Research Paper

Effect of Health Education on COVID-19 Preventive Behaviors in Oil Industry Workers: An Application of Health Belief Model

Sahar Mohammadnabizadeh[1*], Ali Asghar Najafpoor[1, 2], Vahid Ghavami[1, 3]

1. Social Determinants of Health Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran.
2. Department of Environmental Health Engineering, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran.
3. Department of Biostatistics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran.

Use your device to scan and read the article online

Citation Mohammadnabizadeh S, Najafpoor AA, Ghavami V. Effect of Health Education on COVID-19 Preventive Behaviors in Oil Industry Workers: An Application of Health Belief Model. Journal of Research & Health. 2023; 13(5):343-350. http://dx.doi.org/10.32598/JRH.13.5.2135.1

doi: http://dx.doi.org/10.32598/JRH.13.5.2135.1

ABSTRACT

Background: Recently, the pandemic of coronavirus disease 2019 (COVID-19) is a new emerging universal challenge in infectious epidemic disease management. Even today, with access to vaccines, the most effective intervention is behavioral intervention, and as new types emerge, it continues to be significant. The goal of the present study was to promote preventive behaviors during the coronavirus pandemic among oil factory workers using the health belief model (HBM).

Methods: A total of 138 onshore shift workers (69 control and 69 case group) were randomly chosen from the two sites of oil fields in southern Iran. Data collection tools were demographic characteristics questionnaire, COVID-19 knowledge questionnaire, HBM questionnaire, and prevention behaviors questionnaire. The Whatsapp application was used to educate the intervention group. Workers completed questionnaires at baseline, after the intervention, and three months after the educational program. Data analyses were done using SPSS software, version 24.

Results: Except for knowledge and cues to action, there were significant interactions between time and group for HBM constructs and behavior ($P \leq 0.05$). Furthermore, there were significant changes in all variables between follow-up and baseline in the intervention group ($P \leq 0.05$). The linear regression indicated that the perceived benefit ($\beta = 0.48$, $P = 0.001$) and self-efficacy ($\beta = 0.40$, $P = 0.001$) were the most effective factors in preventive behavior, respectively.

Conclusion: The results showed that efficient education based on the HBM and emphasizing enhancing knowledge and preventive behavior adoption can prevent individuals from developing COVID-19 and its complications. Considering that the perceived benefits and self-efficacy were the strongest predictor of behavior, attention to these constructs in educational interventions, especially among oil factory shift workers studied, who are at risk of COVID-19 and without enough knowledge, can provide better outcomes related to COVID-19 preventive behaviors.

Keywords: Coronavirus, Educational intervention, Health belief model

Article info:
Received: 03 Dec 2022
Accepted: 29 Apr 2023
Publish: 01 Sep 2023

*** Corresponding Author:**
Sahar Mohammadnabizadeh, PhD.
Address: *Social Determinants of Health Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran.*
Phone: *+98 (915) 1054260*
E-mail: *mohammadnabizadehs@mums.ac.ir*

1. Introduction

Recently, a new universal subject in infectious epidemic disease management is the pandemic of coronavirus disease 2019 (COVID-19) [1]. At present, COVID-19 has quickly deployed and changed the world with fast transmission and outbreak, large incubation time, and also the capability of infecting all people [2]. In order to delay and prevent COVID-19 transmission, societies have recommended using masks, staying at home as much as possible, washing hands repeatedly, remaining approximately 1–2 meters away from others, and not gathering [3]. Even today, with access to vaccines, the most effective intervention is behavioral intervention, and as new types emerge, it continues to be significant [4]. Behavioral models, such as Protection Motivation Theory (PMT) and Transtheoretical Model (TTM) are designed to recognize factors that affect behavior change to control disease transmission [5, 6]. Health belief model (HBM) is one of these models. The public acceptance of the HBM is due to its high predictive capacity [7]. This model relies on the assumption that people's preventive behaviors are modified by their beliefs about risk (perceived susceptibility), the severity of risk (perceived seriousness), belief in the efficacy of preventive behaviors (perceived benefits), and the conception of advised behaviors costs to perform (perceived barriers) tasks that lead to motivation of individual's prevention behavior (cues to action), and assurance of performing recommended behaviors (self-efficacy) [7]. Researchers have indicated the HBM as a beneficial model to explain preventive behaviors of infectious diseases, like COVID-19 [8].

