse and eventually lead to death (Aliakbari dehkordi, eisazadeh, aghajanbigloo, 2020).

In fact, the most important problem in this disease is not its mortality rate, but its high prevalence has been considered (Chen, Zhou, Dong, Qu, et al., 2019). Since there is no effective cure or vaccine for this disease yet, the best way to control it is to prevent the outbreak. The virus is typically spread during close contact and via respiratory droplets produced when people cough or sneeze. It may also spread when one

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touches a contaminated surface and then their face (Aliakbari Dehkordi, Mohtashami, Tadrisi, 2020). It is most contagious when people are symptomatic, although spread may be possible before symptoms appear. The most important recommends to prevent infection include frequent hand washing, social distancing (maintaining physical distance from others, especially from those with symptoms), covering coughs and sneezes with a tissue or inner elbow, and keeping unwashed hands away from the face (Jin, Cai, Cheng, Cheng, et al., 2020).

In response to this pandemic in more than 200 countries, the most important goal of disease control is the compliance with preventive behaviors in corona disease (Alizadeh-fard, 2020). To this purpose, some countries have declared complete home quarantine, like china & Italy. This form of quarantine is the best way to effectively prevent disease. But because of some economic and social problems, some countries have preference a semi-quarantine and encourage people to stay home by closing the assembly centers. In this condition, the success of health policies depends on compliance with prevention behaviors, and its evaluating has becomes even more important; and scientific models are needed to assess compliance with preventive behaviors (Alizadeh-fard, Alipour, 2020).

The health education and promotion has evolved from the early days of focusing on information of knowledge-based programs to present-day theory-based behavior change interventions. Although, they have multiple influences from several disciplines, but primarily are derived from the behavioral and social sciences, so that deeply embedded in the social sciences, and borrowed the strategic planning of their methods from behavioral sciences. The core concepts of behavioral and social sciences are organized in the form of the health education and promotion theories (Davies, Macdowall, 2006).

Ordinarily, theories are developed a result of research. Health promotion field is interested in predicting or explaining changes in behaviors or environments. A model can be characterized as a theory in its early stages, so presents ideas that may not yet have the empirical evidence and is required a theory. Sometimes a model is thoroughly verified, but yet the word “model” sticks as part of its name. An example of a model is the precede-proceed model (Green & Kreuter, 2005), that is planning in health promotion programs. This model provides guidance for planning at the macro level; what behaviors to target, what resources to tap, how to mobilize the community etc. But a theory such as social cognitive theory provides guidance at the micro level, and tells which attitudes to change for making the behavior change, what activities or educational methods to do, etc.

There are different theories that commonly used in Health Education, behavior change, and community health promotion. These theories are applicable at several different levels: 1) community intrapersonal level that focus on how communities or larger institutions can affect health through institutional, community, and public policy factors. Some examples of this level are social advocacy theories, empowerment theories, community organization theory, diffusion of innovation, communication theories. 2) Interpersonal level that focus on how behavior is influenced by interactions between individuals and primary groups (e.g. family, friends, peers) that provide social identity, support, and role definition. Some examples of this level are social cognitive theory and social learning theory. 3) Intrapersonal level; these theories focus on individual characteristics that influence behavior (e.g. knowledge, skills, attitudes, beliefs). The most famous examples are Stages of Change-Trans theoretical Model, Theory of Planned Behavior, Theory of Reasoned Action, Precaution Adoption Process Model, and Health Belief Model (Sharma, Romas, 2012).

The health belief model (HBM) is one of the first theories in health behaviors. Although labeled a “model,” the HBM meets all the criteria for a theory.

Today it is one of the most popular models which provide specific guidance at the micro level for planning the "how to" part of interventions. Over the years, the HBM has expanded and borrowed from other theories to strengthen its predictive and explanatory potential (Sharma, Romas, 2012).

