Perceived Threat and Stress Responses in The Face of Covid-19 based on Health Belief Model

Fahimeh Pourhaji
Department of Health Education and Health Promotion, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran.

Fatemeh Pourhaji
Department of Public Health, Member of Health Sciences Research Center, Faculty of Health, Torbat Heydariyeh University of Medical Sciences, Iran

Hadi Tehrani
Department of Health Education and Health Promotion, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
Social Determinants of Health Research Center Mashhad University of Medical Sciences

Mahdi Talebi
Department of Family Medicine, Social Determinants of Health Research Center Mashhad University of Medical Sciences

Nooshin Peyman
* Social Determinants of Health Research Center Mashhad University of Medical Sciences
Department of Health Education and Health Promotion, Faculty of Health, Mashhad University of Medical Sciences, Mashhad, Iran. (Corresponding author) : Peymann@mums.ac.ir

ABSTRACT

Background and Objective: Coronaviruses (COV) is a large group of viruses that can infect humans and cause diseases ranging from the common cold to acute respiratory syndrome. Social anxiety and stress responses are an important consequence of the coronavirus outbreak in world. This study aimed to examine key elements related to perceived threat and stress responses in the face of coronavirus based on the health belief model.

Materials and Methods: A cross-sectional online survey was conducted on 200 participants after prevalence of SARS-CoV-2 in Iran from April to August 2020. The study population were selected through convenience sampling from residents who lived in Razavi Khorasan province, Iran. The survey assessed the participant's demographic information, perceived threat of SARS-CoV-2 infection, stress responses using originally developed assessment scores.

Results: The mean age of the participants was 31.7 (SD 7.6) years. Many respondents were females (61.5%; n: 123) and age of from 27 to 36 occupied the majority of the population (40.5%; n: 81). The results showed the mean score of perceived threat was 37. 6±3. 9 (37.04-38.15; 95% CI) and the mean scores of stress response was 29.19±8.04 (28.6-30.31; 95% CI). There was a significant relationship between the perceived threat variable and stress responses (r = 0.45, p<0.05).

Conclusions: In the Iran population, perceived susceptibility and severity of SARS-CoV-2 infection was very high. This suggests some impact of the COVID-19 pandemic on communities' behavioral responses in Iran. The findings of this study would contribute to the timely behavioral assessment of the community benefits to improve the preventative interventions and risk communication strategies during an epidemic.

Paper Type: Research Article

Keywords: Coronaviruses, theory, health education, health promotion, Health Belief Model

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Introduction

Coronaviruses (COV) are a large group of viruses that can infect humans and cause diseases ranging from the common cold to acute respiratory syndrome(1). The coronavirus disease 2019 (COVID-19) has quickly spread worldwide, and the World Health Organization (WHO) has reported that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes COVID-19, it is considered as an international pandemic (2). The outbreak of the new virus has begun in December 2019 in Wuhan, China. According to the latest meta-analysis study on 50,466 patients with COVID-19, the death rate from the virus was 4.3 (3). Following the recommendations of the Emergency Committee on 30 January 2020, the WHO declared that the COVID-19 as the sixth public health emergency of international concern (2). The abrupt prevalence of COVID-19 in China and more than 30 countries around the world lead to shocking in the human community, especially for health policymakers.

The spread of coronavirus has various consequences in over the world. One of the most important consequences is the development of social anxiety. It leads to great concern among the citizens of a country (4) because origin, extent, and severity of the 2019-nCoV model are mostly unknown (5), and the ignorance of a phenomenon causes panic in people. This panic increases anxiety in healthy people, especially people with mental problems. Besides, fear and uncertainty are among the emotional responses that people may experience, stress and distorted perceptions of danger often shape negative social behaviors.

Individuals may experience a wide range of general mental health concerns, including anxiety responses (extreme fear of illness, anger, and insomnia), mental health disorders (physical weakness, depression, stress, and anxiety disorders), and high-risk health behaviors

(increased alcohol and tobacco consumption, and social isolation) (6). The stress response arises from perceiving risk in the present or expecting a threat in the future, which leads to confrontation or escape from the threat (7).

To decrease stress and anxiety among the people, besides advising and training people to abide by all the principles of health, inducing and keeping people calm is also very important to deal with this disease (8).

Citizens' behavior is essential in managing the disease's spread, especially when no treatment or vaccine is available other than non-pharmacological interventions. Risk perception toward the current health threat leads to voluntary preventive behaviors. The perceived threat is cognitions about a risk or loss that exists in an environment. Perceived threat comprises two underlying dimensions: severity and susceptibility (9). Besides, risk perception is a primary, subject in common health behavior theories (10). One such framework is the Health Belief Model (HBM)(11). In addition, the perceived threat and stress responses for COVID-19 can also be linked to social media narratives and multiple information technology sources (12). For example, the overuse of mass media and social network services in communicating the fear of COVID-19 might contribute to overreaction, unwarranted public fear, and an overly pessimistic perception of the current risk (13, 14).