A considerable part of the workers of the National Iranian Oil Company is dedicated to onshore shifts who often work 14 consecutive days for 12 hours, and then, 14 days off in far districts. Based on a previous study, a significant proportion of COVID-19 cases are related to occupational exposure [9]. According to the Centers for Disease Control and Prevention guidelines, employees who travel frequently, especially in contaminated areas, are among the top six occupations with high exposure to COVID-19 [10]. Oil company employees, who are constantly traveling due to their type of job, are among the high-risk groups for contracting and transmitting COVID-19. Unfortunately, even during the peak of the COVID-19 pandemic, this group of workers should travel by plane, bus, and train, or ride to the oil fields of their workplace (mostly in Khuzestan Province, Iran) every week or two weeks, and such consecutive trips (especially with public transportation) is an important factor for contracting and transmitting the disease to family and colleagues at work. Aloes, paying attention to items, such as using a shared service to move people to work (bus), using a shared bathroom at work, a shared dining room, and even shared bedrooms at work (rooms for four to six people), makes it more necessary to study this group. Considering the importance of preventive behaviors in decreasing COVID-19 transmission among these workers as the most at-risk groups, the present study aimed to promote preventive behaviors during the COVID-19 pandemic among oil factory workers using the HBM.

2. Methods

Two sites were randomly selected from the oil fields of southern Iran (January 2022 to June 2022). Then, 138 onshore shift (14 days in a row, daily 12 hours, and then 14 days off) workers (69 and 69 in the control case groups, respectively, based on sample size calculation for two independent groups (d=2, α=0.05, and β=0.2) and considering the study by Shahnazi et al. [11] were chosen via simple random sampling using the list of workers. The research purpose, methods, and importance were explained to the workers and written consent was collected after receiving ethical approval from the Mashhad University of Medical Sciences. The criterion for entering the study included affirming consent to take part in the study. Exclusion criteria were the participation reluctance in the research and incomplete questionnaires. Subjects were eligible to enter the study if they did not have a history or current physical symptoms of serious neurological, cardiovascular, renal, hepatic, endocrine, metabolic, or gastrointestinal diseases and pharmacological treatment, according to the medical reports available at the factory.

Data collection

Data collection tools in this study were the demographic characteristics questionnaire, COVID-19 knowledge questionnaire, HBM questionnaire, and prevention behaviors questionnaire. HBM questionnaire validity was affirmed by Shahnazi et al. [11]. To measure its reliability, the questionnaire was completed by 25 workers who were not part of the intervention and control groups, and Cronbach's α was between 0.73 and 0.86.

HBM questionnaire

Three items measured perceived susceptibility via the three questions (scores ranged from 3 to 15) like "I assume myself to be at risk of COVID-19". Perceived severity was measured by three items (scores ranged from

3 to 15), such as "COVID-19 has a high rate of fatality". Perceived benefits contained two questions about the benefits of protective behaviors (scores ranged from 2 to 10), such as "this disease can be controlled by using personal protective tools like a mask". Perceived barriers of difficulties of carrying out protective behaviors against COVID-19 were measured through eight items (scores ranged from 8 to 40), such as "washing hands frequently with water and soap is difficult". The scoring for perceived barriers was reversed and a lower score showed the betters status. Self-efficacy was measured by one question of the individual's assurance of doing protective behaviors (scores ranged from 1 to 5), such as "I can carry out the preventive commands against COVID-19". Finally, cues to action were measured by two items (scores ranged from 2 to 10), such as "TV and radio information about COVID-19 has been useful".

Scoring the questions was from one (strongly disagree) to five (strongly agree) on a 5-point Likert scale.

