Original Article

Evaluating the Health Belief Model Constructs in Adopting the HPV Preventive Behavior

Solmaz Mohammadi; M.Sc.[1], Zeinab Rabiei; M.Sc.[2], Zahra Sadat Pajohideh; M.Sc.[3], Zahra Barati; M.Sc.[4], Seyedeh Solmaz Talebi; Ph.D.[5], Afsaneh Keramat; Ph.D.[6]

1 Reproductive Health Promotion Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2 Department of Midwifery, School of Nursing and Midwifery, Bushehr University of Medical Sciences, Bushehr, Iran
3 Department of Midwifery, Shoushtar Faculty of Medical Sciences, Shoushtar, Iran
4 Faculty of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
5 Department of Epidemiology, School of Public Health, Shahroud University of Medical Sciences, Shahroud, Iran
6 Center for Health Related Social and Behavioral Sciences Research, Shahroud University of Medical Sciences, Shahroud, Iran

Received August 2022; Revised and accepted January 2023

Abstract

Objective: Genital warts are a highly contagious sexually transmitted disease. It is caused by the human papillomavirus (HPV), which is transmitted through sexual contact. HPV is the most important cause of cervical cancer. This study aimed to evaluate the health belief model (HBM) constructs in adopting HPV preventive behavior in women referred to comprehensive health centers in Southwestern Iran.

Materials and methods: This descriptive-analytical study was performed on 1000 women referring to health centers in Ahvaz during 2019-2020 who were selected via a two-stage stratified random sampling technique. Data were collected using a valid and reliable researcher-made questionnaire based on the HBM. The data were analyzed using descriptive statistics, t-test, ANOVA, Pearson correlation coefficient, and regression analysis in SPSS v.18, at a significance level lower than 0.05.

Results: Total scale reliability of the tool was very good (α=0.828), as the Intra-cluster correlation coefficient (ICC) was to be 0.86. The mean of preventive behavior using an ANOVA test was significantly different at different levels of education (P <0.05). The mean and standard deviation of knowledge about HPV and preventive behavior was moderate (11.45±3.4). Pearson correlation coefficient showed a significant direct relationship between preventive behavior with awareness, perceived sensitivity, and self-efficacy and inversely related to perceived barriers. Perceived sensitivity (0.01) and self-efficacy (<0.001) were identified as the final predictors of behavior in regression analysis.

Conclusion: As the results showed, designing programs to prevent HPV, considering the perceived role of perceived sensitivity and self-efficacy, increases the likelihood of effective interventions.

Keywords: Human Papillomavirus; Health Belief Model; Prevention; Iran

Introduction

Genital warts are a highly contagious sexually transmitted disease (STD). The cause of this disease is the human papillomavirus (HPV), which is transmitted through skin-to-skin sexual contact. The

Correspondence:
Dr. Afsaneh Keramat
Email: afsanehkeramat.s@gmail.com

most important consequences of this virus are genital warts, cervical cancer, vulvar cancer, vaginal cancer, penile cancer, anal cancer, oral cancer, and throat cancer. Genital HPV types are divided into low risk (types 6 and 11) and high risk (types 18-16). The prevalence of HPV infection of the genital tract varies from 20 to 46% in young women in different countries, depending on the diagnostic technique. Still, the potential risk of infection can be 60% or more. The overall prevalence of HPV infection in Iran was 9.4% (1). High-risk behaviors and lack of preventive behaviors are associated with an increased risk of HPV infection and its spread. Although there is no specific treatment for HPV infection, it can be prevented by pre-sexual vaccination, condom use and screening. Studies have shown that women's knowledge of Pap smear test leads to early diagnosis, early treatment, and reduction of complications of HPV infection (2). Khan et al. And Makwe et al showed that most students were unaware of cervical cancer, Pap smear, and HPV vaccine (3, 4). A systematic review in Iran showed that the general knowledge of the Iranian subjects about Pap smear and HPV vaccination is low (5).

Due to the extent of physical problems, psycho-psychological and communication of genital warts, and the high cost of treatment compared to other STDs, identifying the variables determining behavior and understanding their role in behavioral perceptions contribute to designing effective intervention programs (6). One of the models used to explain health behaviors is the Health Belief Model (HBM). This model focuses more on disease prevention and shows the relationship between beliefs and behaviors. Its main assumptions are that disease preventive behaviors under the influence of perceived variables of benefits and barriers, i.e., the perceived threat of the disease, are guides to action. A found that students with more perceived barriers and fewer benefits were more likely not to be vaccinated against HPV (7).

