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RESEARCH ARTICLE

The Effect of Educational Intervention Based on Health Belief Model on Beliefs Towards Human Papillomavirus Vaccination in a Sample of Iranian Female Nursing Students

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***Abstract: Background*:** According to the previous studies, Iranian university students do not have a firm belief in the effectiveness of HPV vaccination.

***Objective*:** The present study aimed to investigate the effect of a Health Belief Model (HBM)-based training program on beliefs of Iranian female nursing students towards HPV vaccination.

***Materials and Methods*:** The present quasi-experimental study was conducted on 80 female nursing students in West Azerbaijan province, Iran, in 2019. A total of 80 nursing students were selected as the participants *via* convenience sampling and were randomly assigned into two groups (40 in each group). The participants in the intervention group attended the HBM training program for 4 weeks and received instructions on HPV related diseases and HPV vaccination, whereas the members of the control group received no education. The HBM questionnaire was administered to the participants in both groups before the intervention, immediately after the intervention, and one month later. The collected data were analyzed using SPSS 22 through chi-square test, independent samples t-test, and repeated measures ANOVA at a significance level of 0.05.

***Results*:** Immediately after the intervention and one month later, the intervention group showed a significant increase in perceived severity, perceived benefits, and cues to action compared to the control group ($P < 0.05$). There was a difference of borderline significance between the intervention and control groups in terms of perceived barriers immediately after the intervention (P=.061).

***Conclusion*:** According to the results of the present study, HBM-training interventions can be used to change students' beliefs toward HPV vaccine and its acceptance.

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1. INTRODUCTION

Human papillomavirus (HPV) infections are the world's most common sexually transmitted infections (STI) among men and women [1]. At least 12 HPV types are classified as carcinogenic [2]. Worldwide, HPV types 16 and 18 cause approximately 70% of cervical cancers, and HPV 16 is associated with anal, oropharyngeal, vaginal, vulvar, and penile cancers. In men, 92% of anal cancer cases, and 89% of oral or oropharyngeal cancer cases are attributed to HPV types 16 and 18 [3, 4]. Genital HPV infections are mainly transmitted by sexual contact with an infected person, including vaginal, oral, or anal [5].

In one of the most recent meta-analysis studies conducted in 2019 on Iranian women with normal cytology and cervical cancer cases, the prevalence of HPV infection was 9.4% and 77.4%, respectively [6]. The predominant genotype in both groups was HPV-16 [7]. In a worldwide study published by the International Agency for Research on Cancer (IARC), the HPV prevalence rates in female subjects with normal

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cytology in Africa, Latin America, Northern America, Asia, and Europe were 22.9%, 18.6%, 13.8%, 8.3%, and 6.6%, respectively in a descending order [8].

Epidemiologic studies have indicated that up to 75% of sexually active persons will eventually become infected with HPV at some point of time in their life [9]. Prophylactic HPV vaccination can prevent infections and diseases caused by the major HPV strains [10, 11]. National HPV vaccination programs are implemented in almost all European countries and various countries worldwide [12, 13]. The quadrivalent Gardasil vaccine is not yet a part of the Iranian national immunization program. There are vaccines available at public pharmacies, which are prescribed by physicians.

According to one systematic review and meta-analysis, the Iranian population (parents, university students, medical students, nurses, and hospital staff) did not have much knowledge about HPV and HPV vaccination; however, they had positive attitudes toward it [14]. Nursing students as future public health workers can promote community awareness about cervical cancer and how to prevent it. Moreover, nurses have an important task of imparting information on risk factors, discovering early signs of cervical cancer, and encouraging females to undergo cervical cancer prevention and screening [15]. The study of knowledge and attitudes is a central point in determining the most appropriate strategies for an effective intervention plan.

Health education is an important instrument of public health for motivating people to protect themselves from preventable diseases [16]. Success in educational interventions such as the prevention of HPV-related diseases depends on the correct use of proper models and theories [17]. A useful model for behavioral modification is the Health Belief Model (HBM) [16].