Prevention behaviors questionnaire

Protective behaviors against COVID-19, which were assessed by eight 5-point scale questions (from always=5 to never=1) included when sneezing and coughing, bending the elbow in front of the nose and mouth, or using a tissue paper, keeping a distance of at least one meter from others, do not kiss and shake hands with others, do not leave the home unless needed, wash hands orderly with water and soap for at least 20 seconds, do not touch the mouth, eyes, and nose through hands, do not take out the mobile from the pocket, when back home, do not touch anything before washing hands (scores ranged from 8 to 40).

COVID-19 knowledge questionnaire

Knowledge evaluation was in the form of 54 items, which included four dimensions (COVID-19 nature, ways of transmission, prevention and care, and treatment) [12]. COVID-19 knowledge questionnaire validity was affirmed by Ranjbar Roghani et al. [12]. The wrong and I don't know answers were scored zero, and the true answer was scored one (outcome scores range from zero to 54). Workers completed questionnaires at baseline, and after the intervention, and three months after the educational program. To measure reliability, the questionnaire was completed by 25 workers who were not part of the intervention and control groups, and Cronbach's α was 0.75.

Intervention

A group was formed in WhatsApp for the information exchange and forward the educational messages via text, figure, video, and voice messages for the intervention group. The training was done in four sessions of 60 minutes (one session per week). The messages contained information about the nature of COVID-19, disease transmission, diagnosis and treatment, identification of prevention strategies focused on using masks, appropriate physical distancing, hand washing practices, leaving home only when necessary, no handshaking and kissing, and avoiding public meetings. Furthermore, the intervention workers were given designed educational content through booklets and pamphlets and were asked to read them by the course end. Each worker in the Whatsapp group determined the prevention behaviors barriers, and the resolving methods and self-efficacy increase were explained through discussion and workers' contributions. To increase self-efficacy, researchers explained how to break down healthy behaviors into small activities to engage more easily. In order to increase the perceived threat, some reports on the COVID-19 statistics in Iran and worldwide were described. The unhealthy behaviors of those at high risk for COVID-19 were also described.

Data analysis

Data analyses were done using SPSS software, version 24. Values are given as Mean±SD. Changes in outcome variables from baseline to post-intervention and follow-up were measured by a two-way repeated measure ANOVA to show differences between groups. Mauchly's test showed that the Greenhouse-Geisser assumptions for the variables were met. Linear regression was applied to find the effects of knowledge and the HBM constructs. The level of significance was set at $\alpha=0.05$.

3. Results

Table 1 shows the demographic characteristics. No significant differences were found between the intervention and control groups.

The t-test results showed no significant differences in outcome variables between the control and intervention groups at baseline (Table 2). Except for knowledge and cues to action, there were significant interactions between time and group for HBM constructs and behavior. This showed that the group differed over time. Furthermore, there were significant changes in all variables from the baseline and follow-up in the intervention group.

Table 1. Participant's baseline characteristics

Demographic Characteristics		Mean±SD/No. (%)		p
		Intervention	Control	
Age (y)		39.81±6.86	38.67±4.59	0.20
Education	Diploma	11(15.9)	14(20.3)	0.66
	Associate degree	35(50.7)	34(49.3)	
	Bachelor's degree	19(27.5)	16(23.2)	
	Master's degree	4(5.8)	5(7.2)	
Marital status	Married	48(69.6)	43(62.3)	0.39
	Single	21(30.4)	26(37.7)	
Working experience (y)		10.98±3.09	10.01±3.66	0.08

SD: Standard deviation.