At the time of this study, there were no published studies found using the HBM in Iran to address determine the preventive behavior of HPV (due to the increased incidence of HPV infection and the important role of this pathogen in Cervical cancer), and Most studies conducted focus on knowledge and attitudes toward HPV infection and its vaccine (8), and the measurement of the HBM constructs in adopting preventive behavior from uterine cancer (9). Consequently, we evaluated different factors of HBM in the preventive behavior of HPV. This general aim is specified into two underlying research objectives. First, the variables of the components of HBM were analyzed to predict the patient's behavior. Second, all the studied variables of the model along with the awareness were chosen for predicting the behavior.

Materials and methods

After obtaining permission from the Vice Chancellor for Research of Shahroud University of Medical Sciences and the code of ethics IRSHMU.REC.1397.233, the present descriptive-analytical study was done in Ahvaz from April 21, 2019, to December 21, 2020.

The study population consisted of all (currently married, divorced, or widowed) women aged 15-45 years, with minimal literacy and health records in selected comprehensive health centers in Ahvaz (Southwestern Iran). Some women were excluded from the study if they did not want to cooperate and answer the questionnaire questions.

Costello et al. consider the best way to determine the sample size to be the subject–to-item ratio. They believe that it is better to take 10 to 20 samples for each instrument's item (10). Therefore, based on the number of items in the initial questionnaire (10 subjects per item), a sample size consisting of 930 subjects was determined. Finally, 1000 subjects were studied as a research unit in this study.

For sampling, Ahvaz Comprehensive Health Centers (in the East and West of Ahvaz) were selected by a two-stage stratified random sampling technique based on a random number table. Accordingly, four units (1-4-5-9) out of 13 ones in East Ahvaz Comprehensive Health Center, and 3 units (1-5-7) out of 9 in West Ahvaz Comprehensive Health Center were selected. Then, according to the population covered by each center, the appropriate number of samples was selected in each center, 30 subjects from East unit 1, 52 subjects from East unit 5, 26 subjects from East unit 4, 784 subjects from East unit 9, 33 subjects from West unit1, 27 subjects from West unit 5, and 78 subjects from West unit 7 were selected. Sampling in each center was done using a systematic random sampling method based on each comprehensive health unit's family file code. Due to the significance of the topic and the lack of a valid and appropriate instrument in accordance with the domestic culture to assess individuals in adopting HPV preventive behavior, a researcher-made questionnaire was developed based on library studies on the topic in three sections of

demographic information (age - marital status - education level - Reproductive status - Pap smear test, etc., containing 25 items), knowledge (HPV vaccine prevents cervical cancer and genital warts?, containing 20 items), preventive behavior items based on the HBM perceived sensitivity, containing 52 items, perceived sensitivity (am I at risk for genital wart infection despite genital hygiene?, containing 4 items), perceived severity (Having genital warts causes long-term treatment and a high cost for me, containing 3 items), perceived benefits (does using a condom prevent me from getting the disease?, containing 7 items), perceived barriers (I refuse to have a cervical smear (Pap smear) for fear of getting the disease, containing 14 items), preventive behavior (do I use a condom to prevent the transmission of genital warts?, containing 4 items), self-efficacy (I am sure I can spend time on a cervical smear (Pap smear) test despite my busy schedule?, containing 7 items), and an external practice guide (I collect information from books and magazines for disease prevention, containing 13 questions) to identify the status quo.

The questionnaire scoring for the HPV knowledge section was so that the correct answer (YES) was given 1, while the wrong answer (NO) and I DON'T KNOW was given zero. The five items (11-10-9-8-7) were scored in reverse. The score range in this range was 1-20.

For preventive behavior items based on the HBM, a 5-point Likert scale (from strongly disagree (score = 1) to strongly agree (score = 5) was employed. Item 3 of the perceived sensitivity domain and items 3 and 4 of the perceived barriers domain were scored reversely. The score range of the perceived sensitivity domain ranged from 4 to 20. The perceived intensity domain ranged from 3 to 15. The perceived benefit domain ranged from 7 to 35, and the perceived barriers domain ranged from 14 to 70. For preventive behavior questions, a score of one was given for proper behaviour (yes) and zero for wrong behavior (NO). The scores in this area domain ranged from 0 to 4. The self-efficacy domain items were scored from 5 (very high) to 1 (very low) on a 5-point Likert scale. The range of scores in this field was 7-35. Each of them was divided into three approximately equal good, moderate, and poor categories to classify the constructs. External practice guide items were calculated in frequency.

