The Effect of Intervention Using Stages of Change Method to Improve Pap Smear Screening for Cervical Cancer

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ABSTRACT

Background & Objective: Cervical cancer screening is crucial for the early detection and prevention of this disease in women. Due to the prevalence of cervical cancer in Iraq, the current study aimed to improve Pap smear screening practices.

Materials & Methods: The present semi-experimental study was conducted in 2019 on 192 Baghdad-based women aged 20 to 60 with active medical records. Two groups of 96 people, intervention and control, were created. The intervention group received training based on the constructs of health belief and stages of change models to enhance Pap smear screening behavior. The control group participated in routine training on Pap smear screening behavior in health centers from health professionals. The participants completed a questionnaire created by the researchers in the pre-test and post-test stages. For data analysis, version 19 of SPSS statistical software and independent t-tests, paired t-tests, chi-square, and Fisher's exact test were utilized.

Results: A p-value of less than 0.05 was deemed statistically significant. Before the educational intervention, there was no significant difference between the two groups in the stages of behavior change (P>0.05). However, after the educational intervention, the intervention group significantly differed from the control group in the Pap smear screening change (P<0.01). Also, based on the paired t-test, the mean scores of the intervention group's knowledge, susceptibility, severity, barriers, and self-efficacy were significant before and after the intervention (P<0.05). After the intervention, the intervention group demonstrated significantly higher Pap smear screening behavior than the control group (P<0.01).

Conclusion: The utilization of educational intervention of the stages of change and health beliefs models has proven to be highly effective in bringing individuals to the action stage.

Keywords: Cervical cancer, Pap smear, Health belief, Stages of change

Introduction

Cervical cancer is a common prevalent female reproductive system cancer (1). Considering that the precancerous stage of this disease is lengthy and the patient survival rate in the stage of the precancerous lesions is high if treated, screening in the early diagnosis of this disease is crucial (2). Approximately one million women are diagnosed with advanced cervical cancer yearly, and over fifty percent perish. According to statistics, cervical cancer ranks sixth among cancer-related deaths (3).

Cervical cancer is one of the few that can be readily diagnosed during the precancerous phase. Pap smear screening is a procedure used to detect cervical diseases (4). Cervical cancer screening with the Pap smear increases the detection of pre-invasive disease in the early stages of invasive disease, thereby reducing the incidence and mortality (5). Multiple studies have demonstrated that Pap smear screening can reduce cervical cancer incidence and mortality. Therefore, Pap smear screening is considered a health and promotion behavior among married women (6).

The survival rate of patients with cervical cancer is directly proportional to the stages of diagnosis. The survival rate for women with carcinoma in situ is close

to one hundred percent (7). Pap smear screening is repeated annually after initiating sexual activity and every three years after two negative tests. Given the high prevalence of cervical cancer among women, the high diagnostic power of Pap smear screening, and the ease with which it can be performed, it is expected that all women will regularly undergo screening. While in developing nations, the screening referral rate is unfavorable (8).

The following factors have been identified as influential factors in the lack of proper Pap smear screening coverage: lack of access to health centers, a lack of trained human resources, a greater allocation of resources for treatment (which is more expensive than prevention), lack of knowledge, gender-based social and cultural barriers (9). Many women in many societies are unaware that uterine cancer is preventable, and in many cases, they only go to the doctor when they are sick (10). Despite being aware of these cases, women in some societies refuse to be screened for reasons such as shame, fear, and a lack of trust in health workers (11).

