RESEARCH ARTICLE

The Effect of Health Belief Model-Based Education through Telegram Instant Messaging Services on Pap smear performance

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Abstract

Background: Pap smear is an effective screening method for early detection of cervical cancer. This study aimed to investigate the effect of education based on Health Belief Model (HBM) through Telegram instant messaging services on the Pap smear test. **Material and methods:** This research was a quasi-experimental study which was performed on 106 eligible women (48 participants in the intervention group and 47 participants in the control group). The patients in both groups completed the written consent form and questionnaires at the beginning of the study. In intervention group, the educational content based on HBM was regularly sent via Telegram during one month. After education and three months later, both groups completed questionnaires. Then, the data was analyzed with using SPSS version 22. **Results:** The findings showed that the two groups at first were similar in demographic characteristics. In the intervention group, the mean difference of the scores before and immediate post training on the knowledge and all of the constructs were significant (P<0.001). Also, the mean difference of the scores before and three months after training on knowledge and all of the constructs (except for perceived barriers) has increased and about the perceived barriers this difference has decreased significantly compared to the score before the training. In the control group, changes in knowledge and other constructs were not significant in during the study. Within the three months after the training, 23 participants (47.9%) in the intervention group, and 4 participants (5.8%) in the control group performed Pap smear which indicates a statistically significant difference (P<0.001). **Conclusion:** With regard to the individuals' access to mobile phone, content posted by Telegram on the HBM-based education affects the women's belief and behavior regarding Pap smear test.

Keywords: Cervical cancer- Pap smear- Health belief model (HBM)- m-Health- instant messaging service- Telegram

Introduction

Cancer is the second worldwide cause of death and according to the World Health Organization in 2015, 8.8 million people died of cancer (WHO Media centre, 2017). Among cancers, cervical cancer is the second cause of death among women around the world (Chesun et al., 2012). Statistics show that each year, about half a million people suffer from advanced cervical cancer (Hajializadeh et al., 2013). While cervical cancer is one of the few cancers which are early detectable and preventable (Tahmasebi et al., 2014; Farshbaf-Khalili et al., 2015; Logan et al., 2011), as 20- 60% of deaths from cervical cancer is preventable and treatable through doing Pap smear test (Leyva et al., 2006). Unfortunately, this test is not worthy welcomed by the women and its irregular conduction is evident in women (Vasheghani et al., 2012).

One of the models in the field of health behaviors, particularly preventive behaviors, emphasizes the individuals' perceptions, beliefs, and awareness is the health belief model (Heydari et al., 2015). According to this model, if people believe they are susceptible to diseases such as cervical cancer (perceived susceptibility), and

also perceive the depth of the risk in their lives (perceived severity), if they consider the proposed behaviors as Pap smear useful in reducing the risk of disease (perceived benefits), and can overcome the inhibiting factors such as cost, pain, etc. (perceived barriers), they will have more tendency to participate in health promotion behaviors and in this case, the interventions and training programs would probably be effective (Noroozi et al., 2011; Thurmond , 2003).

Today, mobile health interventions (m-Health) as a group of electronic health interventions (E-health) are known worldwide which is used to provide health information and improve health outcomes (Lee et al., 2014). According to Norman et al., (2007) the E-health interventions are divided into several generations: the first generation is the interventions in which participants use a PC material, such as pamphlets, reports, and newsletters; the second generation is the interventions in which the training is based on the internet, e-mail, CD ROM, and Pocket PCs; and the third generation is the interventions in which the mobile phone is used as a Pocket PC, as a result, Telegram based interventions (Telegram is an instant messaging service that users can send messages and

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exchange photos, videos, stickers, audio, and files of any type (Telegram messaging service, 2017)) are among this generation. The users of these equipment are increasing, so that in October 2013, Telegram had daily 100,000 active users and in February 2016, Telegram had monthly 100 million active users, with 350,000 new users signing up every day, delivering 15 billion messages daily (Telegram messaging service, 2017). Also the E-health interventions are in progress, and the direction of behavior change is in its early stages of development and assessment, therefore, it is better to do broader research on this new technology (Norman et al., 2007).

In several studies, effectiveness of the verbal training in terms of health belief model on doing the cervical cancer screening behavior is reviewed and approved (Barbouni et al., 2013; Coronado Interis et al., 2015; Fouda et al., 2013), in addition, in some studies, the education via SMS by mobile phone has been effective on doing the Pap smear test (Lee et al., 2014; Wanyoro et al., 2015), however, few studies have been found on the effect of modern education as the interventions based on instant messaging tools (the third generation of interventions) on improving the preventive behaviors, such as Pap smear, and they are sometimes contradictory; therefore, the aim of this study was to determine the effectiveness of the health belief model-based education via Telegram on the beliefs and Pap smear performance.