Quantitative and qualitative content validity and formal (qualitative) validity were employed to test the instrument validity. Ten faculty members of the Ahvaz University of Medical Sciences and Shahroud University of Medical Sciences were requested to comment on their corrective perspectives on the observance of the grammar, use of appropriate terms, items' positions in their proper place, and proper scoring after careful investigation of the instrument. Then, the items were edited according to their comments. The minimum acceptable CVR (necessity of each item) was 0.62 based on the content validity ratio (Lawshe's table) and according to the evaluation of the opinion of 10 professors, and CVI (relevance, clarity, and simplicity) was 0.79 according to Polit and Beck (2006) (11). For the face (qualitative) validity of the instrument, the opinions of ten women of reproductive age were used. They read the items formulated in the instrument and express their understanding of them in terms of difficulty, appropriateness, and ambiguity. The relevant experts performed the face validity of the instrument in the content validity stage.

Alphacronbach was used to assess the internal consistency of the questions. Acceptable criteria for Cronbach's alpha were considered 0.7 to 0.9 (10). To determine the intra-cluster correlation coefficient (ICC), the items were tested-retested so that they were completed by 20 eligible subjects in one-week intervals. The ICC of 0.8 or higher was considered acceptable (10).

The researcher and assistant researcher fluent in Arabic were present in a physically appropriate place in the health centers. After determining each of the subjects following the inclusion criteria, considering the exclusion criteria, obtaining informed consent, and noting that the questionnaire would be anonymous and completely confidential, the subjects were allowed to refuse to complete the questionnaire at any stage. First, the research purpose was discussed with each of the subjects, and then the questionnaire was presented to them for completion. The collected data were analyzed in SPSS v. 18 software using t-test, ANOVA, Pearson correlation coefficient, and regression analysis. A significance level lower than 0.05 was considered.

Results

This study aimed to investigate the HPV preventive behavior based on the Health Belief Model. The initial questionnaire consisted of 93 items. Knowledge questions were designed based on a Yes-No-Don't Know-YNDK. Scale and preventive

behavior items were developed based on a 5-point Likert scale. According to Lawshe's table, items with a CVR lower than 0.62 were excluded. So, the questionnaire items were reduced from 93 to 72 items. The mean validity ratios of CVRstrict and S-CVI of the instrument were 0.88 and 0.93, respectively. Cronbach's alpha coefficient of the whole instrument was 0.82. The ICC was calculated at 0.86. The researcher also tried to use the correct method of writing and phrasing the items according to experts and women of reproductive age for testing the instrument's face validity.

The subjects' mean age, mean age at marriage, and standard deviation were 30.1± 7.1 and 22.35± 4.3, respectively. More than 50% (55.1%) of the subjects became pregnant at most once. 28.6% of them had a history of having at least one Pap smear. The mean of preventive behavior using the ANOVA test was significantly different at different education levels (P< 0.05). The mean difference in preventive behavior in the subject holding a degree above the diploma, compared to those with a diploma and lower levels was 3.06 and 5.87, respectively. 17.6% of the subjects had sufficient knowledge about HPV and genital warts. According to the independent t-test, the mean of preventive behavior with work, history of STDs and Pap smear were significantly different (P<0.05). The relationship between preventive behavior and subjects' demographic characteristics is shown in Table 1. 20% of the subjects had sufficient knowledge about HPV preventive behavior. 51.6% of the subjects had undesirable behavior. The mean scores of knowledge and constructs of the HBM are shown in Table 2.

The most crucial external practice guides were friends and acquaintances (46.4%), the Internet (31.6%), physicians (31.4%), and the staff of comprehensive health centers (20.6%), respectively. Also, the subjects' willingness to receive education related to HPV preventive behavior belonged to the treating physician (53.7%), comprehensive health centers (33.8%) and mass media (radio and television) (11%), respectively. Pearson correlation coefficient showed a significant direct relationship between HPV preventive behavior and knowledge, perceived sensitivity, self-efficacy, and an inverse relationship with perceived barriers (Table 3). Among the HBM constructs included in the regression model, perceived sensitivity and self-efficacy could predict 14.6% behavior variations.