The HBM is based on work of Godfrey Hochbaum, Stephen Kegels, and Irwin Rosenstock (Rosenstock, 1974). These social psychologists were involved with the problem that very few people were participating in preventive and disease detection programs, and to explain this phenomenon developed the HBM. The health belief model is influenced by the value expectancy theory of Kurt Lewin and his colleagues (Lewin, 1935; Lewin, Dembo, Festinger, & Sears, 1944) which were believed preventive behaviors depend on value and expectancy. The HBM is conceptually similar to five other theories of decision making: risk-taking model, subjective expected utility model, decision making under uncertainty model, reinforcement model, and performance behavior theory.

Risk-taking model described behavior as a multiplicative relationship among expectancy, incentive, and motive. Expectancy is the person's anticipation of outcomes from an action, which can be positive or negative. Incentives are rewards that will accrue when the person performs the behavior. Motives are characteristics that encourage the person to pursue positive incentives and avoid negative incentives. Subjective expected utility model purports that action is based on the subjective value (or utility) of attaining the goal and the subjective probability (or likelihood) of attaining that goal. Decision making under uncertainty model utilizes three constructs: (1) attainment attractiveness, which is the individual's preference to pursue a goal; (2) success probability, which is the likelihood that a given goal is attainable; and (3) choice potential, which is the behavior to be done. Reinforcement model purports that behavior is based on the expectancy that a certain action will lead to a certain outcome and on reinforcement from previous learning. Finally, performance behavior theory describes six variables (three positive and three negative) that influence the performance of any behavior: (1) need, (2) positive valence, (3) expectation, (4) need-push against work, (5) negative valence of expected, (6) expectation of work.

The HBM has six constructs, the first of which is perceived susceptibility that means subjective belief to acquiring a disease or reaching a harmful state as a result of indulging in a particular behavior. The second construct is perceived severity, which means a person's subjective belief in the extent of harm that can result from the disease or harmful state as a result of a particular behavior. Perceived severity also has a strong cognitive component, which is dependent on knowledge. According to the HBM, health educators need to build perceived severity by describing the serious negative consequences and personalizing them. The constructs of perceived severity and perceived susceptibility are often grouped together and called perceived threat.

The third construct of the HBM is perceived benefits, which refers to advantages of the methods for reducing the risk or seriousness of the disease. The relative effectiveness of known available alternatives plays a role in shaping actions. The fourth construct, which goes hand-in-hand with the construct of perceived benefits, is perceived barriers. Perceived barriers refer to beliefs concerning the actual and imagined costs of following the new behavior. An individual may believe that a new action is effective in reducing perceived susceptibility or perceived severity of the disease but may consider the action to be expensive, inconvenient, unpleasant, painful, or upsetting.

This model emphasizes that perceptions of these four variables, explain how and why individuals compliance with health or preventive behaviors (Christina, Jakob, Courtney, Scherr, Brown & Jeremy, 2015). If people feel themselves at risk of a health problem, and then perceive its seriousness,

they most likely will adopt the preventive behaviors. Also, it's important that how they perceive the benefits and barriers of the target behavior (Christina, Jakob, Courtney, Scherr, Brown & Jeremy, 2015). The target preventive behaviors have to strongly provide positive benefits and prevent strongly the negative health outcomes. Moreover, they have to perceive there are not strong barriers to do so (Christopher, 2010).

Now, we acknowledge the importance of compliance with preventive behaviors in corona virus breakout, and health behavior model as a theoretical framework; but still one point has remain that led us to this question: Which of the HBM variables are most valuable in Iran? And what variables need to be strengthened to increase compliance with preventive behaviors? So, the main purpose was study the relationship between compliance with preventive behaviors of corona disease with health belief model, and predicting the high level and low level of compliance with these behaviors based on health belief model variables.

Method

The purpose of the current study was to investigate the relationship between variables of health belief model with compliance with preventive behaviors of corona disease; so, it conducted as a correlational-descriptive design.