Materials and Methods

Study design

This research is a quasi-experimental study which was done from August 2015 to March 2016 in health centers of Bushehr, a southwestern province in Iran. The inclusion criteria in this study included being able to read and write, passing at least six months of their marriage, having a smart cell phone, having no background in genital tract cancer in their family, and having no experience of doing Pap smear in the past three years, and exclusion criteria included inability to continue participation for at least 3 months, completion of incomplete questionnaires, the diagnosed cervical cancer, hysterectomy, and pregnancy. The sample size according to the study of Lee et al., (2014) was estimated 45 participants for each group, and with considering attrition rates (20%) in three months fallow up, 53 participants in each group were considered. Among the 10 health centers, 4 centers were selected by lottery, and with reviewing records of households in these centers, researcher determined the eligible individuals and after a phone call, people who would like to participate in the study were identified and an information sheet for the probably participants were provided. Then, according to the number of people covered by each center, the samples of each center were identified and randomly divided into two groups (53 participants in each group). It should be noted that 5 participants from the intervention group and 6 from the control group were excluded because of immigration, pregnancy, and completion of incomplete questionnaires; so, finally 48 participants in the intervention group and 47 participants in the control group completed the study and their data was analyzed.

Method and data collection

In the intervention group, after getting the written informed consent, the individuals' phone numbers were taken to communicate educationally through Telegram and their membership in telegram was assured and participants were asked to complete the questionnaires before the training. The participants in this group received the training in the form of text messaging, electronic posters, infographics, podcasts, and video tutorial. The participants received at least 6 messages per week from Saturday to Thursday during four weeks. Sending the content was done in the form of a regular schedule as follows:

Week 1: Informing about breast anatomy and structure, and the process of breast cancer beginning (increased knowledge).

Week 2: Making susceptibility against the risk of breast cancer, perceiving severity and seriousness of the disease (increased perceived susceptibility and severity).

Week 3: Informing about benefits of Pap smear test and performing health behaviors (increased perceived benefits and health motivation).

Week 4: Observing some rules before Pap smear test and decreasing barriers of Pap smear test (decreased perceived barriers).

After posting content via Telegram, the participants were asked to send their feedback by the sentence of "I saw the message". On the end of each week, participant's questions on the training content were answered. Until one month after the training, in order to provide cues to action, every week two text messages were sent along with the posters for the intervention group and exactly one month after training, a reminder to perform Pap smear was sent.

In the control group, after giving the written informed consent, the participants completed the questionnaires but didn't receive any training by the end of the study.

Immediately after the end of the training (one month after the start of the study), the participants in both groups presented in the center and completed the second stage questionnaires. Then, three months after the training, the participants in both groups completed the questionnaires and were analyzed in terms of doing or not doing the Pap test with receiving the test answer.

Instruments and measures

Data collection tool in this study was a standard questionnaire consisted of three parts:

The first section contains demographic characteristics with 13 items including age, marital status, age of marriage, gravidity, number of children, the participants and their spouses' educational level, family planning method, and history of other cancers in their family.

The second section contains 8 multiple-choice items related to measuring the knowledge of cervical cancer. For each true answer a positive point and for each false answer no point was appointed. The reliability of this section according to Kuder Richardson coefficient was 0.67.

The third section was related to the Health Belief Model constructs and included 34 items about individual beliefs about Pap smear, which include perceived susceptibility (3 items), perceived severity (6 items),

perceived benefits (4), perceived barriers (14 questions), and health motivation (7 items), all with a five-point Likert scale with the score of 1 (strongly disagree) to 5 (strongly agree) were ranked as higher scores indicating agreement with the beliefs of health assessment (Guvenc et al., 2011). Based on the Cronbach's alpha coefficient, the validity of these constructs was estimated of 0.67 (health motivation) to 0.80 (perceived benefits).

The fourth section included one yes/no question which evaluate doing or not doing the Pap smear test within the three months after the intervention.

The data were analyzed with SPSS version 22. Descriptive statistics, chi-square test, and t-test were used to analyze the data.

Ethical principles

The aim of the study was verbally explained to the potential participants who met the inclusion criteria. The participants were told that they could withdraw from the study at any time and that all information would be kept secret and anonymous. The required permissions were obtained from the Vice-Chancellor for research of Bushehr university of medical sciences. Also, the study was approved by the university ethics committee (Ethic No: IR.BPUMS.REC.1395.57).

