Research Paper

The Impact of Educational Intervention Based on the Health Belief Model on Adopting COVID-19 Preventive Behaviors Among Clients of Urban Health Centers

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ABSTRACT

Background: The COVID-19 outbreak, the ongoing pandemic of Coronavirus disease 2019, has become a clinical threat worldwide. Therefore, this study aims to investigate the impact of educational intervention, based on the health belief model (HBM), on adopting COVID-19 preventive behaviors in clients referring to urban health centers in Zabol City, Iran.

Methods: This quasi-experimental study was conducted on clients referring to urban health centers in Zabol City (Southeast of Iran) in 2021. A total of 160 participants (80 each in the intervention group and the control group) were selected using the convenience sampling approach. A researcher-made questionnaire was used to collect data. The questionnaire was completed by all participants before and one month after the educational intervention. The educational intervention was conducted using an educational program based on the HBM for 4 weeks. The intervention was performed during 8 sessions of face-to-face interactions in the classroom (two 1 hour sessions per week). The statistical analysis of the data was performed using SPSS software, version 22. Data were analyzed using analysis of variance (ANOVA), t-test, and paired t-test. The P was considered 0.05 in this study.

Results: The mean age of participants in the intervention and control groups was 35.0±12.34 and 33.87±11.33 years. The mean score of awareness, perceived sensitivity, perceived severity, perceived benefits, perceived self-efficacy, and COVID-19 prevention behaviors significantly increased one month after the intervention (P<0.05).

Conclusion: The results indicated the effectiveness of educational intervention based on HBM on COVID-19 preventive behaviors. Therefore, it is recommended that health centers employ educational intervention programs based on this model

Keywords: Education, Preventive behaviors, Health belief model (HBM), COVID-19

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Introduction

On December 8th, 2019, the Chinese center for disease control and prevention (CDC) reported a novel Coronavirus (then known as 2019-nCoV) to the World Health Organization (WHO). A seafood market in Wuhan City, China, has been widely acknowledged as the onset of the outbreak of the novel type [1]. The virus rapidly spread from one country to neighboring countries and worldwide and became a pandemic [2]. Following the increase in the number of infections and global spread of the virus, the WHO issued a statement declaring the novel Coronavirus (2019-nCoV) outbreak a public health emergency of international concern (PHEIC) on January 30, 2020. That was the sixth time that the WHO declared a PHEIC [3].

One of the crucial aspects of the COVID-19 disease is its very rapid spread through tiny droplets released in the air and surfaces and objects contaminated with these tiny droplets, which shows the need for more personal and social hygiene [4]. The speed of the spread of the virus has caused countries to face a large volume of infected people [5].

On February 19, 2020, Iran reported its first confirmed cases of infection. According to the public relations of the Iran Ministry of Health and Medical Education, 2070000 COVID-19 infections were identified in the country by April 12, 2021, of which 64 490 cases passed away, and 1 710 974 cases recovered [6]. According to official statistics provided by the Zahedan University of Medical Sciences, 64 patients with a confirmed infection caused by COVID-19 were hospitalized in Sistan and Baluchestan Province, Iran on April 3, 2021, out of which 3 patients were admitted to hospitals affiliated with the Zabol University of Medical Sciences [7].

Although most deaths and infections of COVID-19 are in people over 50 years of age and people with underlying diseases, the risk of infection exists in the whole population, and the importance of prevention increases due to the cases of asymptomatic carriers because these people can transmit the disease to high-risk people and thus cause an increase in mortality [8]. Planning and preparing to face the crisis of COVID-19 is one of the national and international necessities, and taking preventive actions at the community level to control the epidemic of COVID-19 should be highly considered by policymakers and health officials [9].

The WHO considers washing hands regularly, maintaining respiratory hygiene, keeping a proper distance, and avoiding shaking hands and hugging as crucial behaviors to prevent this disease [10]. Studies have shown that knowledge, attitude, and perceived threat are critical predictors of health behaviors [11, 12]. The study conducted by Bashirian et al. showed a direct and significant correlation between preventive behaviors against COVID-19 and perceived severity and sensitivity [13].

