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Effectiveness of a Community-Based Intervention (CBI) Based on the Protection Motivation Theory (PMT) in Preventing COVID-19 Infection among Bank Employees

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Abstract

Background: The COVID-19 virus has caused concern and fear among people worldwide. This study aimed to assess the effectiveness of a Community- Based Intervention (CBI) based on the Protection Motivation Theory in preventing COVID-19 infection among bank employees.

Materials and Methods: This research was a quasi-experimental study (pre- and post-intervention). The study participants were 180 bank employees selected randomly from banks in Sirjan. The CBI was conducted over three months, and participants received educational interventions about promoting health-related behaviors and improving their working environment. Data were collected by a questionnaire with 62 questions in four parts: demographic information, knowledge, questions related to the structures of PMT, and questions about behaviors. Data was analyzed by paired t-test and Mc Nemar's test in SPSS23 software.

Results: The mean age of participants was 41.6 ± 2.16. There were significant differences in the mean scores of knowledge and perceived severity, perceived susceptibility, response efficiency, rewards, self-efficacy, response cost, fear, and protection motivation after the CBI ($p<0.05$). Also, health behaviors improved significantly after the CBI ($P<0.001$); for example, the prevalence of regular hand washing among the target group increased from 36.6% to 93.4%.

Conclusion: The results showed that Protection Motivation Theory was effective in improving COVID-19 prevention strategies among bank employees and may help prevent infection and control this disease outbreak.

Keywords: COVID-19, Self-Efficacy, Knowledge, Health Behaviors.

Introduction

Coronaviruses are one of the most deadly infectious viruses in humans [1, 2]. COVID-19 was first observed and identified in Wuhan, China [3, 4]. Since then, this virus spread to other countries worldwide [5]. The COVID-19 epidemic has been spread by people to almost every country in the world and was declared a pandemic by WHO on March 22, 2020. According to worldwide statistics, its mortality rate is about 2-3.4% [6].

According to current knowledge, the disease can range from mild to severe, with symptoms such as body aches, fever, cough, shortness of breath, pneumonia, and death. There is currently no effective treatment for this infection. Therefore, community-based training can effectively prevent coronavirus infection among high-risk populations such as bank employees [7].

There are several strategies to achieve prevention goals [7]. Identifying pathways that cause disease transmission plays an important role in its control, but these transmission routes have not yet been determined precisely. As a general principle, respiratory viruses are mainly transmitted by droplets, coughing, sneezing, or touching contaminated objects; education interventions

can be performed to minimize behaviors that facilitate transmission [5].

The value of any education depends on its effectiveness in changing or creating appropriate health behaviors [8]. Behavioral change theories and models adopted from them are one of the most effective interventions in health education [9]. The Protection Motivation Theory (PMT) is one of the theories introduced by Rogers in 1975 about protective behaviors [10]. This theory consists of 7 constructs:perceived susceptibility, perceived severity, intrinsic and extrinsic rewards, perceived self-efficacy, response costs, response efficacy, and protection motivation, both of which are mediated through two cognitive processes, which are Threat Appraisal and Coping Appraisal [9]; and assesses the threat of maladaptive behaviors and the factors that influence the likelihood of engaging in potentially unhealthy behaviors. Threat Appraisal is the sum of severity and vulnerability minus the rewards [11]. Rewarding inappropriate behaviors increases the likelihood of selecting adverse reactions, while threats reduce the likelihood of selecting adverse reactions [10]. Coping Appraisal consists of self-efficacy, response efficacy, and response costs. Thus, increasing response efficiency and self-efficacy and reducing the response cost will increase Coping Appraisal. Response efficiency and self-efficacy increase the likelihood of choosing adaptive responses cost responses can reduce adaptive responses. The efficacy of the two cognitive processes creates motivation and protection behavior [12]. Some studies, such as the Elgzar study about educational intervention based on PMT, had an impact on pregnant women's knowledge and self-care regarding COVID-19 [13], and the other study about the non-pharmaceutical intervention in promoting protective behaviors against COVID-19 among the older adults [14], showed the effectiveness of this theory in preventing COVID-19.