In this regard, timely evaluation of behaviors and psychological responses of the community is necessary to provide preventive interventions and adopt effective strategies to deal with risk during an epidemic (15). Therefore, the present study, designed in the context of spreading SARS-CoV-2 infection, aimed to examine perceived threat and stress responses in the face of coronavirus disease based on the health belief model.

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Materials and Method
Study design and sampling

A cross-sectional online survey was performed after the confirmed spread of SARS-CoV-2 in Iran. The study population was 200 people who lived in the Province of Razavi Khorasan. Study population were selected through convenience sampling from April 2021 to August 2021. Residents in Razavi Khorasan province were invited to share the survey link and promotion messages on their web pages, social media networks, and other channels to transmit information among the general population. The sample size was obtained using the standard deviation of perceived threat in similar studies (16) and mean estimate formula, with 95% confidence interval, and 0.5 accuracy.

$$n = \frac{\left(Z_{1-a_{/2}}\right)^2 (\sigma^2)}{d^2}$$

Eligible participants were 18 years-old or above, understood Persian language and lived in Razavi Khorasan in the last month of the survey. To avoid duplicate responses from the same responder, the survey could only be taken once from the same electronic device.

Data collection

The research instrument included a self-reported questionnaire with 63 items. The questionnaire items of demographic information (9 items) and the most reliable source of information about coronavirus. In this study, perceived threat questionnaire was developed based on Health Belief Model Scale (CHBMS)(17). This structure consists of 2 dimensions. 1) 'Perceived sensitivity': Perceived sensitivity corresponds to knowledge and belief about coronavirus infection (e.g., "Corona virus transmission rate is very high, there is a possibility of getting coronavirus"). Perceived sensitivity was measured with three items. The respondents were asked to rate their beliefs on a 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). The scoring range from 3 to 15.2. 'Perceived severity' was assessed with six items about the personal belief regarding the individual suffering of the disease process and intensity of symptoms (e.g., "coronavirus is a serious and dangerous threat due to its high rate of transmission). The respondents were asked to rate their beliefs on a 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). The scoring range was rated from 6 to 30. The perceived threat to COVID-19 was measured using on two dimensions of perceived sensitivity and perceived severity and its score was ranged from 9 to 45.

The stress responses (individual or collective) arise from the perception of danger coronavirus in the present, or in anticipation or expectation of a future threat (e.g., "I feel heart beat when I think of the coronavirus...."). The respondents were asked to rate their beliefs on a 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). All the measures were online questionnaires, which required around 10-minute completion times. The content validity ratio (CVR) and the content validity index (CVI) were determined by a panel of experts (eight specialists in health education and health promotion). The final version of the questionnaire was average content validity (s-CVI/Ave) of 0.80 which indicated adequate content validity. The reliability of each sub-scale of the questionnaire was calculated separately using Cronbach's alpha. A test of internal consistency indicated that Cronbach's alpha for the overall scale and each sub-scale of the questionnaire was adequate ($\alpha \geq 0.82$).

Data analysis

Descriptive analyses were conducted to examine

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sample characteristics and frequencies in this survey. Data were analyzed using simple descriptive statistics and SPSS statistical version 20.0 (SPSS Inc., Chicago, IL). Mann-Whitney U, Kruskal-Wallis, and Spearman correlation coefficient were applied. We set 0.05 as a criterion for statistical significance.

Ethical considerations

This study has been approved by the Ethics Committee of Mashhad University of Medical Sciences (ID: 990270, 25/04/2020). All data collection and analyses used exclusively anonymous data, and participants provided their consent through the relative section of the online survey. Privacy and confidentiality were maintained throughout the study period.

Results

This survey was conducted from 24 April to 20 August 2020. Our survey period covers the timings when important clinical cases were confirmed, including the first local death. Although 250 participants responded to the survey, 50 questionnaires were excluded because of incomplete filling, and final sample size was 200 in this study. Mean age of the participants was 31.7 (standard deviation [SD] 7.69), many respondents were females (61.5%; n: 123) and age of from 27 to 36 occupied the majority of the population (40.5%; n: 81). In addition, 125 (62.5%) of participants were married and most participants had moderate economic situation (44%). The results showed that the majority of people assess their health status as good (64%; n: 128)(Table 1).