It is necessary to use scientific patterns to identify the factors affecting preventive behaviors. The pattern of health belief is one of the most commonly used theories to evaluate health behaviors based on individuals' attitudes. Based on this pattern, health behaviors are affected by individual beliefs, including perceived sensitivity, the effect of illness on one's life, as well as the impact of health measures on the severity of the disease, perceived benefits, and perceived barriers [14]. This model is rooted in the theory that one's willingness to change their health behaviors primarily depends on their health perceptions. Health belief model (HBM) focuses on changing the beliefs causing behavior [15].

According to this model, to employ preventive behaviors, a person must undergo several stages. First, they should feel threatened by the subjective perception of the risk of getting infected with COVID-19 (perceived susceptibility). Next, they must comprehend the severity of the disease complications, e.g. medical and social consequences (perceived severity). Then, through positive external stimulus (cues to action), they must believe that the COVID-19 prevention program is feasible and effective (perceived benefits). Then they weigh the benefits against barriers to action (perceived barriers) and regard them as less costly. Eventually, one takes measures of precaution against COVID-19. Moreover, one's positive judgment about their ability to develop COVID-19 preventive behaviors (perceived self-efficacy) is also a reviving force that leads to a person's demand to adopt disease-preventive behaviors [16]. Therefore, this study was conducted to investigate the impact of educational intervention based on the HBM on adopting COVID-19 preventive behaviors in clients of Zabol urban health centers.

Methods

This quasi-experimental study was conducted on 160 clients referring to urban health centers in Zabol City (Southeast of Iran) in 2021. Intervention studies are standard studies to measure the efficiency of an intervention in people's health status. Nevertheless, in some cases, the golden point of these studies, that is, the random divi-

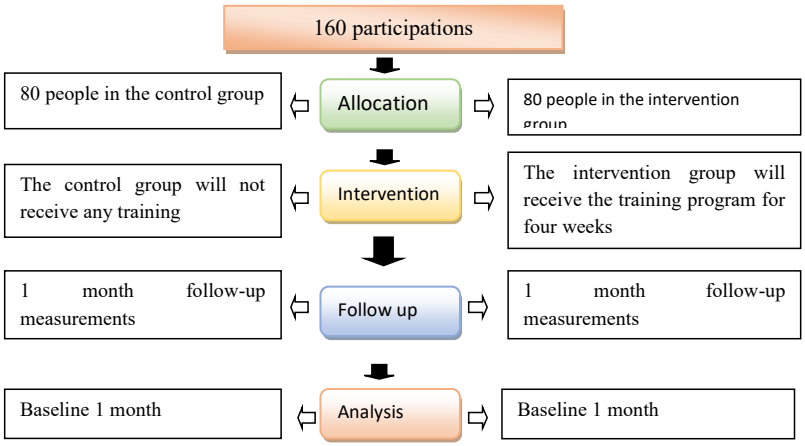

Figure 1. Workflow chart

sion of people under investigation, into two intervention and control groups, becomes impossible. For example, to evaluate the effectiveness of a public health program, such as the educational campaign to quit smoking hookah in a city, it is impossible to randomly divide people into intervention and control groups. In such a case, the design of interventional studies can be used, and due to the limitation, the design of these studies is done in a quasi-experimental way. One of the modes of quasi-experimental studies is before and after design. In this case, only one group receives the intervention. Therefore, the researchers measured the characteristics of the participating individuals twice before the intervention and after the intervention. It is the difference between these two measurements that determine the effectiveness of the intervention [17].

The inclusion criteria included being able to read and write, being under the coverage of health centers, and having a complete file and specifications in the integrated health systems. The exclusion criteria included not completing a written consent form and not attending regular educational courses in the intervention group.

A total of 160 participants (80 each in the intervention group and control group) were considered through the convenience sampling method. Using the Pocock formula with a 95% Cl and a power of 80%, a sample size of 144 people was calculated for both groups, considering 20% of the effect and attrition index, 80 people in the intervention group and 80 people in the control group based on the inclusion criteria were selected for this study. Figure 1 shows the flow chart of the study. The final data analysis was performed with 80 samples.