Community-based intervention (CBI) can benefit from various strategies such as individual, group, and community-based educational interventions, providing opportunities for people to make healthy choices and behaviors, encouraging, facilitating, and supporting community health choices, providing health incentives, enacting supportive laws, participating in decision-making and designing appropriate strategies [15]. CBIs can be conducted for family planning, tobacco use, healthy nutrition, alcohol abuse, and vaccination [16].

The innovative aspect of this research was the use of a community-based educational intervention approach, which has not been used to prevent COVID-19. Also, focusing on the groups most at risk for COVID-19 is one of the most important categories for new interventions, one of which is bank employees due to the large number of people exposed to it daily.

Observance of health protocols (such as hand washing, use of face masks, personal protective equipment, and social distancing) is important in infection prevention and transmission of COVID-19. However, lack of knowledge, inappropriate attitude, or incorrect practices have limited or precluded success in controlling COVID. Bank employees are among the groups that have faced high mortality since the commencement of this epidemic. Their high mortality from COVID-19 is probably contact with infected customers and handling infected cash. This study aimed to evaluate the effectiveness of a Community-Based Intervention based on the PMT in preventing COVID-19 infection among bank employees working in Sirjan.

Materials and Methods

This community-based study had a participatory approach with a pre and post educational intervention design and was conducted in 2020.

The target population was the bank employees of Sirjan City, who were selected by simple random sampling. The list of all banks in Sirjan was inquired, and 10 banks were selected randomly. After visiting the selected banks, eligible individuals were randomly drawn from the employee list.

Inclusion criteria included being any bank employee and living in Sirjan city.

To determine the sample size, the significance level was assumed to be 5%, and power =80%. According to a similar community-based study [15], the standard deviation of one variable (prevention behavior)was assumed to be 4.5, and the minimum significant difference was assumed to be 1 score. Also, considering the matched a minimum sample size of 159 people was sufficient. Eventually, 180 employees were enrolled.

The data collection tool was a researcher-made questionnaire based on the PMT completed before and three months [17] after the community-based intervention by the bank employees.

The data collection tool was a Persian questionnaire that included four parts: demographic information, knowledge, questions related to the structures of PMT, and questions about behaviors.

1- The first part contained demographic information with 4 questions about gender, age, education, and marital status.

2- The second part consisted of eight multiple-choice questions about knowledge. In this part, the “Yes” option got a2 score, and “No” got a1score. The range of the knowledge score was from 8 to 16.

3- The third part included 46 questions related to the constructs of the PMT. These questions were asked on a 5-point Likert scale from strongly agree (5 scores) to strongly disagree (1 score). Based on the meaning of the phrases, some questions were scored the opposite way.

The constructs of the PMT were perceived susceptibility (8 questions, range: 8-40), perceived severity (8 questions, range: 8-40), rewards (6 questions, range: 6-

30), perceived self-efficacy (8 questions, range: 8-40), response costs (6 questions, range: 6-30), response efficacy (8 questions, range: 8-40), fear (6 questions, range: 6-30) and protective motivation (6 questions, range: 6-30).

To assess the reliability and validity of the questionnaire, initially, the questionnaire was sent to eight people (including 4 health experts, 3 health educators, and 1 epidemiologist), to determine its content and face validity. After receiving their comments, the edited version of the questionnaire was prepared, and these evaluators were asked to comment about the questions' clarity, necessity, relevance, and comprehensiveness. After receiving their comments, ambiguous, irrelevant, and vague phrases were removed or corrected.

30 people were asked to complete the questionnaire to determine the internal reliability of the questionnaire, and Cronbach's alpha was 0.7 or higher, considered acceptable. To examine external reliability, a test-retest was done in a two-week interval by 30 employees who were not included in the study. The Perceived susceptibility (8 questions, Cronbach's alpha= 0.83; r= 0.86), Perceived severity (8 questions, Cronbach's alpha= 0.84; r= 0.85), Rewards (6 questions, Cronbach's alpha= 0.86; r= 0.87), Response costs (8 questions, Cronbach's alpha= 0.87; r= 0.87), Response efficiency (8 questions, Cronbach's alpha= 0.88; r= 0.86), Self-efficiency (8 questions, Cronbach's alpha= 0.84; r= 0.86), Fear (6 questions, Cronbach's alpha= 0.85; r= 0.88) and Protection Motivation (6 question, Cronbach's alpha= 0.87; r= 0.88) constructs, all had sufficient internal validity and reliability.

