Original Article

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Quick Response Code:

Website: www.jehp.net

DOI: 10.4103/jehp.jehp_1_22

Women's decision to adopt or not adopt cervical cancer screening: Application of precaution adoption process model as the theoretical framework

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Received: 01-01-2022
Accepted: 13-03-2022
Published: 26-11-2022

Abstract:

BACKGROUND: The cancer is uncontrolled growth and spread of cells that affect almost all parts of the body. One of the most prevalent cancers in the female genital system is cervical cancer. The aim of present study was to determine the effect of educational intervention using the Precaution Adoption Process Model (PAPM) on cervical cancer screening behavior (Pap smear test) among women.

MATERIALS AND METHODS: In this interventional study that was done in Karaj health centers (2016), women (aged 15-49 years) were in the third stage of behavior change process based on PAPM randomly assigned to experimental and control groups. The data collection tool was a PAPM-based questionnaire whose validity and reliability were confirmed. Gathered data were analyzed using statistical software SPSS 16 and statistical tests (*t*-test, repeated measures analysis of variance, and Wilcoxon, Chi-squared, Fisher's exact, and Mann-Whitney tests).

RESULTS: The result showed that the stages of the decision-making process between the two groups were significantly different at the time immediately and 2 months after the intervention ($P > 0.001$). Also the results of the intervention based on the health belief model health belief model (HBM) components, regarding variables of knowledge, perceived susceptibility, perceived benefits, perceived barriers, and subjective norms, the mean scores in the experimental group were significantly different between the three sections before, immediately, and 2 months after the intervention ($P > 0.001$).

CONCLUSIONS: This study provides hints how persons could be influenced to move from the "Deciding about action" positions into to the stages of decided to act, adoption, and maintenance for promoting cervical cancer screening behavior.

Keywords:

Cervical cancer, intervention, model, theory-based, screening

Introduction

The cancer is uncontrolled growth and spread of cells that affect almost all parts of the body.[1] One of the most prevalent cancers in the female genital system is cervical cancer.[2] Cervical cancer after breast cancer is the second most common cancer among women. Annually approximately 530,000 women with cervical cancer are diagnosed worldwide and 270,000 of them die because of the disease. More than 85% of these deaths are observed in developing countries.[3-6] Although there is a possibility of cervical cancer at any age,[7] the average age of patients at diagnosis time is 52 years and the distribution of cervical cancer have two peaks of 35-39 years and 60-64 years of

How to cite this article: Sharifipour Z, Rakhshanderou S, Mehrabi Y, Safari-Moradabadi A, Ghaffari M. Women's decision to adopt or not adopt cervical cancer screening: Application of precaution adoption process model as the theoretical framework. J Edu Health Promot 2022;11:363.

age.[8,9] Cervical cancer in Iran is the second most common cancer after breast cancer and the fifth female lethal cancer.[10] The report of the Iranian Ministry of Health indicates a high incidence (9.5 per 100 thousand people year) of this cancer.[11] Precaution Adoption Process (Pap) tests are one of the most reliable and effective tests available for cancer screening by age of 21 years. Pap tests should be done on a regular basis. If the test result is normal may take up to three years would not need to be retested.[12] This test has been successful in reducing cervical cancer incidence to the 79% and in the mortality has been successful to 70%.[13]

Some studies show that the most important factors driving the Pap test are health workers recommend methods of prevention and awareness by the media. The most important barriers in doing Pap smear test are a lack of awareness of the existence of such screening and lack of awareness of the existence of such centers to do the test.[14] One of the essential issues of society is that education in it is necessary and is the training in maintaining public health.[15] Health education is a planned combination of learning experiences for, enabling and strengthening voluntary behaviors which lead to health in individuals, groups, and communities. In other words, the ultimate goal of health education is providing health behavior and its consistency.[16]

Point to be considered in designing educational interventions is that all people are not at an equal level in decision-making process. Therefore, for improving efficiency of the interventions, individuals' decision-making stage should be determined first and then designed for each stage.[17] For this purpose, we can refer Precaution Adoption Process Model (PAPM). This model deals with Pap and reviewing the process of involving people in the change and its aim is explaining the decision-making of a person in doing a task and how the transformation of that decision to task by him. PAPM identifies seven stages along the path from a lack of awareness to action. At some initial point in time, people are unaware of the health issue (Stage 1). When they first learn something about the issue, they are no longer unaware but they are not yet engaged by it either (Stage 2). People who reach the decision-making stage (Stage 3) have become engaged by the issue and are considering their response. This decision-making process can result in one of three outcomes: They may suspend judgment, remaining in Stage 3 for the moment. They may decide to take no action, moving to Stage 4 and halting the precaution adoption process, at least for the time being. Or, they may decide to adopt the precaution, moving to Stage 5. The third stage is a crucial phase in behavior change process among individuals. There are important differences between people who have not yet formed opinions and those who have made decisions. People who have come to a definite position on an issue, even if they have not yet acted on their opinions, have different responses to information and are more resistant to persuasion than people who have not formed opinions.[18-20] Thus, it could be mentioned that the third phase is the most appropriate one for conducting interventions. For those who decide to adopt the precaution, the next step is to initiate the behavior (Stage 6). A seventh stage, if relevant, indicates that the behavior has been maintained over time (Stage 7) [See Figure 1].[21] The PAPM has been applied to many types of health behaviors, including cancer screening.[22-25]

Study research questions ask whether a stage of changes model, in this case the Pap, measures effects of an intervention that uses targeted methods, what level of behavior change is associated with those effects, and finally what predicts changes in stages of decision-making for Pap test to prevent cervical cancer; therefore, authors plan was to strategically take validated health behavior concepts (the Health Belief Model) along with domain specific knowledge scales (cervical cancer screening) to determine their ability to discriminate people among the stages of change based on the PAPM. In the clinical setting, patient education based upon principles of health behavior may improve opportunities for prevention related to cervical cancer screening.