Participants and Procedure

The design of the present study was contextual and correlational. The statistical population included all adults over 20 years of age in Tehran, without symptoms of coronavirus infection in corona disease epidemics. Considering that the adult population of Tehran is estimated to be more than 10 million people and based on Morgan and Krejcie formulas, the sample number was calculated as at least 385 people. Since individuals with high and low levels of compliance with preventive behaviors were be target, so near to 3 times the minimum sample size, 900 voluntary subjects were selected through online recall method. Due to the special conditions and the limitations of traffic and social communication, the questionnaire was designed online (designed Posrline), and published through social networks (Telegram and Whatsapp). Finally, 274 person as high level and 198 person as low level in compliance with preventive behaviors identified. The data were analyzed through descriptive statistics, and then results were analyzed by the regression analysis with SPSS-21.

Ethical statement

Initially, informed consent was obtained from patients. The participants were assured that their information would be kept confidential. The participants were briefly explained about the study process and its goals. It was explained that if participants are reluctant to continue, they can stop taking part in the study at any time. It was also mentioned that at the end of the study, the results would be revealed to participants.

Measures

To assess the demographic characteristics, a questionnaire was used that include age, sex, and education (a. under diploma, b. diploma, c. higher education).

The Compliance with Preventive Behaviors of Corona scale

The CPBC scale is a measure that developed to evaluate Compliance with Preventive Behaviors of Corona disease (Courtenay, Mccreary, Merighi, 2002). This scale consists 6 item, such as "I follow the instructions to leave the house, such as using gloves and a mask". Each items is measured by a 5 point Likert scale from 1 (always) to 5 (never). In the mail research, the Intra-class correlation coefficients (ICC) was 0.98; the reliability as cronbach's alpha was 0.81; and content validity index of this scale (CVI) was 0.7 (Courtenay, Mccreary, Merighi,

2002). The cronbach's alpha in the present study was 0.78.

Table 1. Demographic variables of two groups

		Sex				
		Male	female	df	t	sig
Low group		105 (53.03 %)	93 (46.96 %)	470		0.057
High group		133 (48.54%)	141 (51.45 %)			
Age						
Low group		46.17		470		0.041*
High group		51.09				
Education						
	under diploma	diploma	higher education	df	χ^2	sig
Low group	19	27	152	2	3.18	0.146
High group	30	75	169			

The health behavior model inventory

The CHBM (health behavior model) inventory is a 24 item measure that developed to evaluate different aspect of health behavior model (Tarrant, Cordell, 1997). It assesses four components of HBM. Each components related to 6 items (perceived susceptibility such as "I know corona disease is very contagious", perceived severity such as "Corona disease can kill thousands in a short time", perceived benefits such as "Frequent hand-washing greatly prevents corona disease", and perceived barriers such as "Corona prevention guidelines can cause job problems for me"). Each dimension is measured by a 5 point Likert scale from 1 (absolutely untrue) to 5 (absolutely true). In the mail research, the Intra-class correlation coefficients (ICC) was 0.91; the reliability as cronbach's alpha was 0.79; and content validity index of this scale (CVI) was 0.8 (Tarrant, Cordell, 1997). The cronbach's alpha in the present study was 0.77.

Results

The Means of CPBC in all participants was 3.18 ± 0.83. Thereupon, two groups were formed according of range of 3.18 ± 0.83, as high group (>4.01) and low group (<2.55). The characteristics of demographic variables in these groups are shown in Table 1.

According to table 1, there is not any significant difference between gender and education levels between two groups. Also, there are significant difference in age between groups; as the average age of high group is more than low group. In the next step, the means of CPBC and subscales of CHBM was examined, the results are shown in table 2.

Table 2. Mean and standard deviation of CPBC & CHBM variables

		Low group	High group
CPBC		1.92 (0.28)	4.18 (0.17)
CHBM	susceptibility	3.41 (0.88)	4.29 (0.21)
	severity	3.08 (0.76)	4.71 (0.24)
	benefits	2.65 (0.79)	4.34 (0.31)
	barriers	4.07 (1/02)	2.03 (0.46)

As shown in Table 1, there is a significant difference in CPBC between two groups (t= 9.68; sig= 0.004). Also, barriers and benefits are minimum value, and severity and barriers are maximum value respectively

in high and low groups.