Table 2. Changes in outcomes variables during baseline through follow-up

Variables	Time	Pre-test	Post-test	Follow-up	Group×Time (P)
Perceived severity	Intervention	7.09±1.53	7.35±1.49	7.97±2.22	0.03
	Control	7.13±1.74	6.98±1.62	7.03±1.43	
	P	0.87	0.17	0.004	
Perceived susceptibility	Intervention	8.48±1.89	9.51±1.88	10.13±1.89	0.001
	Control	8.36±1.79	8.27±1.68	8.45±1.68	
	P	0.71	0.001	0.001	
Perceived benefit	Intervention	6.72±1.61	7.46±1.67	8.00±1.52	0.003
	Control	6.49±1.66	6.42±1.68	6.43±1.79	
	P	0.41	0.001	0.001	
Perceived barrier	Intervention	28.75±2.82	28.59±4.78	25.81±6.55	0.01
	Control	28.09±3.37	28.22±3.00	27.83±3.08	
	P	0.21	0.58	0.22	
Self-efficacy	Intervention	1.35±0.98	1.72±0.92	1.81±1.10	0.04
	Control	1.36±0.97	1.40±0.49	1.50±0.53	
	P	0.85	0.01	0.01	
Knowledge	Intervention	24.19±6.84	27.32±6.92	30.41±7.60	0.28
	Control	23.70±11.13	24.13±8.96	27.12±9.80	
	P	0.75	0.02	0.03	
Cues to action	Intervention	5.75±0.98	5.91±1.22	6.20±1.44	0.40
	Control	5.70±0.96	5.72±0.98	5.81±0.96	
	P	0.72	0.32	0.06	
Behavior	Intervention	18.46±4.35	19.49±4.39	23.41±4.84	0.001
	Control	18.39±4.48	18.06±3.84	19.42±5.94	
	P	0.68	0.04	0.001	

Table 3. Regression analyses for variables

Independent Variables	ß Standard	P	R^2	Dependent Variable
Perceived severity	0.04	0.25		
Perceived susceptibility	0.06	0.08		
Perceived benefit	0.48	0.001		
Perceived barrier	-0.27	0.001	0.89	Behavior
Self-efficacy	0.40	0.001		
Knowledge	0.06	0.04		
Cues to action	0.02	0.53		

JRH

The linear regression indicated that self-efficacy, perceived benefit, perceived barrier, and knowledge, were associated with preventive behaviors, and perceived benefit and self-efficacy were the most factors affecting preventive behavior, respectively (P≤0.001) (Table 3).

4. Discussion

The novelty of COVID-19 along with its indeterminacies has motivated healthcare professionals to make convenient strategies to manage and provide for the public. Theoretical health belief models are necessary tools for realizing the decision-making factors by determining what prevents or motivates individuals to adopt healthy behaviors [13]. This study used the HBM to examine the effects of educational intervention on promoting preventive behaviors of COVID-19 among oil industry workers.

Our results showed that the perceived susceptibility and severity of workers were not high about COVID-19, before the intervention. This finding showed that although participants were worried about getting COVID-19, approximately a few cases considered themselves at high risk to get COVID-19. Therefore, increasing risk perception is necessary, because high-risk perception leads to adopting preventive actions and enhancing epidemic control [14]. We detected increased perceived susceptibility and severity in the case group in the follow-up. In the study by Saffari et al. based on the HBM to modify risk factors of COVID-19, perceived threat improved between the baseline and follow-up [15]. The construct of perceived threat is an important factor to take preventive actions; therefore, people should suppose the intensity of COVID-19 to be dangerous and assume themselves susceptible to it [16].

The mean score of the perceived benefits subscale significantly increased after the program and in the follow-up in the intervention group (7.46 and 8.00 out of ten), which means that having high perceptions of the usefulness of preventive behaviors against disease causes an increase in perceived benefits. Perceived benefits must overcome perceived barriers to behavioral change [17]. Dror et al. indicated that recommended behaviors imply a personal risk-benefit understanding [18]. Chatripour et al. showed that education based on HBM increased the perceived benefits of COVID-19 prevention [19].

Based on our results, perceived barriers significantly decreased after the intervention and in the follow-up in the intervention group. Perceived barriers are a fundamental factor that determines the adoption of behaviors [20]. The perceived barrier is an efficient construct of the HBM as people must overcome behavior obstacles despite their tendency to carry out preventive behaviors [17]. Therefore, eliminating and recognizing the barriers, which prevent COVID-19 preparation in the community is essential.

In this investigation, workers' self-efficacy increased after the intervention in the intervention group. In many previous studies, self-efficacy has been identified as the most important factor for the intention to adopt healthy behaviors [6]. In a study by Mahmoodabad et al., self-efficacy was the cause of enhancing prevention behaviors [21]. The existence of high self-efficacy is one of the main factors to overcome the obstacles of health behaviors [22].