The stages of change model are the most widely used models for planning effective educational interventions (12). This model has been established as a comprehensive model for behavior change that focuses on people's decision-making, with the stages of change serving as its central structure (13). The stages of change model are built on understanding people's readiness to accept change. According to the hypotheses of the stages of change model, behavior change is a stage process that necessitates interventions that are appropriate to the stage of people's preparation and assist them in passing through various stages (14). This model describes a person's current health behavior and intention to change it. According to this model, people go through a series of steps to change their behavior (15). The different states of the stages of change model are shown schematically in Figure 1.
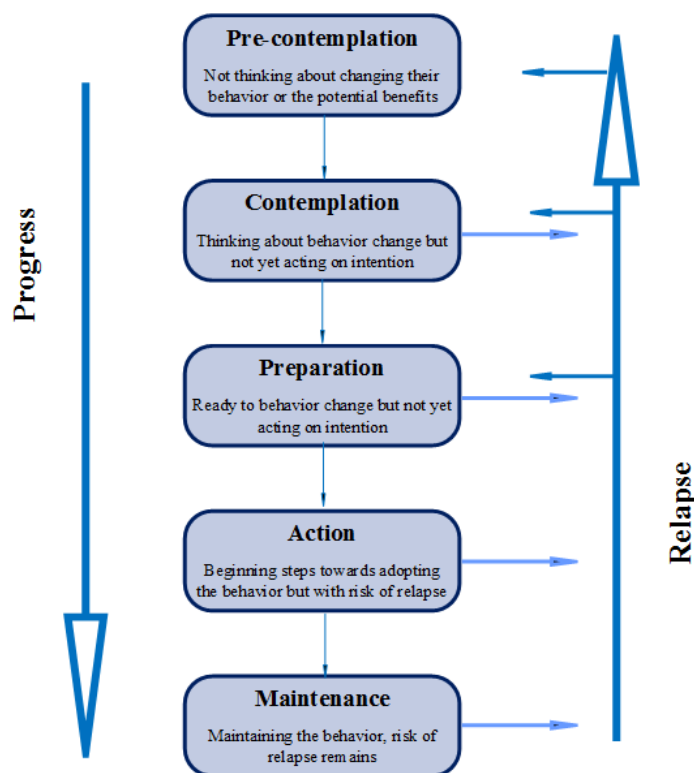

Figure 1. Schematic form of the stages of change model

The health belief model (HBM) is an additional educational model in health education. This model contains the following components: knowledge, perceived severity, perceived susceptibility, perceived barriers, perceived benefits, and perceived self-efficacy. Numerous researchers acknowledge that HBM is effective at promoting preventive health behaviors. This model has been utilized to teach individuals in each stage of Pap smear screening behavior modification (16-18).

Due to the insufficient knowledge of women eligible for Pap smear screening for cervical cancer and the method of screening for this cancer, it is evident that research in this area is necessary. Cervical cancer is the second leading cause of death among sex-related cancers in Iraq, so identifying its risk factors is also crucial (19). The present study aimed to improve Pap smear screening behavior by identifying women in the stages of change model's pre-contemplation, contemplation, preparation, and relapse steps. The innovation of the current study was that training for

individuals of all stages was based on the health belief model's structures.

Methods

In 2019, this field experiment-based study was conducted for cervical cancer referred to treatment centers in Baghdad. In order to conduct the study, a questionnaire containing background information and questions regarding the six structures of the stages of change model was first completed. Next, women who were in the stages of change without action and maintenance, were extracted based on the questionnaire. The size of the statistical population was calculated to be 283 individuals based on the health belief model (HBM). Among the 283 women, 192 were selected by a simple random sampling method, entered this study, and were randomly assigned to both groups of 96 individuals: intervention or control. Inclusion criteria included married women between the ages of 20 and 60 with minimal literacy, an active health record, and no prior participation in an educational intervention regarding cervical cancer. Exclusion criteria included refusal to participate in the study, refusal to complete the questionnaire, and absence from more than two sessions. The participants' participation in the study was informed and voluntary, and they retained the right to withdraw. In order to comply with ethical considerations, the research's objectives and procedures were explained before its commencement.

To match the both groups, the number of people in the intervention group in each of the stages of Pap smear screening behavior change (pre-contemplation, contemplation, preparation, and relapse) was randomly selected among the people in the control group in the same number for each step. This is due to the comparability of the two groups regarding the changes at each stage of behavior change following intervention implementation. It should be noted that participants in both groups completed the pre-test and post-test questionnaires based on the constructs of the health belief model. Notably, the pre-test and post-test stages were conducted immediately before and after the intervention.

The intervention group received training based on the HBM to improve Pap smear screening behavior. In contrast, the control group received regular training about Pap smear screening behavior from health professionals. In order to ensure that the control group received regular Pap smear screening training, the researchers contacted the participants via telephone to confirm that healthcare professionals had provided it.

In addition, altering the days of medical center visits reduced the possibility of information transfer between the groups. In addition, the complete specialization of the intervention group's training based on the HBM's constructs effectively overcame the lack of information exchange between the two groups. The instrument was a researcher-created questionnaire that included: personal information, questions about Pap smear screening behavior based on the transtheoretical model's (TTM; Prochaska & Marcus, 1994) six stages of change, and questions about various aspects of the health belief model regarding Pap smear screening behavior and cervical cancer [20]. Each question in all constructs has five options on a Likert scale ranging from disagree entirely to agree and was scored from 1 to 5.