In the next step, the normality of the distribution of scores checked out by using the Kolmogorov-Smirnov test for (table 3).

Table 3. Kolmogorov-Smirnov test for normality

		Kolmogorov-Smirnov statistic	sig
CPBC		2.79	0.063
CHBM	susceptibility	3.35	0.071
	severity	2.80	0.060
	benefits	3.91	0.082
	barriers	2.57	0.055

Then, the relationship between research variables was investigated and Pearson correlation method was used. Table 4 shows the correlation results.

negative correlation between age and benefits, and a positive correlation with low group of CPBC. Also, there is a positive correlation between severity and benefits, and a negative correlation with high group of CPBC.

Afterwards, for analyzing the relationship among these variables in each group regression analysis method was used. The results of regression analysis are showed in table 5 and 6

According to table 5, the results of model summery for low group in CPBC showed that full model is significantly reliable (F=53.84, p< 0.001); this model can explain 53 percent of low group variation. Also low value of CPBC could be predicted by age (27 percent), benefits (36 percent), and barriers (44 percent) can significantly.

Overall, the results of model summery for high group in CPBC showed that full model is significantly reliable (F=62.17, p< 0.001); this model can explain 62 percent of low group variation. Also low value of

Table 4. The pearson correlation coefficient between research variables

	Low group in CPBC		High group in CPBC	
	pearson	sig	pearson	sig
age	- 0.49	0.01*	0.11	0.241
susceptibility	- 0.19	0.11	0.23	0.068
severity	- 0.27	0.05	0.63	0.002*
benefits	- 0.56	0.00*	0.38	0.049*
barriers	0.71	0.00*	0.42-	0.030*

*P< 0.05

Table 5. The results of regression analysis of Low group in CPBC

		R^2	F	ß	t	sig
Low group in CPBC	age	0.53	53.84*	-0.27	-4.01	0.042*
	susceptibility			-0.14	-1.15	0.067
	severity			-0.19	-1.36	0.055
	benefits			-0.36	-6.73	0.011*
	barriers			0.44	8.17	0.004*

*P< 0.001

The results of correlation test showed there is a

CPBC could be predicted by severity (42 percent),

benefits (31 percent), and barriers (39 percent) can significantly.

Discussion and Conclusion

The aim of this research was investigating the relationship between variables of health belief model with compliance with preventive behaviors of corona disease. For this purpose, and based on mean and standard deviation of CPBC, two groups (high and low) in compliance with preventive behaviors of corona were formed. Both groups were evaluated by using regression analysis method that results previously presented. The findings showed that there are meaningful differences in age and variables of HBM. First, it was found that the demographic characteristics of the two groups were significantly different in age and but the gender and educational level of the two groups was not different. In the following, these results will be discussed.

Table 6. The results of regression analysis of high group in CPBC

		R^2	F	ß	t	sig
High group in CPBC	age			0.09	0.89	0.082
	susceptibility	0.61	62.17*	0.03	0.74	0.110
	severity			0.42	7.69	0.003*
	benefits			0.31	5.80	0.027*
	barriers			0.39-	7.02-	0.019*

*P< 0.001

The results indicated age difference between two groups, and was predicted that the younger people are more likely belong to the low group. This results is consistent with some researches that indicated negative health behavior outcomes with decreasing in age. Such as studies that focused on driving risks (Chein, Albert, O'Brien, Uckert, Steinberg, 2011; Gardner, Steinberg, 2005), smoking, alcohol & substance use (Caouette, Ewing, 2017; Lundborg, 2006), unsafe sexual practices (Finer, Henshaw, 2006), or even on healthy behavior like regular mammograms (Helen, Glenn, Richard, 2005), Pap smear test (Singh, Siahpush, 2002). Most research tried to explain this difference with risk perception concept (Knoll, Magis-Weinberg, Speekenbrink, Blakemore, 2015). The difference in risk perception between age groups influence on a wide range of health or dangerous behaviors, and more important on their judgments about the seriousness of the consequences of preventive behaviors, and their evaluating of relative costs and benefits of these activities (Beyth-Marom, Austin, Fischoff, Palmgren, Jacobs-Quadrel, 1993). In other words, the preventive behaviors of younger people influenced by ignorance, irrationality, delusions of invulnerability, or misperceptions of risk (Steinberg, 2007). These findings have led to suggest that age differences is so important in designing preventive strategies and future intervention.