This study was performed in three stages, pre-intervention stage, intervention stage, and post-intervention stage. In the pre-intervention stage, demographic information, as well as the level of awareness, perceived sensitivity, perceived benefits, perceived severity, and barriers, and participants' self-efficacy in adopting COVID-19 preventive behaviors using a self-designed questionnaire based on the HBM, were collected. Then, based on the analysis of information obtained, participants entered the intervention stage, which lasted for 4 weeks. The intervention group received the training intervention while the control group did not receive any educational program. After the intervention in the post-intervention stage, one month after the intervention, a post-test was performed using the previous questionnaire for both control and intervention groups. The obtained data were analyzed at two-time points before the intervention and one month after the intervention. Again, the participants were invited, the questionnaire was given to them and after completing the questionnaires, the obtained data were collected and analyzed.

The educational intervention was conducted for the intervention group (n=80) by holding eight sessions (two 1-hour sessions per week) in the classroom of health centers (Table 1).

In this research, a researcher-made questionnaire was used to collect data at two-time points. This questionnaire consisted of two parts. The first part included demographic information and had 7 items and the second part had 35 questions, including awareness (10 questions), perceived sensitivity (4 questions), perceived severity (4 questions), perceived benefits (4 questions), perceived barriers (4 questions), self-efficacy (4 questions), and behavior (5 questions). For questions in the field of awareness, a 3-part Likert scale is no idea (score

Table 1. The educational program for the intervention group

Sessions*	Objectives	Educational Content and Teaching Method
1st week	Increasing participants' knowledge of Coronavirus disease and its prevention ways.	Prevalence of the disease in the community, its complications, and its mortality rate. Providing the stages of this disease transmission, and its effect on the body. Providing prevention strategies and their effectiveness. Teaching method: Lectures, group discussions, questions and answers, and playing video.
2nd week	Increasing the perceived susceptibility and severity of Coronavirus disease and creating the ability sense in the individual to cope with the disease.	Providing information about disease severity, complications of this disease, disability degree and its mortality, infection risk at various places, and ages. Creasting positive thinking in individuals about being able to maintain yourselves against COVID-19. Teaching method: Lectures, expressing experiences, group discussions, questions and answers, and playing video.
3rd week	Improving the perception of participants and their ability to adopt COVID-19 preventive behaviors.	Providing information on improving self-efficacy for adopting behaviors that help prevent disease spread. Teaching method: Lectures, role-playing by participants, and playing video Role-playing was conducted by participants to practice and learn how to manage stress while experiencing challenging situations when adopting healthy behaviors.
4th week	Increasing participants' perceived behavioral control in preventing Coronavirus disease and teaching prevention behaviors.	Success experiences of similar people were conducted to improve participants' belief in the ability to master similar activities for success. Teaching method: Lectures, playing videos, and practical demonstrations.

*2 sessions in 1 hour

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0), wrong (score 1), true (score 2). For the questions of the domains of the HBM (perceived sensitivity, perceived severity, perceived barriers, perceived benefits, and self-efficacy), the expected answer 3, no idea 2, and the wrong answer 1 were considered. In the field of preventive behaviors against COVID-19, the correct behavior was assigned 2 points and the incorrect behavior was assigned 0 points.

The questionnaire was evaluated by the participants and experts of the research team in two stages in terms of validity, and reliability. The questionnaire was given to 3 health education specialists and physicians to be examined in terms of content and appearance. The opinions of these individuals led to the correction or change of some questions in the questionnaire. The reliability assessment method was used with the internal consistency method (Cronbach's α). Cronbach's α for the whole scale was (0.70). In the external reliability of the questionnaire, which was performed by retesting, the questionnaire was sent to 16 clients with a time interval of 2 weeks.

The data obtained were analyzed by SPSS software, version 22 using analysis of variance (ANOVA), t-test, and paired t-test. The P was considered 0.05 in this study.

Results

The age mean of the intervention group was (35±12.34) and the control age group was (33.87±11.33) years. Nearly 60% of the intervention group and 57.5% of the control group were women. Approximately 46.3% of the intervention group and 43.8% of the control group were housewives. The income of 57% of the intervention group and 56% of the control group was below two million Tomans per month. A total of 38 participants (47.5%) in the intervention group and 36 participants (45%) in the control group had undergraduate education. About 95% of the intervention group and 93.8% of the control group had no history of COVID-19. A total of 91.3% of the intervention group and 88.8% of the control group had no history of COVID-19 in their family members. The variables of sex, job, monthly income, education, history of COVID-19, and history of Corona in family members were not significantly different in the intervention and control groups (P>0.05) (Table 2).