4- The fourth part included 4 questions related to behaviors. These questions were about regular hand washing, not touching their face (nose, eyes, and mouth) by hand, using personal protective equipment, hand sanitizers, and social distancing. These questions were replied by "Yes" or "No". Then, the number (percentage) of people who replied "Yes" before and after the CBI were compared.

Educational interventions (community-based intervention) were divided into two main categories: 1- educational interventions to promote health related behaviors among individuals 2- suggesting interventions to improve the working environment of the employees (Table 1). Face-to-face individual training sessions were held for 10 minutes and in three sessions. All trainers and employees wore protective masks and stood at a safe distance during these training sessions. Also, a pamphlet and a booklet were given to all 180 employees after the face-to-face educational session. Social media such as WhatsApp, Telegram and Instagram were used to reinforce the messages. Two messages were sent to participants daily, one at 8 am and one at 10 pm. Mass media such as television (bank's television and monitor), health radio, and newspapers were used to reinforce the messages, and one message was sent through this media daily. Ten banners were installed in the banks, and 10 billboards were installed in the streets. Also, the 4030 telephone number was established to answer health questions.

Table 1. Interventions of the CBI for the prevention of COVID-19 infection

Intervention	Details
Educational interventions to promote health-related behaviors among individuals	Face-to-face individual training sessions were held for 10 minutes.
	Social media such as WhatsApp, Telegram, and Instagram were used to reinforce the messages
	Mass media such as bank's television, health radio, and newspapers were used to reinforce the messages.
	Banners& Billboards were Installed
	Pamphlets and booklets were given to the target group.
	The 4030 telephone number was established to answer health questions.
Suggesting interventions to improve the working environment of the employees	Disinfection of surfaces and objects inside the bank
	Disinfection of ATMs
	Minimizing paper currency exchange, loans, and other bills
	Reducing staff working hours
	Scheduling working shifts
	Giving employees leave from work without deducting from their total permitted annual leaves.
	Providing personal protective equipment such as a mask and hand sanitizer
	Creating barriers to maintaining the distance between the booth and the customer
	Applying proper air conditioning in the bank and opening the windows
	Abolishing unnecessary installments

The normality of the data distribution was evaluated by the Kolmogorov-Smirnov test. Data were summarized using descriptive statistics (frequency and percentage) and analyzed with paired t-test and chi-square. The significance level was considered $p<0.05$, and SPSS23 software (IBM, Armonk, NY, USA) was used for analysis.

Results

The participants of this study were 180 bank employees. The mean age of the participants was 41.6 ± 2.16. The demographic characteristics of the population under study can be seen in Table 2.

Table 2. Demographic characteristics of the bank employees participating in this study.

Variable	Group	Number (percent)
Age	20 to 35 years old	30 (16.7)
	36 to 60 years old	150 (83.3)
Sex	Male	152 (84.4)
	Female	28 (15.6)
Marital status	Single	37 (20.5)
	Married	143 (79.5)
Education	Intermediate School Education	8 (4.5)
	High School diploma	97 (53.9)
	Higher degree	75 (41.6)

The results of paired t-tests showed that the mean scores of knowledge and perceived susceptibility, perceived severity, response efficiency, self-efficacy, fear, and protection motivation significantly increased, and rewards and response cost significantly decreased after the educational campaign ($p < 0.05$) (Table 3).