In this study, cues to action construct significantly increased in the intervention group at follow-up. Based on the HBM, the instructions and guidance that individuals obtain from their surroundings are beneficial in promot-

ing healthy behaviors [23]. Previous investigations have shown that developing acceptance of disease prevention and emphasizing a sense of social responsibility through mass media can increase disease-preventive behaviors [8].

The mean scores of the participants' knowledge levels were from 23.70 to 24.19 out of 54, before the intervention, but they significantly increased after the intervention and in the follow-up in the intervention group. Zareipour et al. determined that individuals with high awareness of COVID-19 had higher scores in preventive behaviors [24]. Efficient steps can be taken in COVID-19 prevention through enhancing awareness of the disease, transmission routes, prevention methods, and effective factors on it [25]. Although researchers have indicated that preventive behavior can be increased by improving awareness, to obtain long-term self-care, motivation, and attitude of individuals are more necessary than awareness lonely [25].

The results of this study indicated that the mean scores of preventive behaviors of COVID-19 remained higher in the follow-up than the baseline. Recognizing the potential risk of the COVID-19 pandemic infection, from the very beginning when it was discovered, Iran took measures through the creation of social prevention campaigns to educate people to prepare against this disease These included actions for repeated washing hands or use other methods of hand hygiene, mandatory mask use, social distancing, prohibition and restriction of travel, prohibition, and restriction of holding various ceremonies, limiting the working hours, and closing schools during the COVID-19 outbreak peaks. These public precautions to prevent the COVID-19 outbreak approximately enhanced the general knowledge of the severity of COVID-19 and its threat perception. However, educational interventions can be very useful to increase adherence to recommended lifestyle modifications and greatly delay the spread of COVID-19.

Using linear regression analysis, perceived benefits were found as the strongest predictor of preventive behaviors. This result was in line with previous studies, such as the study by Sulat et al. who reported that people usually adopt recommended behaviors that are useful for them [26]. Educational interventions can be more useful for improving the adoption of health behaviors if they focus solely on the benefits of the proposed behaviors rather than the threats associated with the disease [26]. The second strongest predictor of health behaviors was self-efficacy. This supports the findings of several previous investigations indicating self-efficacy is essential to realize and change behaviors [27].

5. Conclusion

The HBM-based intervention increased the mean scores of knowledge, HBM constructs, and preventive behaviors in the intervention group. This result showed that the efficient education based on the HBM and increasing the knowledge and preventive behaviors adoption can prevent the individuals from the development of COVID-19 and its complications. Considering that the perceived benefits and self-efficacy were the strongest predictors of behavior, attention to these constructs in educational interventions, especially among oil factory shift workers studied, who are at risk of COVID-19 and with not enough related knowledge, can present better outcomes related to COVID-19 preventive behaviors.

This study is the first of its kind, which evaluated the effects of an educational intervention on promoting COVID-19 preventive behaviors among oil factory workers based on the HBM. Conducting a theory-based intervention for oil refinery workers who are at risk of contracting COVID-19 and lack relevant knowledge was one of the benefits of this research. In addition, knowledge was assessed in this study along with the main HBM constructs. However, there are some recommendations. In this study, participants were followed up for three months after the intervention; however, long-term follow-up may indicate different results. The present investigation had some limitations. Because of the pandemic condition, we were not able to use face-to-face educational intervention, which could be more efficient. All presented data were self-reported and may be subject to bias.

Ethical Considerations

Compliance with ethical guidelines

Ethical approval was received from the Mashhad University of Medical Sciences (Code: IR.MUMS.FHMPM.REC.1400.083).

Funding

This study was financially supported by the Social Determinants of Health Research Center, Mashhad University of Medical Sciences.