Based on the results, the mean score of HBM constructs in participation in two study groups before intervention was not significantly different (P>0.05); however, a significant difference was observed after the intervention (P<0.05) (Table 3). The knowledge score in both groups before the intervention was not significantly different (P=0.9), while after the intervention, this score was higher in the intervention group than the control group (P=0.001).

Before the intervention, no statistically significant difference was observed between the two groups in terms of perceived susceptibility (P=0.8), but after the intervention, this difference was statistically significant (P=0.02). Before the educational intervention, the mean perceived intensity in the two groups was not significantly different (P=0.8), but this difference one month after the intervention was statistically significant (P=0.02). Furthermore, despite being the same groups regarding perceived ben-

Table 2. Demographic characteristics of participants in intervention and control groups

Variables		No. (%)		P
		Intervention	Control	
Sex	Female	48(60)	46(57.5)	>0.05*
	Male	32(40)	34(42.5)	
Job	Housewife	35(43.8)	37(46.3)	>0.05**
	Worker	6(7.5)	7(8.8)	
	Student	4(5)	6(7.5)	
	Unemployed	6(7.5)	3(3.8)	
	Self-employed	8(10)	5(6.3)	
	Farmer	5(6.3)	8(10)	
	Employee	14(17.5)	12(15)	
	Retired	2(2.5)	2(2.5)	
Monthly income (million tomans)	<2	56(70)	57(71.3)	>0.05**
	2-4	14(17.5)	15(18.8)	
	>4	10(12.5)	8(10)	
Education	Undergraduate	36(45)	38(47.5)	>0.05**
	Diploma	22(27.5)	24(30)	
	Graduate	22(27.5)	18(22)	
History of COVID-19	Yes	5(6.3)	4(5)	>0.05*
	No	75(93.8)	76(95)	
History of family members' Corona	Yes	9(11.3)	7(8.8)	>0.05*
	No	71(88.8)	73(91.3)	

*T-test,**Analysis of variance (ANOVA).

efits before the intervention (P=0.5), they were statistically different one month after the intervention (P=0.02).

Regarding perceived barriers, no significant difference was observed between both groups before the intervention (P=0.4), but one month after the intervention, this difference was statistically significant (P=0.001).

In terms of self-efficacy mean score, no difference was observed between the two groups before the intervention (P=0.3) but after the educational intervention, this difference was significant (P=0.001). Finally, regarding the average score of preventive behaviors, the results showed no statistically significant difference before the intervention (P=0.6) but after the intervention, this difference was statistically different (P=0.001) (Table 3).

Discussion

This study was conducted to investigate the impact of educational intervention based on the HBM on adopting COVID-19 preventive behaviors in clients of Zabol urban health centers. In the present study, clients' awareness of COVID-19 preventive behaviors increased for the intervention during one month. This result was confirmed by the Khazaee-Pool study [16]. Improving knowledge is a necessary condition for creating prevention beliefs, forming a positive attitude, and promoting positive behaviors, and people's knowledge about the disease affects the effectiveness of their coping strategies and behaviors to some extent [18].

Table 3. Comparison of the mean scores of HBM constructs in participations in study groups pre- and post-intervention

Variables			Mean±SD		P*
			Control	Intervention	
Awareness		Pre-intervention	15.3±0.3	15.26±2.72	0.9
		Post-intervention	14.38±0.2	19.67±0.7	0.001
HBM factors	Perceived susceptibility	Pre-intervention	8.46±0.1	8.43±1	0.8
		Post-intervention	8.7±0.08	8.95±0.2	0.02
	Perceived severity	Pre-intervention	1.36±0.2	10.71±1.7	0.8
		Post-intervention	11.31±0.15	11.72±0.8	0.02
	Perceived benefits	Pre-intervention	11.46±0.14	11.32±1.4	0.5
		Post-intervention	11.81±0.06	11.97±0.1	0.02
	Perceived barriers	Pre-intervention	8.83±0.3	8.5±3.02	0.4
		Post-intervention	6.45±0.3	9.97±2.7	0.001
	Self-efficacy	Pre-intervention	10.82 ± 0.1	11.03±1.2	0.3
		Post-intervention	10.01±0.1	11.96±0.2	0.001
Preventive behaviors		Pre-intervention	7.05±0.2	7.2±1.7	0.6
		Post-intervention	5.65±0.2	9.7±0.6	0.001

HBM: Health belief model.