Table 3. Comparison of the mean scores of knowledge and PMT constructs before and one month after the CBI

Constructs	Intervention group (n=280)		P-value (paired t-test)
	Before Intervention Mean± SD	After intervention Mean± SD	
Knowledge	13.09±1.14	15.43±0.59	<0.001
Perceived susceptibility	31.37±2.67	36.79±1.66	<0.001
Perceived severity	32.98±4.15	36.67±3.05	<0.001
Response efficacy	32.73±2.72	37.11±2.05	<0.001
Self-efficacy	30.08±3.22	32.48±2.99	<0.001
Rewards	23.08±2.29	20.37±2.00	<0.001
Response cost	32.92±2.78	26.37±5.17	<0.001
Fear	21.83±2.12	25.01±1.91	<0.001
Protection motivation	22.16±1.98	25.55±2.36	<0.001

The results of McNemar's test showed that the number (percent) of protective health behaviors such as regular hand washing, not touching their face, using personal protective equipment, using hand sanitizers, and keeping their distance from people increased after three months of the CBI (table 4).

Table 4. The comparison of health behaviors before and after the CBI

Health behaviors	Before intervention n (%)	After intervention n (%)	P-value (chi-square)
Regular hand washing	66(36.6)	168 (93.4)	**<0.001**
Not touching their face (nose, eyes and mouth)	49 (27.2)	159 (83.3)	**<0.001**
Using personal protective equipment	34 (18.8)	146 (81.1)	**<0.001**
Using hand sanitizers	25 (13.8)	180 (100)	**<0.001**
Keeping their distance from people	39 (21.6)	175 (97.2)	**<0.001**

Discussion

The outbreak of COVID-19 showed that communicable diseases are still serious and that, despite medical advances, can still cause many deaths. In addition, the panic created by this pandemic has put the world on hold. Fortunately, there are ways to prevent this disease, such as observing personal hygiene and obeying social distancing.

The findings of this study showed that CBI increased knowledge, improved the scores of the PMT constructs, and increased prevention behaviors among bank employees, which indicates the positive impact of educational programs provided through multiple media. Changing people's health behaviors requires their knowledge and awareness. In the meantime, health educators can play a very important role in raising public knowledge, especially bank employees, to control and prevent COVID-19 in the bank, family, and community. Therefore, their level of knowledge and continuous training is important. The first step in preventing COVID-19 is education, which can increase knowledge. Similar to this study, Matlabi et al. conducted an educational intervention and succeeded in enhancing knowledge, attitudes, and behaviors related to COVID-19 prevention based on PMT in Bajesta, Iran [18], and Elgzar et al. reported increased knowledge and self-protection regarding COVID-19 after educational intervention among pregnant women's in Alexandria, Egypt [13]. These studies showed that educational interventions based on PMT through training and sending reinforcement messages increased knowledge and promoted protective behaviors in the target group.

This study showed a significant increase in the mean score of perceived susceptibility and severity after the CBI. These results suggest that the more people consider themselves at risk of COVID-19 (perceived susceptibility), the more likely they are to be motivated to exercise protection. Also, the more people are aware of the severity and consequences of COVID-19 infection on their health and those around them (perceived severity), the more likely they are to have protective motivation and preventative behaviors. An educational intervention based on the PMT was shown to be effective in Ansari et al.'s study in Iran and increased the mean scores of perceived susceptibility and perceived severity in high school students [19]. But, the findings of Demirtas et al., using an educational interventional based on the Health Belief Model for promoting cervical cancer screening, showed that although the percentage of women who had heard about the Pap test was 77.7%, only 32.4% had undergone the screening test [20].

In the present study, the average self-efficacy score increased after the CBI. Self-efficacy is defined as people's beliefs about their capabilities, the successful implementation of an action, and their influence over events that affect their lives [21]. A person with high self-efficacy believes that he can act (health behavior) consistently against a health risk (COVID-19 disease), which motivates him to protect himself against disease. Therefore, when a person achieves higher self-efficacy, he can better perform health protocols and appropriate health behaviors. Also, in this study, the score of response efficacy increased. The probability of performing consistent behaviors will increase if appropriate responses can eliminate the threat. In this study, improving perceived response efficacy in bank employees increased people's expectations that a consistent response (protective behavior against the risk of COVID-19 disease) could reduce or eliminate the risk. Therefore, the target group realized the benefits and importance of observing preventive behaviors. The results of several studies also show the effect of training on increasing self-efficacy and response efficacy [22-24].