Table 1: Relationship between HPV preventive behaviour and demographic variables (n = 1000)

Demographic variables		N (%)	Preventive behaviour
Level of education	Below the level of diploma	288 (28.8)	0.005
	Diploma	429 (42.9)	
	Above the level of diploma	283 (28.3)	
Occupational status	Housewife	868 (86.8)	0.001
	Employed	132 (13.2)	
Martial status	Married	979 (97.9)	0.33
	Divorced	10 (0.1)	
	Widow	11 (1.1)	
Method of contraception	No	205 (20.5)	0.53
	Natural	309 (30.9)	
	Medicine	245 (24.5)	
	Candum	182 (18.2)	
	IUD	52 (5.2)	
	DMPA	5 (0.5)	
Record of STDs	Yes	69 (6.9)	0.03
	No	931 (93.1)	
Polygamy	Yes	17 (1.7)	0.42
	No	983 (98.3)	
Smoking	Yes	120 (12)	0.42
	No	880 (88)	
Record of Pap smear	Yes	286 (28.6)	0.001
	No	714 (71.4)	

Table 2: General characteristics of knowledge and the HBM constructs of women participating in the study

Variable	Scores range	Cronbach's alpha	Mean	SD	Min.	Max.	Good	Moderate	Weak
Knowledge	0-29	0.88	11.45	3.4	1	20	200 (20%)	520 (52 %)	271 (27.1%)
Perceived sensitivity	4-20	0.75	12.5	2.4	4	20	345 (34.5%)	652 (65.2%)	17 (0.3%)
Perceived severity	3-15	0.93	10.6	1.8	5	15	143 (14.3%)	854 (85.4%)	3 (0.3%)
Perceived benefits	7-35	0.97	26.5	4.7	14	35	882 (88.2%)	118 (11.8%)	0 (0%)
Perceived barriers	14-70	0.70	40.8	7.1	16	68	216 (21.6%)	771 (77.1%)	13 (1.3%)
Self-efficacy	7-35	0.78	25.5	1.5	21	28	649 (64.9%)	191 (19.1%)	160 (16%)
Behavior	0-4	0.75	2.5	0.6	2	4	Favorable		Unfavorable
							484 (48.4)		516 (51.6)

Results of regression analysis of predictors of preventive behaviours in women participating in the study are summarized in table 4.

Discussion

This study aimed to evaluate the constructs of the health belief model in adopting HPV preventive behavior. As many health problems are closely related to human behavior, behavioral theories and models can provide new insights into prevention of health problems (12). The health belief model is one of the most common frameworks for understanding behavioral characteristics. However, the HBM has limitations and shortcomings, especially concerning sexual behavior issues. For example, mental norms, which are among the most important predictors of healthy sexual behavior, are not included in this model (11). Besides, sexual behavior is associated with some individual characteristics, such as religious beliefs, which are not included in health beliefs (13).

In this study, 20% of the subjects had good knowledge about HPV. A systematic review conducted in Iran showed that the Iranian people's general knowledge and knowledge (parents, women, university students, medical students, nurses, and hospital staff) about HPV and HPV vaccination is low (5). Khan et al. showed that students' knowledge about HPV infection is low (3). Also, Gelastropolo et al. found that only 31.7% of Greek students had sufficient knowledge about HPV (14). Several studies have reported that most women are unaware of HPV and its association with cervical cancer. However, knowledge of HPV has not improved in recent years (15).

The subjects' perceived severity was moderate, having no significant correlation with preventive behavior; However, Lee et al. showed that understanding cancer as a terrible disease is the main reason why people choose HPV vaccination (16). Two studies in Botswana (17) and Ghana (18) identified an association between HPV vaccine acceptance and perceived severity. Iriyama also found that adolescents with a high level of understanding of AIDS fully agree with intending to abstain from sex before marriage (19). However, the results of Ghaffari (20) study indicated that there is no significant relationship between perceived severity and premarital sexual abstinence, which is consistent with the findings of the present study.

The results also showed that 88.2% of the women participating in the study perceived benefit score were good. This result indicates that they believe that taking preventive measures such as vaccination, condom use, Pap smear infection screening, and health tips can prevent or diagnose the disease early, reducing its costs and complications.