The reliability of the questionnaire was checked using the content validity method; so, the questionnaire was developed based on reputable scientific sources and recent research and was then reviewed by ten professors, whose feedback was incorporated into the questionnaire. To determine the reliability of the questionnaire regarding questions regarding the stages of change, it was conducted using a model of the stages of change derived from reliable scientific studies on Pap smear examinations. According to behaviors and behavioral intentions, the questions regarding stages of change were divided into three groups: active (action and maintenance stages), inactive (pre-contemplation, contemplation, and preparation stages), and recurring (relapse stage). Then, retesting was conducted; the correlation coefficient of 0.81 was representative of the stages of change questionnaire's reliability. Cronbach's alpha was also applied to the health belief model construct questions. A Cronbach's alpha value of 0.82 was obtained for the structure of perceived sensitivity, 0.79 for perceived severity, 0.76 for barriers, 0.74 for benefits, 0.84 for self-efficacy, and 0.73 for knowledge. After collecting the data, it was analyzed with SPSS (SPSS software, version 19, IBM, USA) and the independent t, paired t, chi-square, and Fisher's exact test. In statistical terms, a *P*-value of 0.05 or less indicates statistical significance.

Results

The present study analyzed the data of 192 participants in both the intervention and control groups. Before the intervention, Table 1 displays the characteristics of the participants in the two groups. According to the results of Table 1, it is clear that there is no significant relationship for any of the demographic variables (P>0.05).

Table 1. Comparison of the mean demographic variables of two groups

Variable	Mean ± SD*		P-value
	Intervention	Control	
Age	37.42±10.46	36.91±10.14	0.53

Variable	Mean ± SD*		P-value
	Intervention	Control	
marriage age	19.73±4.07	20.39±3.82	0.87
Age of first pregnancy	21.57±4.26	21.78±4.41	0.62
Number of pregnancies	2.84±1.17	2.76±1.12	0.67
number of births	2.53±1.03	2.38±0.84	0.71
number of children	2.26±0.94	2.34±0.81	0.46

*SD= Standard deviation

Table 2 indicates the results of the post-test stage, using the chi-square test. According to Table 2, after the educational intervention, 83 people in the intervention group (86.5%) were promoted to the preparation, action, and maintenance stages. In contrast, 10 people in the control group (10.4%) were promoted to these stages.

Table 2. Post-test comparison of the stages of change in Pap smear screening

Stages of change	Group		Chi-square test
	Intervention	Control	
Pre-contemplation	2	25	
Contemplation	5	19	
Preparation	18	6	$x^2=36.38$
Action	29	1	$P<0.001$
Maintenance	36	3	
Relapse	6	42	

The results of the paired t-test are shown in Table 3. According to the Table 3, when examining the changes in the mean of the HBM in both groups pre- and post-test, the mean of all constructs of the HBM (except perceived benefits) in the dimension of health beliefs changed significantly ($P<0.05$), except for the construct of perceived sensitivity. There was a statistically significant difference between the groups after the educational intervention, but there was no difference between the groups before ($P>0.05$).

Table 3. Changes in the HBM construct scores before and after the educational intervention

HBM Structures	Group	Mean ± SD*		P-value
		Pre-test	Post-test	
Knowledge	Intervention	2.54±1.37	5.41±1.16	<0.001
	Control	2.38±1.33	2.74±1.68	0.473
Susceptibility	Intervention	16.42±3.29	12.50±2.63	0.03
	Control	16.32±3.17	15.67±3.38	0.18
Severity	Intervention	18.23±4.06	22.19±3.72	0.004
	Control	18.13±3.94	18.78±4.33	0.36
Benefits	Intervention	17.42±5.11	16.27±5.34	0.08
	Control	18.22±4.97	15.82±5.18	0.76
Barriers	Intervention	25.16±6.84	16.79±5.39	<0.001
	Control	25.71±7.26	24.83±6.67	0.12
Self-efficacy	Intervention	17.59±3.65	22.41±4.82	<0.001

HBM Structures	Group	Mean ± SD*		P-value
		Pre-test	Post-test	
	Control	17.06±3.34	17.80±3.86	0.64

*SD= Standard deviation

The outcomes of Fisher's exact test are presented in [Table 4](#). Before the educational intervention was implemented, there was no statistically significant regarding Pap smear screening performance between the groups (P<0.05). This relationship between both groups became statistically significant in the post-test phase (P<0.001).