In this model, individuals' behaviors are influenced by their beliefs including: (1) Perceived susceptibility (a person's perception of the chances or risk of the disease or certain condition), (2) perceived severity (one's perception of the seriousness of the consequences of the disease or certain condition), (3) perceived benefit (a person's belief in the efficacy of the recommended actions to decrease probability or seriousness of disease or certain condition), (4) perceived barrier (a person's assessment of noticeable physical or psychological costs of the recommended actions), (5) cues to action (proper actions to notify the person and prepare him/her for behavior change), and (6) self-efficacy (one's confidence in his/her ability to do recommended actions) [16, 18].

Most previous studies in Iran focused on knowledge and attitude about HPV [14], and hence, there are limited studies on the effects of education on beliefs about HPV vaccination.

Hence, the present study was done to evaluate the effects of an HBM-based training intervention on the beliefs of female nursing students towards HPV vaccination.

2. MATERIALS AND METHODS

The present quasi-experimental study was conducted on 80 female nursing students in Khoy University of Medical Sciences, Nursing and Midwifery School in West Azarbayjan province, Iran, in 2019. The students of Urmia Nursing and Midwifery School were selected as the intervention group and the students of Khoy University of Medical Sciences were considered as the control group. The sample size was determined using the standard formula suggested for parallel clinical trials. The sample size was estimated at 80 individuals using the results of a study conducted by Mehta *et al*. (2017) [19], with the mean and standard deviation of 0.54 ±1.13, and -061±1,14 for intention to behave among control and intervention group respectively, as well as 95% confidence interval, 95% power and 30% dropout rate.

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 (S_1^2 + S_2^2)}{(\bar{X}_1 - \bar{X}_2)^2}$$

Forty students in each group were selected using stratified random sampling from all classes after explaining the purpose of the study and obtaining written consent. The inclusion criteria were as follows: Female nursing students, unmarried, and agreed to participate in the research, having a mobile phone, or computer access. The exclusion criteria were absences in one or more training sessions and unwillingness to continue participating in the study.

The tools used for collecting the demographic data (age, household income, and history of HPV vaccine uptake) and the five HBM constructs were developed by the researchers (researcher-made questionnaires) following the previous studies in the literature. The development of the questionnaires was guided by the HBM, and enriched by adding questions assessing other correlates of HPV vaccination acceptability found in the literature. The items assessing each theoretical construct were developed based on previous studies and adapted to fit the objectives of this study [20, 21]. The HBM constructs were perceived severity measured with 11 items, perceived benefits (8 items), perceived barriers (9 items), perceived susceptibility, (10 items), and cause of action (7 items). The minimum and maximum scores for each item on all constructs were 1 and 5 except for the last construct (cause of action) in which each item is scored either 0 or 1 with a total score ranging from 0 to 7.

Each of the above-mentioned constructs, except the cause of action, was scored on a Likert scale from 1 to 5 from strongly agree to strongly disagree, respectively. To ensure the accuracy of the answers, some of the items were developed and scored inversely to ask the opposites as well. Cause of action was alternatively to be answered yes (score 1) and no (score 0).

The face and content validity indexes of the tools were assessed and confirmed by 10 experts in health education and promotion (5 individuals), epidemiology (1 individual), and reproductive health (4 individuals). To determine the formal validity, both quantitative and qualitative methods were used. The content validity of the questionnaire was assessed by the experts by checking items such as grammar, word choice, item location, and the scoring technique. The content validity of the two indexes was assessed quantitatively using Content Validity Rate (CVR) and Content Validity Index (CVI). The content and face validity of the questionnaire were reviewed and verified by 10 health education and reproductive health professionals. In this psychometric, on average, the Content Validity Ratio (CVR) and the Con-

tent Validity Index (CVI) of the study instrument were reported as 0.80 and 0.92, respectively.

The Cronbach's alpha value for the whole questionnaire was 0.78, and the Cronbach's alpha coefficients for the subscales of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action were 0.85, 0.78, 0.65, and 0.85, respectively. The participants in the intervention group received some instructions on HPV vaccination based on HBM. Initially, all questionnaires were filled for all participants in both groups before the intervention (T1). Based on the results of the pretest, the educational needs of the participants were determined. Then, the training program was developed based on determined needs and HBM.