Authors' contributions

Conceptualization and supervision: Sahar Mohammadnabizadeh; Methodology, funding acquisition and resources and data collection: Sahar Mohammadnabizadeh; Investigation, writing the original draft, review & editing: Sahar Mohammadnabizadeh and Ali Asghar Najafpoor; Data analysis: Sahar Mohammadnabizadeh and Vahid Ghavami.

Conflict of interest

The author declared no conflict conflicts of interest.

Acknowledgments

The authors gratefully acknowledge the financial support of the Social Determinants of Health Research Center, Mashhad University of Medical Sciences, and the Research Chancellor of Mashhad University of Medical Sciences.

References

[1] Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. JAMA. 2020; 323(11):1061-9. [DOI:10.1001/jama.2020.1585] [PMID] [PMCID]

[2] Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet (London, England). 2020; 395(10223):497-506. [DOI:10.1016/S0140-6736(20)30183-5] [PMID]

[3] Carico RR Jr, Sheppard J, Thomas CB. Community pharmacists and communication in the time of COVID-19: Applying the health belief model. Research in Social & Administrative Pharmacy. 2021; 17(1):1984-7. [DOI:10.1016/j.sapharm.2020.03.017] [PMID] [PMCID]

[4] Fischhoff B, Wong-Parodi G, Garfin DR, Holman EA, Silver RC. Public understanding of ebola risks: Mastering an unfamiliar threat. Risk Analysis. 2018; 38(1):71-83. [DOI:10.1111/risa.12794] [PMID]

[5] Wong LP, Alias H, Wong PF, Lee HY, AbuBakar S. The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. Human Vaccines & Immunotherapeutics. 2020; 16(9):2204-14. [DOI:10.1080/21645515.2020.1790279] [PMID] [PMCID]

[6] MohammadNabizadeh S, Taymoori P, Hazhir MS, Roshani D. Educational intervention based on protection motivation theory to improve vitamin E and C consumption among Iranian Factory Workers. Journal of Clinical and Diagnostic Research. 2018; 12(10):JC01-6. [DOI:10.7860/JCDR/2018/37056.12079]

[7] Dodel M, Mesch G. Cyber-victimization preventive behavior: A health belief model approach. Computers in Human Behavior. 2017; 68:359-67. [DOI:10.1016/j.chb.2016.11.044]

[8] Mo PKH, Wong CHW, Lam EHK. Can the Health Belief Model and moral responsibility explain influenza vaccination uptake among nurses? Journal of Advanced Nursing. 2019; 75(6):1188-206. [DOI:10.1111/jan.13894] [PMID]

[9] Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. New England Journal of Medicine. 2020; 382(13):1199-207. [PMID]

[10] World Health Organization. Getting your workplace ready for COVID-19: How COVID-19 spreads, 19 March 2020. Geneva: World Health Organization; 2020. [Link]

[11] Shahnazi H, Ahmadi-Livani M, Pahlavanzadeh B, Rajabi A, Hamrah MS, Charkazi A. Assessing preventive health behaviors from COVID-19: A cross sectional study with health belief model in Golestan Province, Northern of Iran. Infectious Diseases of Poverty. 2020; 9(1):157. [DOI:10.1186/s40249-020-00776-2] [PMID] [PMCID]

[12] Ranjbar Roghani A, Nemati R, Fathi Y, Sheikhnavaz Jahed S, Ajri Khamsloo F, Ajri Khamslou M. [Knowledge and attitude for medical students towards COVID-19 (Persian)]. Iran Journal of Nursing. 2020; 33(126):44-57. [DOI:10.52547/ijn.33.126.44]

[13] Kan T, Zhang J. Factors influencing seasonal influenza vaccination behaviour among elderly people: A systematic review. Public Health. 2018; 156:67-78. [DOI:10.1016/j.puhe.2017.12.007] [PMID] [PMCID]

[14] Schmid P, Rauber D, Betsch C, Lidolt G, Denker ML. Barriers of influenza vaccination intention and behavior - A systematic review of influenza vaccine hesitancy, 2005 - 2016. Plos One. 2017; 12(1):e0170550. [DOI:10.1371/journal.pone.0170550] [PMID] [PMCID]