**Table 1. Demographic characteristics of participants**

Variable	Number (%)	Variable	Number (%)
Sex		**Marital status**	
Male	77 (38.5)	Married	125(62.5)
Female	123 (61.5)	Single	75(37.5)
Age (years)		**Economic situation**	
16-26	78 (39.0)	Weak	21(10.5)
27-36	81 (40.5)	Medium	88 (44.0)
37-46	32 (16.0)	Good	67 (33.5)
47-56	7 (3.5)	Very good	24(12.0)
57or above	2 (1.0)	**Occupational status**	
Educational level		Employee	67 (33.5)
Diploma	16 (8.0)	Housewife	15(7.5)
Graduate	104 (52.0)	Unemployed	6 (3.0)
Postgraduate	80(40.0)	Retired	12 (6.0)
Health worker		Student	80(40.0)
		20(10.0)	

The results showed that the mean scores of perceived threat were 37. 6±3. 9 (37.04-38.15; 95% CI) and the mean scores of stress response was 29.19±8.04 (28.6-30.31; 95% CI)(table 2).

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Table 2. The mean scores of perceived threat and stress response

Variables	Means±SD	Scoring range	CI
Perceived threat	37. 6±3. 9	5-10	37.04-38.15; 95% CI
Stress response	29.19±8.04	6-30	28.6-30.31; 95% CI
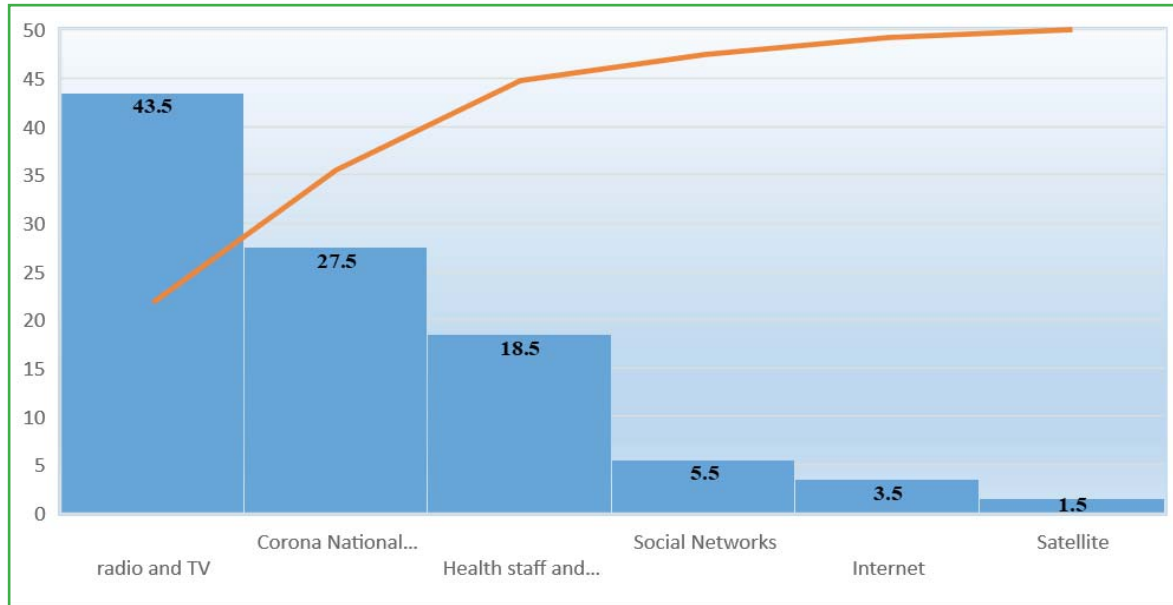
Fig 1. The most reliable source for obtaining information about COVID-19

The findings indicated radio and television were the most reliable source for obtaining information about the corona virus disease (Fig 1).

The results of Mann-Whitney test showed that there was a significant relationship between the mean perceived threat (z = -3.24, p = 0.001) and stress response scores (z = -2.16, p = 0.03) with gender; therefore, women had a higher score.

The results of the Spearman correlation test showed that there was no significant relationship between the mean score of perceived threat and age (r = -0.069, p = 0.33). Also, the Spearman correlation test showed there was a significant t and negative relationship between the mean score of stress response and age (r = -0.17, p = 0.01). The results of Kruskal-Wallis test showed that there was a significant relationship between the mean score of perceived threat and education, so that people with higher education had more perceived threat. The results of Kruskal-Wallis test showed that there is a significant relationship between the mean score of perceived threat and employment, so that health workers had the highest perceived threat. The results of Kruskal-Wallis test showed that there is a significant relationship between the mean score of stress response and employment, so that housewives showed the highest stress response. The results of Kruskal-Wallis test showed that there is a significant relationship between the mean score of perceived threat and stress response with economic status; thus, people with good economic status showed the highest perceived threat and stress response. Other results are shown in Table 3.