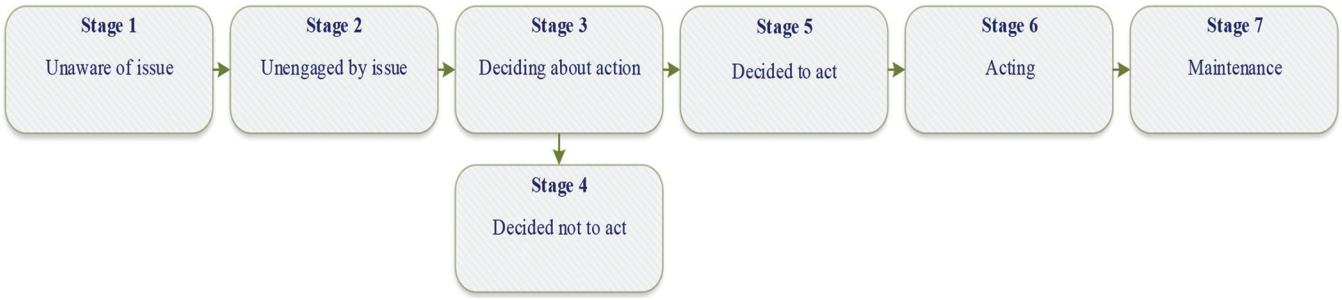

Figure 1: Stages of the precaution adoption process model. (Source: Weinstein ND, Sandman PM. The precaution adoption process model. In: Glanz K, Rimer BK, Lewis FM, editors. Health Behavior and Health Education: Theory, Research and Practice. 3rd ed. San Francisco: Josey-Bass; 2002. p. 121-43.)

Materials and Methods

Study design and sampling

This interventional study (before and after) was conducted in the two groups (experimental or control group) during April to August 2016. The studied individuals were 140 women who referred to health centers in the city of Karaj in 2016.

The sample size by use of statistical formula $n = \frac{2\left[Z_{\left(1-\frac{a}{2}\right)} + Z_{(1-\beta)}\right]^2 \left(S^2\right)}{\Delta^2}$ was 64 individuals that with an attrition rate of 10%, finally 140 women (70 subjects in the experimental and 70 in the control group) were considered.

The sampling method was randomized and multistratified. From among all healthcare centers located in the target region, four were randomly selected. The optimal size of each cluster was estimated to be 35. Selection of the centers, allocation to either the experimental or control group, or cluster formation were all random. Random sampling method was used to select samples from each cluster. First, the women attending health centers were screened based on the algorithm of taking-care process and those who were in the third round of this model were selected. Then, among the screened individuals, 70 individuals were considered for control group and 70 of them were considered, as the experimental group, randomly.

The criteria for inclusion to the study were: Consent to participate in the study, those who were in the third stage of PAPM (selecting people based on questions related to the model PAPM), no history of hysterectomy and cervical cancer (based on self-report), women aged 15-49 years who were married at least once, and the lack of doing a Pap smear test. Also, exclusion criteria considered as were lack of continuous attendance in educational sessions or during completing the post-test questionnaire (more than two sessions of six sessions). In the health system of Iran, approximately all women have health records and, on the other hand, due to their numerous visits to health centers they are familiar and engaged with the issues such as cervical cancer, Pap smear, etc., Therefore, in this study the focus of the research team was on stage 3 of PAPM.

Dependent measures

For this study, we defined participants' stage of decision-making about cervical screening based on respondents' answers to three questions used for assessing the Pap.[26,27]

A seven-stage changes of change schema was constructed based on respondents' answers to three questions: (i) 'Have you ever heard about cervical screening? coded yes or no; (ii) Have you ever had a cervical screening test? coded yes or no; and (iii) Which of the following best describes your thoughts about cervical screening?, with four response categories including 'I've never thought about it, I am undecided, I have decided I don't want it, and I have decided I do want it.' Based on sets of answers respondents were initially categorized into seven stages of decision-making outlined in Table 1.

Independent measures

Independent measures used in this study include sociodemographic measures of age, marital status, level of education, parity, history of cervical cancer in the family, contraception method, and history of smoking.

In addition, we generated six scales from respondents' answers to questions indicating participants' attitudes and beliefs about cervical screening (Pap test). These are shown in Table 2.

Tool validity/reliability and scoring

To assess the validity of tools of the content validity and for testing the reliability, the test-retest methods and internal consistency (Cronbach's alpha) were used. Assessing the validity of the questionnaire was done through multi-item scale, including relevance and simplicity; clarity of the questions was examined. Therefore, all questions in the questionnaire were separately provided for 12 skilled professionals in this field (eight Health Education and Promotion professionals, one of the Obstetricians and Gynecologists, two Midwives, and one statistician), and

Table 1: Stages of decision making from the precaution adoption process

Classification question	Stage	Classification question
1. Have you ever heard about Pap Test?		Stages definition
No	Stage 1	Unaware of preparedness
Yes [Go to 2]		
2. Have you ever had a cervical Pap Test?		
Yes	Stage 6	Acting
No [Go to 3]		
3. Which of the following best describes your thoughts about Pap test?		
I've never thought about Pap Test	Stage 2	Aware but not engaged
I'm undecided about Pap Test	Stage 3	Engaged and trying to decide what to do
I've decided I don't want to Pap Test	Stage 4	Decided not to ac
I've decided I do want to Pap Test	Stage 5	Decided to act but not yet acted