The training intervention for the participants in the intervention group was organized into four training sessions, each lasting 45-60 min, with a frequency of one session per week. The content of the training sessions included lectures, group discussions, questions, and answers, as well as the use of educational posters and pamphlets, showing films, and PowerPoint presentations. The corresponding author implemented the educational program. The details of the training sessions were as follows:

First session: Providing general information about HPV including virus subtypes, transmission, clinical outcomes, diagnoses, treatments, and prognosis (perceived susceptibility, severity, and cues to action).

Second session: Discussing the HPV prevalence and complications related to diseases including cervical cancer and genital warts and their risk factors (perceived susceptibility and severity).

Third session: Discussing HPV prevention methods such as a condom, Pap test, HPV test, and HPV vaccine (perceived benefits and barriers).

Fourth session: Talking about benefits of and barriers to the use of the vaccine, condom, Pap test, and HPV test (perceived benefits and barriers).

To facilitate the student's involvement in training sessions, they were divided into small groups (8-15). The participants in the control group did not receive any training and only attended two sessions to fill out the questionnaires. However, to comply with ethical considerations, a training session on HPV vaccination was held for this group after the completion of the study.

The questionnaires were completed for all participants both immediately (T2) and one month after the intervention program (T3). The collected data were analyzed *via* SPSS software (v. 22). All variables had a normal distribution and hence, the independent samples t-test, repeated-measures analysis of variance, and Bonferroni post hoc test was conducted for data analysis at a significance level of less than 0.05.

3. RESULTS

A total of 80 female students (40 in the intervention group and 40 in the control group) participated in this study. The mean age of the participants was 21.20 ± 1.18 years in the intervention group and 21.35 ± 1.87 years in the control group, and the independent samples t-test did not show a significant difference between the two groups. Other demographic characteristics of the participants in the two groups did not show any significant difference (Table **1**).

The results showed that before the intervention, there was no significant difference between the intervention and control group in terms of perceived susceptibility, perceived severity, perceived benefits, perceived barrier, and cues to action ($P > 0.05$), but immediately after the intervention and one month later, the intervention group showed a significant increase in perceived severity, perceived benefits, and cues to action compared to the control group. There was no significant difference between the intervention and control groups in terms of perceived susceptibility immediately after the intervention and one month later. There was a difference of borderline significance between the intervention and con-

Table 1. Comparison of demographic characteristics of qualitative variables between the control and experimental groups (N=80).

Statistics	Experimental Group	Control Group	Variable	
	N (%)	N (%)		
χ^2= 5.8	18(45)	14(35)	19-20	Age
df=2	10(25)	20(50)	21-22	
p=0.06	6(15)	-	23-26	
χ^2=0.2	11(27.5)	10(25)	First-year	Educational level
df=2	11(27.5)	10(25)	Second-year	
p=0.98	10(25)	-	Third-year	
	9(22.5)	10(25)	Fourth-year	
χ^2=0.41	4(10)	3(7.5)	Income more than expenditure	Economic Status
df=2	29(72.5)	28(70)	Income equal to expenditure	
p=0.81	7(17.5)	9(22.5)	Income less than expenditure	

Table 2. Comparison of mean scores of HBM constructs in experimental and control groups and significant effects by repeated measures analysis (N=80).

P value	Control	Experimental Group	Time	Significant Effects by Repeated Measures Method	Constructs
	Mean ± SD	Mean ± SD			
0.072	31.25±3.48	32.85±4.32	Before intervention	Interaction of time with intervention N.S *P*= 0.993	Perceived susceptibility
0.156	31.25±3.60	32.85± 6.08	Immediately after the intervention		
0.253	31.35±3.03	33.10±9.12	One month after intervention		
0.657	39.47±5.71	38.97±4.20	Before intervention	Interaction of time with intervention S *P*< 0.001	Perceived severity
0.002	39.37±5.33	43.95±7.08	Immediately after the intervention		
0.01	39.97±5.92	42.97±4.08	One month after intervention		
0.132	27.70±5.02	29.22±3.85	Before intervention	Interaction of time with intervention S *P*< 0.001	Perceived benefits
0.001	26.77±4.14	36.37±2.78	Immediately after the intervention		
0.1	26.67±4.38	29.87±6.23	One month after intervention		
0.332	28.50±3.08	27.90±2.36	Before intervention	Interaction of time with intervention S *P* =0.023	Perceived barriers
0.061	28.87±3.15	26.87±5.85	Immediately after the intervention		
0.654	29.37±3.59	29.80±4.77	One month after intervention		
0.484	1.35±1.59	1.60±1.58	Before intervention	Interaction of time with intervention S *P*< 0.001	Cause to action

trol groups in terms of perceived barriers immediately after the intervention (*P*=0.61) (Table **2**).