Results

In this study, 48 participants in the intervention group

Table 1. Demographic Characteristics in Two Groups Prior to Training

Demographic variables	Intervention group		Control group		P-value
	N	%	N	%	
Education level					
Diploma or less	22	45.8	15	31.9	0.164
Academic education	26	54.2	32	68.1	
Spouses' educational level					
Diploma or less	15	31.3	11	23.4	0.391
Academic education	33	68.8	36	76.6	
Gravidity					
0	0	0	5	10.6	0.103
1	17	35.4	10	21.3	
2	21	43.8	18	38.3	
3	8	16.7	11	23.4	
> 3	2	4.2	3	6.4	
Number of children					
0	1	2.1	6	12.8	0.054
1	20	41.7	12	25.5	
2	25	52.1	23	48.9	
3	2	4.1	6	12.8	
Marriage age					
16-20	3	6.3	4	8.5	0.673
20-30	45	93.7	43	91.5	
Contraception method					
Modern	9	18.8	13	27.7	0.545
Barrier methods	20	41.7	19	40.4	
With drawal	19	39.6	15	31.9	

and 47 participants in the control group completed the study. The results showed that the average age of the subjects in the intervention group was 32.0±4.95 and it was 31.21±5.09 in the control group and there was no significant difference between groups. In terms of the other demographic characteristics, the two groups were similar (Table 1).

The findings suggest that despite the random allocation of the participants in two groups and the participants' homogeneity in terms of demographic characteristics, the two groups at the beginning of the study were the same only in terms of perceived barrier and health motivation constructs, and the scores of knowledge, perceived susceptibility, severity and benefits before training in the intervention group were significantly higher than the control group. Therefore, in analyzing the data, the mean difference of before and after scores in the two groups was compared.

Comparison of the mean difference of knowledge and constructs before and immediately after training in two groups showed that in the intervention group, the mean difference of knowledge and health motivation, perceived susceptibility, severity, and benefits was higher than the control group and mean difference in perceived barrier was lower the control group (Table 2).

Comparison of the mean differences before and three months later of training in both groups showed that the mean difference of knowledge and all constructs except perceived barrier in the intervention group increased and in terms of perceived barrier, this difference significantly reduced, which reflects the impact of education through Telegram on changing knowledge and beliefs (Table 3).

Table 2. Comparison of Mean Difference of HBM Constructs' Scores Before and Immediately After Training in Two Groups

Constructs	Intervention group	Control group	P-value
	Mean±SD	Mean±SD	
Knowledge	8.18±3.07	0.27±2.47	<0.001
Perceived susceptibility	3.89±2.26	0.23±1.02	<0.001
Perceived severity	5.50±4.76	-0.02±2.76	<0.001
Perceived benefits	2.00±2.65	-0.02±1.07	<0.001
Perceived barriers	-17.14±10.06	-1.40±5.30	<0.001
Health motivation	1.85±2.40	0.06±1.97	<0.001

Table 3. Comparison of Mean Difference of Hbm Constructs' Scores Before and Three Months Later Training in Two Groups

Constructs	Intervention group	Control Group	P-value
	Mean±SD	Mean±SD	
Knowledge	8.35±3.20	0.17±3.47	<0.001
Perceived susceptibility	4.83±2.69	0.76±2.46	<0.001
Perceived severity	8.78±5.22	1.00±5.71	<0.001
Perceived benefits	2.68±3.21	-0.31±3.32	<0.001
Perceived barriers	-18.81±9.21	0.36±8.01	<0.001
Health motivation	2.16±4.23	-1.02±4.33	<0.001

The data also showed that in the intervention group the mean difference of the scores before and immediately after training on the knowledge and all the constructs was significant higher than score of before training, and about the perceived barriers this difference has decreased significantly than score of before training (P<0.001), and these findings of the mean difference of scores before and three months later of training was also correct. However, the changes in knowledge and other constructs in the control group were not significant in during study.

Findings showed that within the three months after the training, 23 participants (47.9%) in the intervention group performed the Pap smear test, while in the control group only 4 participants (5.8%) did the test (P<0.001).

Discussion

The results of the present study showed efficiency of training based on HBM through Telegram on improving women's belief and performing Pap smear test. The training program based on this template in intervention group could improve the knowledge of cervical cancer and change the individuals' belief in susceptibility and severity of cervical cancer and barriers and benefits of Pap smear, and subsequently caused them to do Pap smear, while in the control group, there wasn't any significant performance regarding the Pap smear test.