Table 2: Description of Independent measures

Construct	No. of Items (Format)	Scoring (Range)	Item Example
1) Knowledge	21 items (True-False-Don't Know)	'correct' response=2, 'don't know' response=1, 'incorrect' response=0 (0-42)	At what age the risk of cancer of the cervix is more?
2) Perceived susceptibility:	7 items/5 point Likert Scale	Strongly Disagree=1, Disagree=2, No idea=3, Agree=4, Strongly Agree=5 (7-35)	I am at risk for cervical cancer
3) Perceived severity	7 items/5 point Likert Scale (strongly disagree- strongly agree)	SD=1, D=2, NI=3, A=4, SA=5* (7-35)	if I get cervical cancer I would have to spend more time and costs for my treatment
4) Perceived benefits	6 items/5 point Likert Scale (strongly disagree- strongly agree)	SD=1, D=2, NI=3, A=4, SA=5 (6-30)	by performing Pap tests and timely visits to the doctors the physical symptoms of cancer will be reduced
5) Perceived barriers	8 items/5 point Likert Scale (strongly disagree- strongly agree)	SD=5, D=4, NI=3, A=2, SA=1 (8-40)	I do not do Pap tests because I do not know the right time and conditions
6) Subjective norms	5 items/5 point Likert Scale (strongly disagree- strongly agree)	SD=1, D=2, NI=3, A=4, SA=5 (5-25)	my wife believes that I should do Pap tests regularly

*SD=Strongly Disagree, D=Disagree, NI=No Idea, A=Agree, SA=Strongly Agree

to assess the content of the questionnaire, the Lavsheh method was used. Content validity ratio and content validity index were calculated for each question and as for all the questions were more than acceptable value all the questions on the questionnaire, such as the question was not removed. Also, 10 women similar to the target population were used for the face validity of the questionnaire (clarity and simplicity). It should be noted that these subjects were not included in the study. Measurement of the reliability of questionnaires was done through internal consistency and by doing an alpha test on 30 people of similar demographic characteristics of the study population which were for perceived susceptibility 0.72, perceived severity 0.79, perceived benefits 0.72, perceived barriers 0.72, and subjective norms 0.92; for measuring the reliability of the questions of the awareness test-retest method was used and the intraclass correlation coefficient was 0.82.

Procedure and intervention

First, using the algorithm that determines the stage of this model those who were at Step 3 were selected (the third step PAPM which people consider during decision-making about the practice, involving the thought about screened and participation). Then between these individuals, two groups of control and experiment were determined and the pilot test was done by the investigator. As per the objectives, the available resources and the obtained results of pretest the assessment needs was, materials and teaching methods, the number of sessions for the training were revealed. The first session included an introduction to cervical cancer, the symptoms and risk factors to raise awareness, the perceived susceptibility, and severity of the side effects of cancer and the second session was familiarity to how to do the Pap test, the right time and conditions of it to solve perceived barriers, and to boost the perceived benefits and perceived barriers and subjective norms regarding the Pap smear test. The educational sessions by the researcher for the experimental group were done as a lecture, answer and response, video screenings during one month and six sessions (each session = 45 minutes) in the classrooms, health centers, and the control group received no intervention. The used materials and educational media used included PowerPoint slides, video projector, text, and transcoder on the behavior of screening for cervical cancer. The content of each session was set in accordance with attendants' learning power, use of credible scientific sources, and field specialists' comments. Assurance from accordance of materials' contents with attendants' learning power was obtained after pretesting materials (pamphlets, PPT slides, etc.) among 10 mothers similar to main samples of study. Immediately and after two months from the last training session, the subjects were again referred to the subjects (experimental and control), and to evaluate the effect of the intervention, the post-test was performed [See Figure 2].

Data analysis

The collected data were analyzed in SPSS version 16 through descriptive statistics such as mean, standard deviation, frequency, and percentage. Inferential statistics were also used including the *t*-test, repeated measures analysis of variance, Wilcoxon, Chi-squared, Fisher's exact, and Mann-Whitney tests. The significance level was set at $P < 0.05$.

Ethical considerations

The study on which these data analyses are based was approved by the Ethical Board Committee of Shahid Beheshti University of Medical Sciences (reference number IR.SBMU.PHNS.REC.1394.7). Issues were considered by the researcher in ethical