4. DISCUSSION

This study showed that the utilization of the HBM could raise the female nursing students' awareness of cervical cancer prevention techniques.

In the pre-intervention stage, there was no significant difference between the two groups in terms of perceived severity. However, after the intervention, the mean score of perceived severity in the intervention group increased significantly, denoting the positive effects of theory-based education on nursing students' perceived severity about HPV vaccination. The more students were aware of the consequences and costs of the disease for themselves and their families, the more likely they were to involve in protective behaviors, as was indicated in the previous studies [24, 25].

In the present study, the mean score of perceived benefits for the participants in the intervention group was higher than that of the participants in the control group immediately and one month after the intervention. This difference can be attributed to the fact that the nursing students in the intervention group had more information on the use of cervical cancer prevention methods as well as HPV vaccination and its benefits. In a cross-sectional survey on male baccalaureate students from eight local Hong Kong universities intended to be immunized for HPV, the students realized they could benefit from HPV vaccination [26]. In another study, there was no significant association between perceived benefit scores and HPV vaccination intention [27]. Besides, a study in England showed that the intervention did not have a significant effect on adolescents' attitudes toward vaccination [28].

Perceived barriers are the most important part of HBM [29]. Perceived barriers are a potential deterrent to adopting a disease-preventive function that enables one to assess the benefits of acting against costs, risks, complications, and time and thereby perform a health behavior. A significant difference in mean scores of perceived barriers before and one month after the intervention indicated the positive effects of education on the awareness of perceived barriers. Therefore, nursing students need to attend training programs developed according to cultural conditions. Meta *et al*. 2014 showed that the perceived barriers score was a positive predictor of vaccine acceptance [19]. Similarly, Richards *et al*. found perceived barriers as a positive predictor of HPV vaccination intention [30]. Another study found no significant association between perceived barriers and HPV vaccination [28]. Research has also shown that there were no significant differences in perceived barrier construct scores before and after the intervention [24]. High vaccine prices, lack of awareness, fear of side effects, and inadequate access to vaccines were major contributors to students' poor adherence. Educational programs and developing accessibility policies are necessary to remove barriers for individuals to receive the HPV vaccine.

In this study, the mean score of the cues for action was significantly higher in the intervention group than the control group immediately and one month after the intervention. The cues for action in this study mainly included reliable

textbooks and articles that induced actions for HPV prevention. The findings of some studies are in line with the results of our study [19, 31].

In the present study, the training intervention did not increase the perceived sensitivity score of the nursing students in the intervention group. This means that after the intervention, most of the students believed that they were not at risk for HPV related disease.

One of the strengths of the present study was the implementation of the health belief model. However, one of the major limitations of the study was the use of a self-report tool for data collection since the researcher trusted the accuracy of the participants' statements. The selection of single female students and the small sample size were other limitations of the present study.

To the best of our knowledge, there is no intervention study addressing the beliefs of nursing students about HPV vaccination. Therefore, more studies are needed to explore this issue.

CONCLUSION

The study findings suggest that the educational intervention based on HBM could improve female students' beliefs in the area of HPV vaccination. Therefore, policymakers might use some findings in order to develop effective educational programs to promote female students' knowledge, attitudes, and beliefs about the prevention of HPV-related diseases.

STANDARDS OF REPORTING

It is confirmed that STROBE guidelines are used for this quasi-experimental study.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The institutional review board and the ethics committee of Urmia University of Medical Sciences, Urmia, Iran, approved this study (IR.UMSU.REC.1397.156). Each student was personally informed about the study, ensured about confidential management of her personal data, and asked to provide written informed consent. For the sake of ethical practice, a one-hour educational session was also held for students in the control group after the second posttest in order to provide them with education about HPV vaccination.

CONSENT FOR PUBLICATION

An informed consent was obtained from the volunteers.

AVAILABILITY OF DATA AND MATERIALS

It is confirmed that the data source used in the article is cited in the text of the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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