Table 4. Comparison of Pap smear screening performance before and after the educational intervention

Time	Group	Performance of Pap smear screening		P-value
		No	Yes	
Post-test	Intervention	35 (36.46%)	61 (63.54%)	<0.001
	Control	93 (96.87%)	3 (3.13%)	
Pre-test	Intervention	0	96 (100%)	-
	Control	0	96 (100%)	

Discussion

The current study, which was conducted to improve Pap smear screening behavior, revealed that prior to the intervention, 54 persons (56.3%) of the intervention group and 59 persons (61.5%) of the control group had no history of Pap smear screening (pre-contemplation, contemplation and preparation stages). Other participants who had previously participated in this experiment did not wish to repeat Pap smear screening (relapse stage). After the educational intervention, there was a significant difference in the stages of change between the intervention and control groups (P<0.001). So, 83 (86.5%) of the women in the intervention group progressed to preparation, action, and maintenance. Only 10 (10.4%) women in the control group reached these stages. The mentioned result confirms the impact of the intervention of the HBM on the progression of change stages toward the stages of behavior preparation, action, and maintenance. Pap smears are used for screening [21-23].

Because the stages of change model focus on behavior change, it has been widely used with positive results in health education interventions. So far, no study on the effect of intervention of the stages of Pap smear screening behavior change in Baghdad has been conducted. However, other related studies, all of which were depending on the stages of change model, demonstrated the effectiveness of this model in educational interventions [24, 25].

After the intervention, a significant difference in the mean knowledge between the two groups became significant, demonstrating the impact of the intervention on raising people's knowledge. Numerous studies demonstrate the positive effect of educational interventions on enhancing women's knowledge [26, 27]. Also, many studies have demonstrated that women who were previously informed about cervical cancer and Pap smear screening (action, maintenance, and relapse stages) had a higher knowledge score than those who had no history of Pap smear (pre-contemplation, contemplation, and preparation stages) [28, 29]. The present study indicated a significant difference in the mean of susceptibility and severity between the two groups at post-test. Also, there was a significant difference between pre- and post-test was implemented in the intervention group [30-32].

In the current study, the perceived benefits score difference between the groups before and after the implementation of the educational intervention was not statistically significant. This may be because all study participants have a case in the health care centers and have been informed of its benefits by the health care staff. The results indicated a significant difference in the mean scores of perceived barriers between the two groups in post-test, and also between before and after the educational intervention was implemented in the intervention group. By influencing people's Knowledge and comprehension through an appropriate educational program, it is possible to help reduce perceived barriers and increase the desirability of Pap smear screening, according to research [33]. Also, according to some studies, in the pre-contemplation stage, people focus more on obstacles such as the distance to the doctor's office than they do on the problem of cervical cancer, which leads them to forego the screening behavior [34].

After the intervention implementation, there was a significant difference of the mean self-efficacy for Pap smear screening between both groups, consistent with the findings of numerous studies [35, 36]. In reality, the

persons believe they can perform the desired behavior after the training. In addition, several studies indicate that the perceived self-efficacy score for Pap smear screening is lower during the pre-contemplation stage (37).

Limitations of this Study

Pap smear screening is old, and it is one of the limitations of the present study. It's important to note that the lack of facilities in Baghdad's treatment centers means that the Pap smear screening method has had to be used. For this reason, it is suggested that updated guidelines and recommendations be used for future studies. The absence of follow-up is one of the limitations of the current study. In addition, the study was conducted for a single period and in a treatment center, which are both limitations. Therefore, it is suggested that future research investigate different regions and periods. Because the present study is one of the first educational interventions based on models of stages of change and health beliefs in the field of promoting Pap smear screening behavior, it is recommended that similar studies be designed and implemented in various locations to enhance Pap smear screening behavior. According to the present study's findings and other studies of a similar nature, the use of educational models of the stages of change and health beliefs has proven to be highly effective in bringing individuals to the action phase. In order to increase the quality of effective practical training for the target population, teaching these models to the treatment staff in the form of educational workshops will be effective in enhancing Pap smear screening behavior.

Conclusion

An educational intervention with the stages of change and health beliefs models can significantly affect Pap smear screening. As 56.3% of the intervention group did not have a history of Pap smear screening prior to the start of the intervention (pre-contemplation, contemplation, and preparation stages), and 43.7% had no desire to do this test despite having a history of Pap smear screening (relapse stage). The intervention based on the HBM moved 86.5% of participants to the regular Pap smear testing stages (action and maintenance stages). A significant difference between the mean of knowledge, severity, barriers, susceptibility, and self-efficacy between the intervention and control groups confirmed the intervention's efficacy after implementing the educational intervention.

Acknowledgments

Conflict of Interest

There is no conflict of interest between the authors of the current study.

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