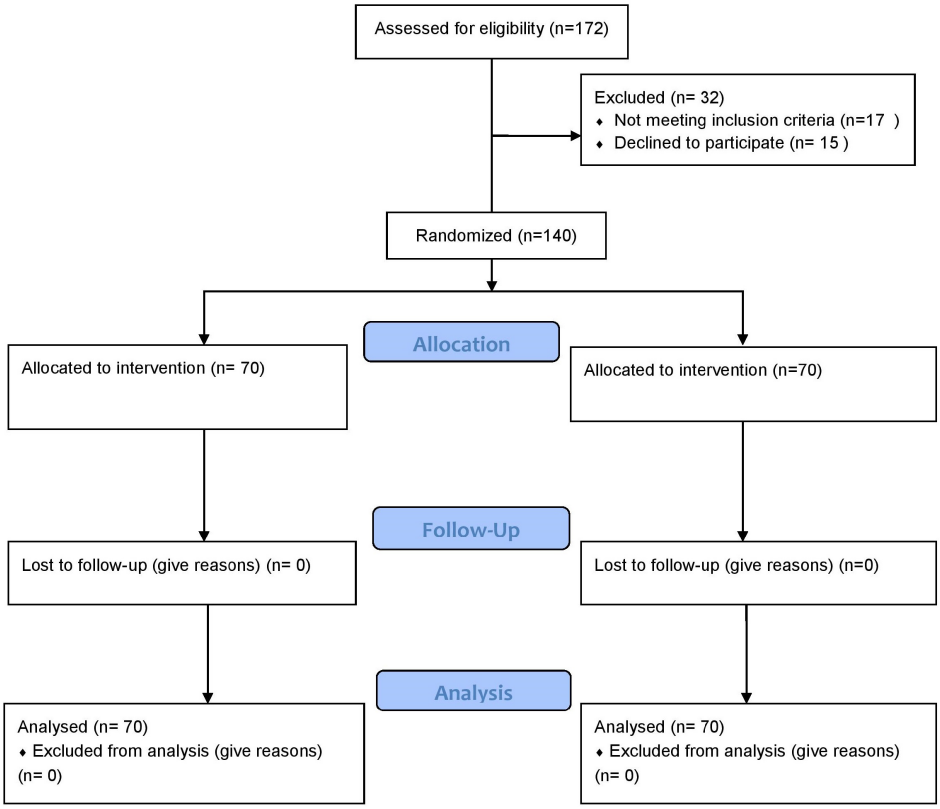

Figure 2: Consort diagram of the study

considerations. At first, from the University received a license and a referral for the healthcare center. The research units were confident about the confidentiality of the specifications and the information they obtained and were justified in terms of the objectives of the study and the reasons for the data collection. They were allowed to enter and leave the study. Suitable conditions were provided for a proper understanding of questions and responses for the subjects. After the end of the intervention period, the control group was trained using the slides that were provided for training in the experimental group.

Results

Regarding the requirement for attendance of women in centers to receive healthcare services, most of the samples were available in both groups and at all stages of the study. Also, due to the presence of the researcher during the completion of the questionnaires, the collected data were free spoilage (incomplete responses and illegible answers). Initially, the two groups were matched for demographic variables. There was no significant difference between them in terms of age with a mean of 29.92 and a standard deviation of 6.77 years (P = 0.49). The minimum age was 19 years and maximum age was 48 years. Also, with the mean of marriage 21.59 and standard deviation 4.03 years, there is no significant difference in terms of marriage age between the two groups (P = 0.48). There was no significant difference between two groups in terms of education level (P = 0.46) and the history of cervical cancer in the family of people (P = 0.625).

The results of the intervention based on the model components are shown in Table 3 and as can be seen, regarding variables of knowledge, perceived susceptibility, perceived benefits, perceived barriers, and subjective norms, the mean scores in the experimental group were significantly different between the three sections (before, immediately, and 2 months after the intervention (P > 0.001). However, this difference is not significant in the control group, except in the case of knowledge and perceived severity (P = 0.88). There was no difference between the two groups in the intergroup comparisons before the intervention, while immediately and two months later, the two groups had significant differences [Table 3 and Figure 3].

The result of the Mann-Whitney test showed that the stages of the decision-making process between the two groups were significantly different at the time immediately and 2 months after the intervention (P > 0.001). Also, Wilcoxon test showed that

Table 3: Comparison of mean and standard deviation of PAPM score components before, immediately and 2 months after intervention in two groups of Experimental and Control

Variable	Group	Before Intervention	Immediately after intervention			2 Months After Intervention				*P*
		Stage 3	Stage 3	Stage 4	Stage 5	Stage 3	Stage 4	Stage 5	Stage 6	
Knowledge	E	59.21±11.31	91.74±4.83	88.88±10.64	90.94±8.77	88.80±6.15	84.22±7.52	87.64±7.13	87.38±7.35	<0.001
	C	56.97±10.01	59.36±10.55	56.77±11.61	61.03±11.02	57.60±8.86	56.66±10.84	63.16±12.26	71.42±20.20	0.001
Perceived susceptibility	E	68.89±11.84	83.23±8.63	79.36±7.66	80.06±7.13	88.85±8.97	77.50±8.14	80.68±7.18	81.14±8.21	<0.001
	C	65.83±12.29	65.21±9.60	68.13±12.66	64.67±8.50	64.84±10.14	67.80±11.80	64.70±8.38	72.85±2.02	0.88
Perceived severity	E	73.87±16.95	86.66±10.33	82.22±9.45	87.39±11.06	90.00±10.79	79.64±11.16	91.22±9.02	88.85±11.85	<0.001
	C	73.26±13.74	74.16±8.45	80.87±11.56	74.28±10.38	74.20±8.91	78.85±12.16	74.11±5.93	82.85±24.24	0.02
Perceived benefits	E	89.90±10.44	90.00±10.23	88.15±10.68	90.14±10.67	94.33±8.61	83.33±10.83	91.50±9.68	92.66±8.86	<0.001
	C	82.80±11.68	81.30±10.29	87.94±15.00	83.03±12.24	79.72±10.09	87.11±14.07	85.29±11.96	85.00±7.07	0.54
Perceived barriers	E	69.71±13.86	82.00±10.69	75.83±6.12	78.31±9.90	84.75±11.63	71.87±7.98	76.36±9.66	74.50±11.94	<0.001
	C	69.53±12.92	68.26±11.80	68.26±12.55	68.40±14.15	67.36±12.33	66.66±12.59	70.73±11.98	76.25±5.30	0.10
Subjective norms	E	72.17±17.69	85.60±9.89	82.66±8.00	84.52±9.56	88.80±9.94	77.50±2.97	85.85±9.88	88.00±10.32	<0.001
	C	73.37±14.71	71.39±13.09	73.84±12.28	74.54±16.02	69.77±12.48	71.46±13.08	76.47±13.70	90.00±14.14	0.27