The results of this study showed that the CBI decreased response cost and perceived barriers scores. Although there was a severe shortage of protective equipment such as masks or hand sanitizers at the beginning of the epidemic, it eventually became available to employees due to high demand. Also, perceived rewards for not performing personal hygiene tasks and not using protective equipment decreased, which shows people became aware of their mistakes and false rewards. In the designed educational intervention, the rewards of unhealthy behavior (for example, if I do not wear a mask, it is easier) were discussed and explored, and the result of this educational intervention decreased unhealthy behaviors in the target group. The results of Malmir et al., about preventing cervical cancer among marginalized women in the west of Iran [25], and Sadeghi et al. about prevention of hookah smoking among the youth [15], both showed a decrease in response cost and perceived barriers after the educational intervention, and were consistent with the results of the present study.

This study showed that fear increased in bank employees, after the CBI. Fear arousal had an important effect on changing attitudes and behaviors in this study. If someone fears COVID-19 infection and its danger, his motivation for prevention will increase. Other results showed that the CBI also increased the protection motivation of bank employees. Protection motivation is the intention to perform the proposed behavior (protective behavior against COVID-19) to prevent health threats, which in this study was to protect against COVID-19 and its complications. For protection motivation to increase, perceived susceptibility and severity must overcome the rewards of the inconsistent response (lack of self-protection against COVID-19), and self-efficacy and response efficacy must outweigh the response cost (self-protection to prevail against COVID-19). Protection motivation is a mediating variable between threat appraisal and coping appraisal8, and preventive (protective) behavior against COVID-19. This result is consistent with the finding of Fardazar et al. about preventive behaviors related to home accidents in mothers with children less than 5 years old [26] and Khiali et al. about pap smear screening behavior among women visiting health centers [27].

In this study, some participants already had good knowledge about hygiene before the intervention, but many unconscious habits, such as touching their face, were observed. The training conducted as part of this study highlighted some of these wrong behaviors for the participants. In the present study, the preventive health behaviors and distance keeping increased after the intervention. Since the ultimate goal of any educational intervention is to change unhealthy behaviors to healthy behaviors, this showed the success of our intervention. The results of a study by Luby et al showed educational intervention about hand washing was effective in reducing childhood diarrhea in high-risk communities in Pakistan [28]. Another study by Harbarth et al. showed the distribution of individual bottles of alcohol-based hand rubs improved compliance with hand hygiene in intensive care units in Switzerland [29].

One of the study's limitations was the danger of holding all training sessions in person. Therefore we tried to do some training by forming social online groups and sending the material to them. Another limitation was the busy schedule of these people while working, and to overcome this limitation, messages were sent to them briefly when we thought they were less busy. Another limitation of this study was the lack of measurement of training outside the study framework. To reduce this

effect, individuals were included in the study using simple random sampling.

Conclusion

The Community-Based Intervention effectively enhanced preventive behaviors regarding COVID-19, raising knowledge, perceived susceptibility, perceived severity, response efficiency, response cost, self-efficacy, rewards, fear, and protection motivation after the CBI among bank employees of Sirjan. Consequently, the educational material used in this study can be used for preventing similar dangerous disease outbreaks.

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Conflict of interest

None declared.

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Ethical Considerations

The aim of the study was clarified for the participants and informed consent was inquired from all participants. Due to the risk of disease transmission by paper and pen, written consent was not obtained, and consent was obtained orally.

Code of Ethics

This study was approved by the Ethics Committee of the Sirjan School of Medical Sciences (Ethics Code: IR.SIRUMS.REC.1399.002).

Authors' Contributions

Reza Sadeghi: Study concept and design, Acquisition of data, and drafting the manuscript; Seyed Ali Razavinasab: Study concept and design; Narges Khanjani: Study concept and design, Critical revision of the manuscript; Victoria Momenabadi: Acquisition of data, and drafting the manuscript.

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