In intervention group, immediately and three months after the training, knowledge had a significant increase, but there wasn't any significant change in the control group and the mean score of knowledge during the study in the intervention group was significantly higher than the control group. The findings of previous studies which used the face to face training (Coronado Interis et al., 2015; Fouda et al., 2013), TV ads (Kye et al., 2014) and multimedia (the second generation of the E-health) (Heydari et al.,2015) confirm the findings of the present study, but the web-based training through email (the second generation of the E-health) in the study of Çapık et al. (2012) did not cause significant change in knowledge (Çapık et al., 2012) that the reason for this paradox is perhaps the lack of familiarity with online learning and training participants via email.

The results showed a significant increase in perceived susceptibility of the intervention group immediately and after three months of training compared to before the training, also, the mean difference of perceived susceptibility during the study in the intervention group was significantly higher than the control group. Results of studies used the first and second generation E-health interventions (Kye et al., 2014; Çapık et al., 2012) confirms the findings of the recent study. However, the face to face training program during two sessions in the form of lecture (Tahmasebi et al., 2014) had results contrary to the recent study; so, it seem that continued and prolonged exposure to sensitizing training messages increases the perceived susceptibility of cervical cancer and doing the Pap smear test, and constantly sending sensitizing messages through e-health interventions such as the Telegram can be effective in creating and enhancing sensitivity to cancer.

The perceived severity immediately and three months after training increased in the intervention group and the mean difference of scores gained by perceived severity during the study was significantly higher in the intervention group than the control group. This result is consistent with findings from different studies in which the training was provided through face to face training (Fouda et al., 2013; Shojaeizadeh et al., 2011; Pirzadeh et al., 2012), using self-learning package (Hanaa et al., 2014), and combined teaching practices including face to face training and short messages from mobile phones (the third generation of the E-health) (Kalan-Farmanfarma et al., 2014).

Perceived benefit also obtained some findings similar to the perceived susceptibility and severity. These findings were consistent with the results of studies with face to face training (Fouda et al., 2013; Barbouni et al., 2013; Shojaeizadeh et al., 2011) and the cancer preventive training using TV ads (the first generation of electronic interventions). The findings showed that training through Telegram instant messaging services like any other method of training could show the advantages of doing Pap smear test in prevention of cervical cancer.

The results showed that immediately and three months after training, perceived barriers in the intervention group significantly decreased but in the control group no significant change was observed and the mean difference score of perceived barriers during the study in the intervention group was significantly lower than the control group. The results of this study were in line with the findings of several studied in which the HBM-based training was provided face to face and by lecture (Barbouni et al., 2013; Shojaeizadeh et al., 2011), by multimedia (the second generation of E-health) (Heydari et al.,2015), web-based training (Çapık et al., 2012; Lee et al., 2017), TV ads (Kye et al., 2014) and reminders sent by mobile phone (Ersin et al., 2013), therefore these results confirmed the effectiveness of the intervention program in the field of E-health. In other words, correcting people's perception of barriers to screening behavior is possible through HBM-based face to face training as well as using different methods of E-health. However, due to easier access to such training methods, including Telegram, they can be used as alternative training methods.

The results of this study showed that immediately and three months after training, the health motivation significantly increased in the intervention group and the mean changes in health motivation score during the study period in the intervention group had a significant increase compared to the control group. In one study, a two-session face to face training program in the form of lecture couldn't increase the score of health motivation in the intervention group (Tahmasebi et al., 2016); In addition, training for doing based on the health belief model through multimedia also failed to change this construct significantly (Heydari et al., 2015) which this contradiction could be due to the participants' constantly facing with health messages during the study and extended exposure increased their health motivation.

The results of the present study indicate the effectiveness of training through Telegram on doing the

Pap smear test. The results of face to face training based on health belief model (Barbouni et al., 2013; Shojaeizadeh et al., 2011) and usage self-training package (Hanaa et al., 2014) indicate the effectiveness of educational interventions on doing Pap smear test within three months which is consistent with the results of the present study.

Some of the limitations of this study can be the short follow-up period, if it was long, more participants might have found enough time for Pap smear test. Secondly, the examination of constructs and knowledge was as self-report which sometimes tend to be overestimated; of course, due to the both groups were examined with a method, this fact is true for both groups.

In conclusion, the findings of this study indicate an increase in the women's knowledge, beliefs, and performance regarding doing the Pap smear test through the training intervention based on health belief model posted by Telegram instant messaging services. Therefore using this training method is recommended considering the cost-effectiveness for public use, lack of human resources in the health system for implementing the program in person, having access to mobile phones by most people, and the popularity of social media among the public. As a result, given that E-health interventions are in progress and they are in the early stages of development and assessment to change behavior, further research should be done on this new technology.

Declaration of Interest

Authors of this study have no conflict of interest to declare.

Acknowledgments

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