E: Experimental - C: Control

Table 4: Comparison of the stage of decision-making process of women about the prevalence of Pap smear screening, immediately and 2 months after the intervention between the test and control groups

Group	Immediately after the intervention			2 months after the intervention				*P* Wilcoxon test
	Stage 3	Stage 4	Stage 5	Stage 3	Stage 4	Stage 5	Stage 6	
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	
Experimental	15 (21.4)	9 (12.9)	46 (65.7)	10 (14.3)	8 (11.4)	42 (60)	10 (14.3)	<0.001
Control	46 (65.7)	13 (18.6)	11 (15.7)	36 (51.4)	15 (21.4)	17 (24.3)	2 (2.9)	0.001
P (Mann-Whitney test)		<0.001				<0.001		

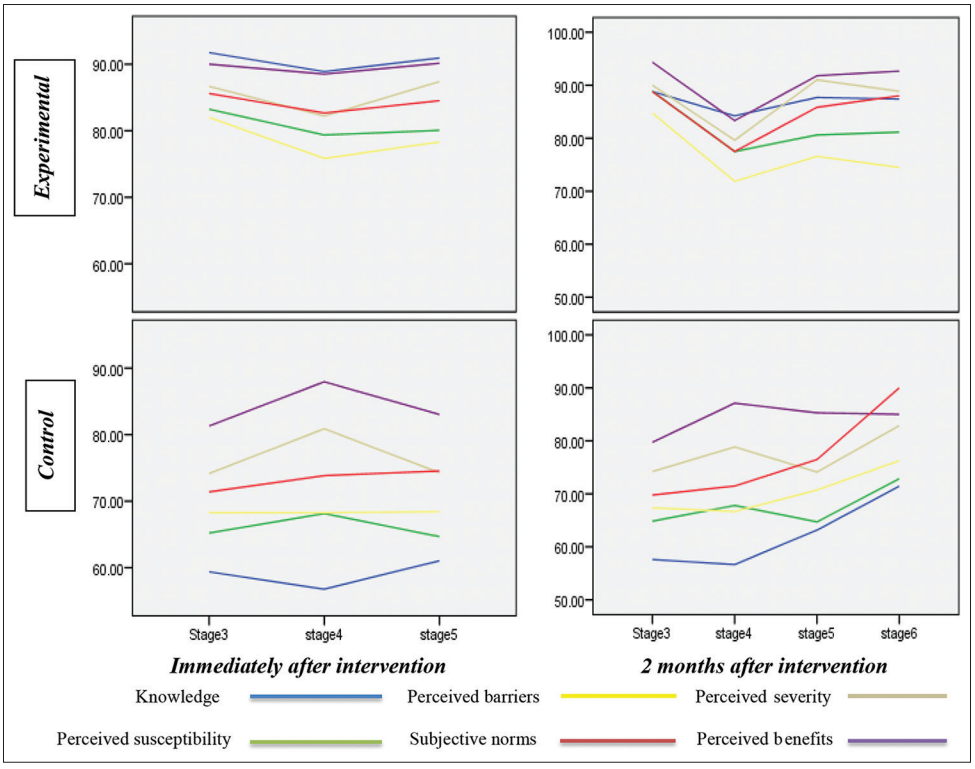

Figure 3: Stage tracking based of PAPM in before, immediately, and 2 months after intervention in two groups of experimental and control

the decision-making process stages changed significantly between the time immediately and 2 months after the intervention in each of the experimental and control groups [Table 4 and Figure 4].

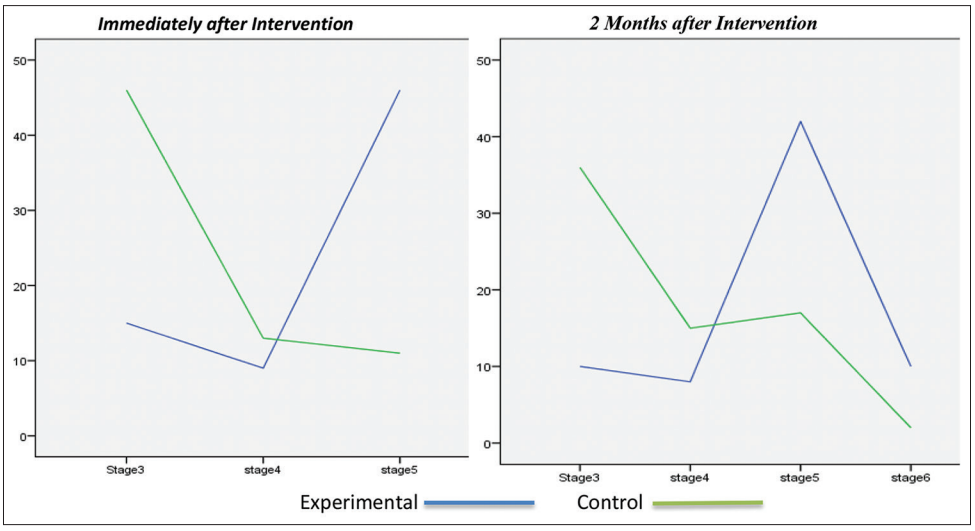

Figure 4: Stage tracking in experimental and control groups immediately and 2 months after intervention

Discussion

The aim of present study was to determine the effect of educational intervention using the PAPM on cervical cancer screening behavior (Pap smear test) among women.