The cuesto action as a reminder system information and news related to the Coronavirus for preventive behaviors were listed as follow: radio and television 98 (49.0%), social networks 51 (25.5%), announcements of the National

Table 3. Relationship between the mean perceived threat and stress response scores with demographic variables

Variable	Number	Perceived threat	Stress response
		Mean Rank	Mean Rank
Educational level			
Diploma	16	103.19	123.94
Graduate	104	88.90	87.01
Postgraduate	80	115.04	113.35
Kruskal-Wallis test		X2=9.419, df =2 p=0.009	X2=12.28, df=2 p=0.002
Occupational status			
Employee	67	85.31	98.78
Housewife	15	124.17	148.60
Unemployed	6	59.25	32.17
Retired	12	86.96	76.79
Student	80	106.65	108.91
Health worker	20	129.55	71.25
Kruskal-Wallis test		X2=17.7, df=5 p=0.004	X2=27.7, df=5 p=0.001
Economic situation			
Weak	21	72.45	110.79
Medium	88	100.40	99.06
Good	91	194.84	193.38
Kruskal-Wallis test		X2=14.9, df=3 p=0.002	X2=1.52, df=3 p=0.003

Coronavirus headquarters 26 (13.0%), health workers, and doctors 8 (4.0%), internet 6 (3.0%), satellite 11 (5.5%).

Discussion

The present study firstly provides new evidence of perceived threats possibly related to stress response after the initial case of SARS-CoV-2 infection in the Mashhad city, Iran. We revealed a timely and important assessment of the perceived threats and stress response among residents of Mashhad. The purpose of this article was to determine the perceived threat and stress response in the face of coronavirus disease based on the health belief model. In the current study, there was a significant relationship between the mean score of stress response and gender; therefore, women had a higher score of stress response. Consistent with the results of this study, Essa Bukhari and et al. (18) suggested females were more concerned about the Coronavirus than men. Also, in study of Rabia and et al.(19) the means of stress score was significantly in female students higher than men . Also, the average perceived threat score was higher in women exposed to the Coronavirus than in

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men. The results of study by Yenan Wang and et al. (20) was similar and showed the anxiety ratio of females was higher than males. In the study of Jianbo Lai and et al(21). We also find the association between severe depression, anxiety, and distress with gender and job title, so that women and technical occupations had intermediate scores.

Consistent with the results of this study, Yenan Wang and et al(20) indicated that age, gender and educational level were associated with anxiety, so that people aged 40 years and younger had more anxiety than people over 40 years. The results this study showed people with a master's degree or upper have a higher risk of depression than people with a bachelor's degree. The results of this study showed participants with higher education had more perceived threat and stress response.

In our study the most reliable sources for obtaining information about coronavirus were radio and television while ina study by Kin On Kwok and et al(10) reported doctors and radiosas the most creditable sources of information. Health workers had higher perceived threat. The results showed housewives had more stress response score. In this study, there was significant relationship between income situation and perceived threat, so that high-income participants had higher perceived threat. While in study of Wanyun Shao and Feng Hao(22) high-income respondents have significantly lower risk perception. Perhaps one of the reasons is the difference in measurement tools or the cultural and social differences between Iran and in the United States. Second, it seems low-economic participants are more affected compared to high-income individuals because of their insufficient access to health services and other services. Thus, this factor is likely one reason that low-income people are more worried about the risk

than high-income people as we indicated in this study.

The sudden outbreak of the coronavirus in the world, unavailable vaccine, and pharmacological interventions, as well as high mortality rates provide the basis for stress response in individuals. The results of this study showed that society is faced with the stress response in an epidemic disease, and it is a serious risk for mental health.

Considering the stress responseof different people in the community in the face of Coronavirus, seems that It is a very effective, timely community assessment to know the interventions that lead to increased sensitivity and perceived severity. It is also reduced stress levels and increase mental health and confidence.

Limitations and Future Perspectives: The study has a number of limitations that should be considered. First, convenience sampling was used, which limited the generalizability of the findings. Second, due to the relatively new research subject, a validated survey with a reasonable scoring system was not available, but we relied on similar literature to improve reproducibility. Future studies could use the telephone or face-to-face interviews, and investigate specific aspects of the interventions promoted by health authorities, to gain more in-depth insights into people's responses. Further, factors associated with perceived susceptibility to the virus should be explored. For example, Qian et al, (23) suggested that perceived susceptibility and severity of disease, as well as information reliability, were important factors associated with the psychological and behavioral responses.

Conclusions

In a sample of the Iran population, perceived susceptibility and severity of SARS-CoV-2 infection was very high. This suggests some impact of the COVID-19 pandemic on communities' behavioral responses in Iran, but may not

necessarily consist with the characteristics of the pathogen and the disease. The findings of this study would contribute to the timely behavioral assessment of the community benefits to improve the preventative interventions and risk communication strategies during an epidemic.

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