[15] Saffari M, Sanaeinasab H, Jafarzadeh H, Sepandi M, O'Garo KN, Koenig HG, et al. Educational intervention based on the health belief model to modify risk factors of cardiovascular disease in police officers in Iran: A quasi-experimental study. Journal of Preventive Medicine and Public Health = Yebang Uihakhoe chi. 2020; 53(4):275-84. [DOI:10.3961/jpmph.20.095] [PMID] [PMCID]

[16] Li JB, Yang A, Dou K, Wang LX, Zhang MC, Lin XQ. Chinese public's knowledge, perceived severity, and perceived controllability of COVID-19 and their associations with emotional and behavioural reactions, social participation, and precautionary behaviour: A national survey. BMC Public Health. 2020; 20(1):1589. [DOI:10.1186/s12889-020-09695-1] [PMID] [PMCID]

[17] Husnayain A, Fuad A, Su EC. Applications of Google Search Trends for risk communication in infectious disease management: A case study of the COVID-19 outbreak in Taiwan. International Journal of Infectious Diseases: IJID : Official Publication of the International Society for Infectious Diseases. 2020; 95:221-3. [DOI:10.1016/j.ijid.2020.03.021] [PMID] [PMCID]

[18] Dror AA, Eisenbach N, Taiber S, Morozov NG, Mizrachi M, Zigron A, et al. Vaccine hesitancy: The next challenge in the fight against COVID-19. European Journal of Epidemiology. 2020; 35(8):775-9. [DOI:10.1007/s10654-020-00671-y] [PMID] [PMCID]

[19] Chatripour R, Shojaeizadeh D, Tol A, Sayehmiri K, Asfeia A, Kia F. [The impact of teacher education on promoting knowledge, attitude and performance of students in prevention of cardiovascular diseases: Application of the HBM model [Persian]. Razi Journal of Medical Sciences. 2016; 23:26-35. [Link]

[20] Fung V, Graetz I, Reed M, Jaffe MG. Patient-reported adherence to statin therapy, barriers to adherence, and perceptions of cardiovascular risk. PLoS One. 2018; 13(2):e0191817. [DOI:10.1371/journal.pone.0191817] [PMID] [PMCID]

[21] Mahmoodabad SS, Zareipour M, Askarishahi M, Beigomi A. Prevention determinants of falling in the elderly citizens: A Precaution Adoption Process Model (PAPM) carried-out in Urmia, Iran. Ambient Science. 2018l; 5(Sp1):41-5. [Link]

[22] Mohammad Nabizadeh S, Taymoori P, Shahmoradi B. Mediators of behavior change in intervention on vitamins e and c consumption based on protection motivation theory. Journal of Biochemival Technology. 2018; 2:83-9. [Link]

[23] Glanz K, Rimer BK, Viswanath K. Health behavior: Theory, research, and practice. New Jersey: Wiley; 2015. [Link]

[24] Zareipour MA, Ardakani MF, Moradali MR, Jadgal MS, Movahed E. Determinants of COVID-19 prevention behavior in the elderly in Urmia: Application of health belief model. Open Access Macedonian Journal of Medical Sciences. 2020; 8(T1):646-50. [DOI:10.3889/oamjms.2020.5653]

[25] Sesagiri Raamkumar A, Tan SG, Wee HL. Use of health belief model-based deep learning classifiers for COVID-19 social media content to examine public perceptions of physical distancing: Model development and case study. JMIR Public Health and Surveillance. 2020; 6(3):e20493. [DOI:10.2196/20493] [PMID] [PMCID]

[26] Sulat JS, Prabandari YS, Rossi S, Elsi Dwi H, Santoso B. The validity of health belief model variables in predicting behavioral change: A scoping review. Health Education. 2018; 118(6):499-512. [DOI:10.1108/HE-05-2018-0027]

[27] Mohammadi N, Soltani N, Amini R, Tapak L. [The effect of education based on health belief model on preventive behaviors towards cardiovascular disease (Persian)]. Avicenna Journal of Nursing and Midwifery Care. 2018; 26(4):227-36. [DOI:10.30699/sjhnmf.26.4.237]