In regard of research hypotheses, findings showed that there was difference in benefits and barriers of preventive behaviors of corona disease between the two groups (low and high compliance with preventive behaviors). In addition, severity, benefits and barriers can predict high value, and benefits and barriers can predict low value of CPBC. In other words, the more perception of risk severity and benefits of preventive behaviors of corona disease; and less perception of their barriers, has increased the commitment to compliance. Inverse, the more perceived barriers and less perceived benefits,

has decreased the commitment to compliance with preventive behaviors.

The explaining of difference between the effects of the health behavior model stages depends on different factors, the most important of which are the nature of disease and social factors (Chin, Mansori, Costa, 2019). Some research has found that focusing on identifying and introduction the disease and its risks has the most impact. In such cases, the majority of people was not familiar with the disease or its potential dangers. For example, in the early 1990s, public Opinion was unfamiliar with HIV disease and had little knowledge about this. As a result, people did not consider behaviors such as unprotected sex, and the use of a common syringe to inject drugs, and so to be highly risky. In this case, the most important preventive action was awareness of the disease and its dangers (Sharp, Hahn, 2011). The results of the current study show that there is not this condition for corona disease and the extent of knowledge about the disease, its contagion form and risks exist in both groups. This reflects the good and proper performance of health organizations and the media, and people's information seems to have come in just a short time. On the other hand, this result shows that it should no longer focus on it.

In other cases, people may know about the susceptibility of disease, but do not perceived the severity of its risk. The results of this study show that although there is no difference in perceived severity between the two groups, but as severity perception grows, preventive behaviors will be increase. In other words, it seems that the main differences are in the high degrees of severity perception and the low and medium severity levels have no effect on the pattern of preventive behaviors. This result is consisted with other sociological findings about this disease (Fazeli, 2020). However, the main question is reminded: why some people perceive the severity of the disease more than others? Perhaps the first answer is that these people's information is different. Although this possibility cannot be ruled out, as respect of widespread and pervasive information on the risk of Corona, the cause must be sought elsewhere. In this stage, two other variables of health behavior model must be taken into consideration: the benefits and the barriers of compliance.

The results showed that the value of both variables were different in two groups and able to discrimination significantly the high and low groups. In other words, if people find preventive behaviors useful and with few obstacles, they likely will these behaviors. But if its barriers are more than its benefits, they most likely will not. It seems that this situation even cause cognitive biases (such as myopia bias or confirmation bias) or acting some defense mechanisms (such as denial). Therefore, it is clear that based on the health model, the most important determinant of compliance with prevention behaviors is the barriers and benefits of these behaviors.

Concluding remarks

Overall, our study showed that there is a significant correlation between age and HBM variables with compliance with prevention behaviors; specially the barriers and benefits of these behaviors are so substantial. This is very important in the health planning of Iranian society. In fact, it is necessary to plan health actions to increase the benefits and reduce the barriers of prevention behaviors. Since many of their barriers due from people job and social relationships, it can be concluded that the priority of the health system should be to focus on social prevention laws. The application of social distance rules for businesses and in assembly centers, as well as penalties for offenders will reduce most of the barriers to preventive behaviors.

The present study has some limitations. First, this research was carried out in the Tehran population, so

it is suggested that this study be carried out in other areas to determine the health and executive priorities. In addition, due to the epidemic conditions, this study was conducted through social networks; many adults who did not have ability or access to these networks did not participate in the study. Thus, this sample may not represent target population. The third limitation is about dynamic nature of HBM variables. Therefore, it is necessary to keep this dynamic in mind and suggest to repeat this research at appropriate intervals in order to clarify the changes in these variables.

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