The results of this study on screening behaviors showed that there is a significant difference between the two groups in the behavioral situation after the educational intervention so that two months after the intervention, in the experimental group, 10 (14.3%) and two (9%) of the experimental group performed the Pap smear test. The study by Dehdari *et al*.[28] shows that after the intervention, a greater percentage of women in the experimental group (61.9%) compared to the control group (7.7%) performed the Pap smear test. Fang *et al*.[29] in their study on Korean women reported that after the intervention, 82% of the experimental group and only 22% of the control group had a Pap smear. In this research, the results of the group study immediately and 2 months after the educational intervention showed that there was a significant difference between the stages of the decision-making process in the experimental and control groups. It also shows that the experimental group immediately after the test of 15 individuals in stage 3, nine individuals in stage 4 (the decision-making stage for nonscreening), and 46 in stage 5 (decision to act or readiness: when women decide to screen) were placed. Two months after the educational intervention, in the experimental group, 10 women at stage 3, eight in stage 4, 42 in stage 5, and 10 in stage 6 (stage of acting: when the people participated in the screening, initiated this behavior) were tested and performed a Pap smear test. In the control group, immediately after the test, 46 women were in stage 3, 13 in stage 4, and 11 in stage 5. After passing two months in the control group, 36 women at stage 3, 15 in stage 4, 17 in stage 5, and two in stage 6 and did Pap smear test. These results are consistent with the study conducted by Delara *et al*.,[30] which showed that after the intervention at the decision-making stage of the individuals the changes occurred and they progressed to higher stages.

In this study, the mean scores of knowledge in the three stages before, immediately, and 2 months later were significantly different within each of the experimental and control groups. A study done by Hazavehei *et al*.[31] on women who referred to Khomeini Shahr city health centers showed that educational intervention increased the mean score of knowledge in the experimental group compared to the control group for performing Pap smear test.[32] A study conducted by Dignan *et al*.[33] on increasing the incidence of cervical cancer screening in North Carolina women also showed that the educational program can increase the likelihood of screening for cervical cancer by increasing women's awareness. These findings are similar to those of the present study, which confirms that the implementation of educational interventions can increase women's awareness of the Pap smear test and cervical cancer disease.

Other findings from this study showed a marked increase in perceived susceptibility to cervical cancer in the experimental group compared to the control group. Similar to this finding, in the study of Hazavehei *et al*.,[31] the results indicated that the effect of educational intervention on the perceived susceptibility of women referred to Khomeini Shahr Health Centers was about performing a Pap smear test. Also, in a study conducted by Karimy *et al*.[34] on women referring to Zarandieh Health Centers for performing Pap smear, it was also shown that educational intervention can increase the mean perceived susceptibility score in the experimental group compared to the control group. If women feel themselves at risk of cervical cancer, they will have a

stronger incentive to adopt screening behavior. A review conducted the study by Austin *et al*.[35] on the conducted studies using the Health Belief Model showed that perceived susceptibility is one of the main obstacles to performing Pap smear test in women.

In this study after intervention study, the mean of perceived severity of women in the experimental group was significantly increased compared to the control group. Similar to the results of this study, a study by Hazavehei *et al*.[31] on women in Khomeini Shahr, Karimy *et al*.[34] on women in Zarandiyeh, and Dehdari *et al*.[28] on women in Tehran about a Pap smear test reported that educational intervention can increase perceived severity in people. In other words, in the present study, the women of the experimental group have understood the severity of the disease in comparison to the control group and this could increase the likelihood of cervical cancer preventive behaviors–the Pap smear test.

In this study, the mean score of perceived benefits in the women of the experimental group was significantly higher than the control group after the intervention. These results are similar to those of other studies.[28,34,36] Also, a study conducted by Park *et al*. in Korean women showed that educational intervention could increase perceived benefits to screening for cervical cancer.[37]

In the present study, after the intervention, the mean score of perceived barriers in the experimental group was significantly reduced compared to the control group. Hazavehei *et al*. and Karimy *et al*.[31,34] also reported similar results in their study. In addition, several other studies confirmed the effect of education based on the health belief model in reducing barriers and adopting health behaviors.[38,39] Perceived barriers are potential negative factors of a particular health action that may prevent the proposed behavior.[17] Mandelblatt and Yabroff.,[40] and Chavez[41] in the United States showed that the fears of the test result and the belief in the inevitability of cancer were the main obstacles to performing the Pap smear test.

The subjective norms are based on the fact that people are influenced by different persons in society such as father, mother, spouse, religious leaders, family members, health workers, etc., do or do not behave as a result of their influence or pressure. In fact, the individual builds his intention based on the wishes of others.[42]

Among other findings of this research, it can be noted that after the intervention, the mean scores of perceived subjective norms in the experimental group were significantly increased in comparison with the control group. Immediately and 2 months later, the difference between the two groups was significant. The study by Akbari *et al*.[43] showed that factors such as the recommendation of physicians, friends, and relatives are among the main motivating factors for the Pap smear test. Also, a study conducted by Jalilian *et al*.[44] showed that subjective norms were a good predictor of a regular Pap smear test among women.