*Paired t-test.

The mean score of perceived susceptibility increased during one month in the intervention group. This result was confirmed by the study conducted by Jose et al. [19] and Clark et al. [20]. Increasing perceived sensitivity indicates that by holding a training course, they believe that the threat of danger and disease is high; therefore, the individual's perception of the risk of exposure to COVID-19 may cause favorable prevention behaviors in the studied population.

In the current study, the mean score of perceived severity increased during one month in the intervention group, which was consistent with the results of the study conducted by Heydari et al. [21]. The results of a study in Hong Kong showed that the perceived sensitivity and intensity of the study subjects from contracting COVID-19 was high; in such a way that 89% of them said that they were at risk of contracting COVID-19 and 97% said that they will experience severe complications if they contract COVID-19 [22]. Due to the increase in the perceived sensitivity score, people's perceived severity of the deterioration of the situation also increases. This may make people more motivated to take preventive measures against COVID-19.

The mean score of perceived benefits increased during one month in the intervention group. This result was confirmed by the Moradi's study [23]. In a study conducted by Sim et al., most participants had a high understanding of preventive behavior benefits, especially mask use in respiratory infections [24]. It seems that the increase in awareness and information about this disease can push the belief and attitude of the studied community toward the benefits of performing preventive behaviors against COVID-19.

According to the results, the mean score of perceived barriers increased during one month in the intervention group. The results of a study conducted in China showed that the vital reason for not doing preventive behavior was the lack of masks in the market [25]. This shows that the surveyed people face more obstacles in adopting preventive behaviors and have more problems in this way. Sitan and Baluchistan Province is a deprived province in Iran, most people in this province are engaged in agri-

culture and animal husbandry. Despite this, they are in a bad situation due to drought problems and lack of proper financial resources. Some of these people cannot afford masks and disinfectant solutions. Therefore, it is necessary to reduce the barriers to behavior as much as possible by making appropriate interventions and predicting the right policies.

The mean score of perceived self-efficacy increased during one month in the intervention group. A study conducted in 2020 showed the educational intervention increased their self-efficacy in overcoming perceived barriers to COVID-19 preventive behaviors [26]. Karimy et al. showed that self-efficacy is a crucial predictor of preventive behaviors [27]. Self-efficacy can influence people's motivation to adopt health-oriented behaviors. People with high self-efficacy are more responsible for their health and others and are more inclined to adopt health-oriented behaviors [28].

It seems that holding the training course has increased the level of awareness of the studied people about contracting COVID-19, which has increased their perceived sensitivity and severity in the context of contracting the disease of COVID-19. On the other hand, increasing the understanding of the benefits of performing preventive behaviors and the disadvantages of not performing them has increased individual self-efficacy regarding positive beliefs about performing preventive behaviors from COVID-19 and affected their behavior and increased the level of adoption. Preventive behaviors from contracting COVID-19. One of the limitations of this study was that the behavior of the participants was assessed using a questionnaire.

Conclusion

Increasing the necessary awareness to prevent and reduce the spread of COVID-19 in society requires the cooperation and participation of the people. Therefore, sending educational text messages, training health care workers in schools, training health and treatment center staff, educational animations for children, virtual clinics, and preparing brochures and educational pamphlets and booklets can play a crucial role in preventing and controlling this disease at the community level.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Zabol University of Medical Sciences (Code: IR. ZBMU. REC.1399.057). Informed consent was obtained from all participants, and participant privacy, information confidentiality, and the impartiality of the researchers were followed throughout all the steps of the research process.

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Authors' contributions

Research design and data extract: Azadeh Heydari; Study conduction and writing the paper: Azadeh Heydari and Parvaneh Isfahani; Review and editing: Parvaneh Isfahani; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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