Limitation

Although the data collection tool was using the questionnaire and completed by women, there were sometimes contradictions in the responses. Also, the psychological conditions of individuals when completing the questionnaire can affect the outcome of the study, which, of course, is unavoidable in such studies. During the study, participants in both the experimental and control groups received information on cervical cancer and its screening behavior through various means, including mass media, friends, and relatives, which was not possible to control, and for both the control, the same test was considered. Among other constraints in this study, it can be noted that due to the time and resources limitation for the project, only those who were in the third stage of Pap process were selected for intervention, which required screening and other stages for this model were not studied.

Conclusion

This study provides hints how persons could be influenced to move from the "Deciding about action" positions into to the stages of decided to act, adoption, and maintenance for promoting cervical cancer screening behavior. The designed educational intervention as per PAPM has a significant effect on knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers and subjective norms, and increased Pap smear testing in women. Based on the findings of this study, it can be said that this model can be used as a suitable framework for health education planning and health promotion in various health topics. Therefore, health decision makers and policy makers pay attention to promoting women's health and facilitating the screening process, use of theory-based educational programs, educational videos, pamphlets and face-to-face training classes, expert counseling and lectures by influential and influential leaders in society, and also, the use of behavioral change patterns should be considered more and more in future research.

Declaration of patient consent

The authors certify that they have obtained all appropriate participant(s) consent forms. In the form the participant(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The participant(s) understand that their names and initials will not be published and

due efforts will be made to conceal their identity but anonymity cannot be guaranteed.

Acknowledgments

This article is an excerpt from the approved thesis of MS degree of Health Education at Shahid Beheshti University of Medical Sciences. The authors of the article express their gratitude to the officials of this university and to the respected management of the health center of Karaj city, the staff of the health centers of Karaj, and all the women who participated in this research.

Financial support and sponsorship

Shahid Beheshti University of Medical Sciences.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. Cancer 2014. Available from: http://www.who.int/topics/cancer/en.
2. Novak ER, GS Jones H. Novak's Textbook of Gynaecology. 13th ed. USA: Williams & Wilkins; 1965.
3. Rakhshanderou S, Maghsoudloo M, Safari-Moradabadi A, Ghaffari M. Theoretically designed interventions for colorectal cancer prevention: A case of the health belief model. BMC Medical Education. 2020;20(1):1-8.
4. Mohebbi B, Tol A, Shakibazadeh E, Yaseri M, Sabouri M, Agide FD. Testing psychometrics of healthcare empowerment questionnaires (HCEQ) among Iranian reproductive age women: Persian version. Ethiopian J Health Sci 2018;28:341-6.
5. Karimi N, Saadat-Gharin S, Tol A, Sadeghi R, Yaseri M, Mohebbi B. A problem-based learning health literacy intervention program on improving health-promoting behaviors among girl students. J Educ Health Promot 2019;8:251.
6. Musa J, Achenbach CJ, O'Dwyer LC, Evans CT, McHugh M, Hou L, *et al*. Effect of cervical cancer education and provider recommendation for screening on screening rates: A systematic review and meta-analysis. PloS One 2017;12:e0183924.
7. Krivak THC MJ, Elkas JC. Cervical and vaginal cancer. In: Berek JS, editor. Novak's Gynecology. 13th ed. Philadelphia: Williams and Wilkins; 2002.
8. Gibbs RS KB, Haney AF, Nygaard IE. Danforth's Obstetrics and Gynecology. 10th ed. USA: Lippincott Williams & Wilkins; 2008.
9. Asgary R, Cole H, Adongo P, Nwameme A, Maya E, Adu-Amankwah A, *et al*. Acceptability and implementation challenges of smartphone-based training of community health nurses for visual inspection with acetic acid in Ghana: mHealth and cervical cancer screening. BMJ Open 2019;9:e030528.
10. Azizi F, Hatami H, Janghorbani M. Epidemiology and Control of Common Diseases in Iran. Tehran: Eshtiagh Publications; 2013. p. 602-16.
11. Safari-Moradabadi A, Alavi A, Eftekhaari TE, Dadipoor S. The reproductive behavior of families with Thalassemic children in Hormozgan. Journal of reproduction & infertility. 2015;16(3):167.
12. Dadipoor S, Moradabadi A, Esmaeelion F, Eftekhaari TE, Alavi A, Fallahi S, *et al*. Prevalence of legal abortions and correlated causes in a central women's hospital in south of Iran (2009-2012). Life Sci J. 2013;10(12s):91-4
13. Keshavarzian K, Barzegari Z. The knowledge of Herisian female about the cervical cancer and pap smear in. Med J Tabriz Univ Med Sci Health Serv 2014;36:70-3.
14. Enjezab B, Mojahed S, Bokaee M. Barriers and motivators related to cervical and breast cancer screening. J Shahid Sadoughi Univ Med Sci 2004;12:78-84.
15. Green LW. Health education models. Behavioral Health: A Handbook of Health Enhancement and Disease Prevention. John Wiley & Sons, New York, 1984. p. 181-98.
16. Saffari M, Shojaeizadeh D, Ghofranipour F, Heidarnia A, A Pakpour. Health Education and Promotion Theories and Models. Tehran: Sobhan Press; 2012.
17. Glanz K, Rimer BK, Viswanath K. Health Behavior and Health Education: Theory, Research, and Practice. John Wiley & Sons; San Francisco, 2008.
18. Anderson CA. Abstract and concrete data in the perseverance of social theories: When weak data lead to unshakeable beliefs. J Exp Soc Psychol 1983;19:93-108.
19. Brockner J, Rubin JZ. Entrapment in Escalating Conflicts: A Social Psychological Analysis. Springer Science & Business Media; Cambridge University Press, 2012.
20. Nisbett RE, Ross L. Human Inference: Strategies and Shortcomings of Social Judgment. Englewood Cliffs, NJ, USA: Prentice-Hall; 1980.
21. Weinstein ND, Sandman PM. The Precaution Adoption Process Model and Its Application. San Francisco: Jossey-Bass; 2002. p. 16-39.
22. Clemow L, Costanza ME, Haddad WP, Luckmann R, White MJ, Klaus D, *et al*. Underutilizers of mammography screening today: Characteristics of women planning, undecided about, and not planning a mammogram. Ann Behav Med 2000;22:80-8.
23. Costanza ME, Luckmann R, Stoddard AM, Avrunin JS, White MJ, Stark JR, *et al*. Applying a stage model of behavior change to colon cancer screening. Prev Med 2005;41:707-19.
24. Glanz K, Steffen AD, Taglialatela LA. Effects of colon cancer risk counseling for first-degree relatives. Cancer Epidemiol Biomarkers Prev 2007;16:1485-91.
25. Bahmani A, Baghianimoghadam MH, Enjezab B, Mahmoodabad SSM, Askarshahi M. Factors affecting cervical cancer screening behaviors based on the precaution adoption process model: A qualitative study. Glob J Health Sci 2016;8:211.
26. Weinstein ND, Sandman PM. A model of the precaution adoption process: Evidence from home radon testing. Health Psychol 1992;11:170.
27. Weinstein ND, Sandman PM. The precaution adoption process model and its application. Emerging Theories in Health Promotion Practice and Research. San Francisco: Jossey-Bass; 2002. p. 16-39.
28. Dadipoor S, Mehraban M, Ziapour A, Safari-Moradabadi A. Causes of maternal ortality in Iran: a systematic review. International journal of pediatrics. 2017;5(12):6757-5770.
29. Fang CY, Ma GX, Tan Y, Chi N. A multifaceted intervention to increase cervical cancer screening among underserved Korean women. Cancer Epidemiol Biomarkers Prev 2007;16:1298-302.
30. Delara M, Ghofranipour F, Azad Fallah P, Tavafian S, Kazemnejad A. Premenstrual syndrome: Reliability and validity of a new developed diagnostic criteria in a sample of Iranian adolescents. J Res Med Sci 2013;3:55-62.
31. Hazavehei S, Sharifirad G, Mohabi S. The effect of educational program based on health belief model on diabetic foot care. Int J Diabetes Dev Ctries 2007;27:18-23.
32. Sabouri M, Shakibazadeh E, Mohebbi B, Tol A, Yaseri M, Babaee S. Effectiveness of an educational intervention using theory of planned behavior on health care empowerment among married reproductive-age women: A randomized controlled trial. J Educ Health Promot 2020;9:293. doi: 10.4103/jehp.jehp_751_20.
33. Dignan M, Michielutte R, Blinson K, Wells HB, Case LD, Sharp P, *et al*. Effectiveness of health education to increase screening for cervical cancer among eastern-band Cherokee Indian women in North Carolina. J Natl Cancer Inst 1996;88:1670-6.

34. Karimy M, Gallali M, Niknami S, Aminshokravi F, Tavafian S. The effect of health education program based on Health Belief Model on the performance of Pap smear test among women referring to health care centers in Zarandieh. J Jahrom Univ Med Sci 2012;10:53-9.
35. Austin LT, Ahmad F, McNally M-J, Stewart DE. Breast and cervical cancer screening in Hispanic women: A literature review using the health belief model. Womens Health Issues 2002;12:122-8.
36. Asgharnia M, Mirbolouk F, Oudi M, Shakiba M, GhaforiPoor B. Frequency of pap smears test and attitude about it among post partum women referred to Alzahra hospital in Rasht (2009). J Health 2010;1:57-65.
37. Park S, Chang S, Chung C. Effects of a cognition-emotion focused program to increase public participation in Papanicolaou smear screening. Public Health Nurs 2005;22:289-98.
38. Yakhforoushha A, Solhi A, Ebadiaza F. The effect of health education via health belief model on knowledge and attitude of healthy voluntaries about pap smear in urban centers Gazvin. J Nurs Midwifery Sci 2008;18:24-31.
39. Pirzadeh A. The effect of health education based on health belief model on performance of women regarding Pap smear test in Kouhdasht health centers in 2010. J Health Syst Res 2010;6:356-72.
40. Mandelblatt JS, Yabroff K. Breast and cervical cancer screening for older women: Recommendations and challenges for the 21st century. J Am Med Womens Assoc (1972) 2000;55:210-5.
41. Chavez LR, Hubbell FA, Mishra SI, Valdez R. The influence of fatalism on self-reported use of Papanicolaou smears. Am J Prev Med 1997;13:418-24.
42. Dadipoor S, Alavi A, Safari-Moradabadi A. A survey of the growing trend of caesarian section in Iran and the world: a review article. Iranian Journal of Obstetrics, Gynecology and Infertility. 2016;19(27):8-17.
43. Akbari F, Shakibazadeh E, Pourreza A, Tavafian S. Barriers and facilitating factors for cervical cancer screening: A qualitative study from Iran. Iran J Cancer Prev 2010;3:178-84.
44. Jalilian F, Emdadi S. Factors related to regular undergoing Pap-smear test: Application of theory of planned behavior. J Res Health Sci 2011;11:103-8.