Table 3: Correlation among the HBM constructs

Constructs	Knowledge	Perceived sensitivity	Perceived severity	Perceived benefits	Perceived barriers	Self-efficacy	Behavior
Knowledge	1	0.29**	0.26**	0.36**	-0.27**	0.29**	0.27*
Perceived sensitivity		1	0.28**	0.24**	0.33	0.25**	0.36*
Perceived severity			1	0.42**	-0.001	0.38**	0.11
Perceived benefits				1	-0.28**	0.47**	0.16
Perceived barriers					1	-0.14**	-0.03*
Self-efficacy						1	0.32*
Behavior							1

**The correlation is significant at the level of 0.01. *The correlation is significant at the level of 0.05.

Table 4: Results of regression analysis of predictors of preventive behaviours in women participating in the study

Variable	B	SE	Beta	t	P
Fixed value	2.5	0.2	-	10.265	0.001
Perceived sensitivity	0.02	0.009	0.088	2.513	0.01
Self-efficacy	0.016	0.008	0.095	4.162	<0.001

The well-perceived barriers scores are low (21.6%) in the women. The belief that the vaccine is less than 75% effective is considered a significant barrier to vaccine selection among young adult women in Manhart. People's perception of benefits contributes to paving the way, so they adopt or avoid behavior based on the analysis of benefits minus barriers (expectancy-value theory) (21). Therefore, future educational interventions should focus on removing perceived barriers.

In this study, there was a positive correlation between self-efficacy and preventive behavior. Other studies have shown a positive relationship between preventive behavior and self-efficacy.

The most critical external practice guides of this study were friends and acquaintances, the Internet, doctors, and health professionals. Cohen and Head showed that peers are the most crucial factor in selecting individuals for HPV vaccination (22). At the same time, Donadiki showed that going to the doctor, being employed, and having healthy behaviors are the most critical guidelines for HPV vaccination (7).

18.2% of the subjects reported that they used condoms as a method of contraception. Methods of contraception (e.g., female/male condoms) are the only contraceptive methods known to prevent HPV transmission and infection. They are associated with regression of HPV-related lesions of the penis (23). The mean scores of preventive behaviors were higher in the subjects with any record of STDs or Pap smear because of the training received during a Pap smear and the treatment process.

The findings also showed a significant correlation between preventive behavior with HPV knowledge, perceived sensitivity, perceived barriers, and self-efficacy. Participants who considered themselves more at risk for HPV infection were more likely to engage in preventative behavior. This finding is similar to previous research on HPV vaccination behavior in young adult women, who were less susceptible to HPV and less likely to be vaccinated (24). Therefore, training programs should focus on people's understanding of their susceptibility to the virus. There was a negative correlation between perceived barriers and preventive behavior among the subjects in the present study. So, by reducing barriers, preventive behavior can be increased in people.

The results of various studies have shown that training the constructs of perceived barriers in different groups is accompanied by reducing perceived barriers in breast screening, cervical cancer screening, Pap smear and HPV vaccine injection. Finally, it has increased the performance of the desired behaviour. Scientific findings suggest that low perceived sensitivity may have a negative effect on adherence to recommended behaviours to reduce risk and prevent the right decision regarding costs and preventive behaviour (25-27).

Ghaferi et al. showed a significant relationship between HIV and AIDS prevention behaviors with perceived sensitivity, perceived benefits, perceived barriers, perceived self-efficacy, mental norms, and religious beliefs (28). Their results are consistent with those of the present study. Khalili et al. showed a significant correlation between the level of virus knowledge and preventive behavior (29). Donadiki et al illustrated a relationship between perceived benefits and perceived barriers to the rate of HPV vaccination in students (7).

In this study, perceived sensitivity and self-efficacy are predictors of preventive behavior. Self-efficacy constructs and perceived benefits have the most significant predictive power of behavioral intent (29). In the study of Grace et al., perceived sensitivity and self-efficacy were the most important predictors of HPV vaccination (22), consistent with the present study's findings. In the study of Merry et al., the main predictors of HPV vaccination in young women were mental norms, self-efficacy, and vaccine cost (30), consistent with the findings of the present study.

One of the most important strengths of this study was investigating effective components in applying HPV preventive behavior based on the HBM using a valid and reliable questionnaire following the Iranian cultural conditions. This study was based on the self-report information on the units so, it may be associated with the possibility of not registering factual information (due to the nature of the items). This study only evaluated women who referred to comprehensive urban health centers. So, it limited the possibility of participation of other women in the population. Since the HBM focuses on individual-level predictors, the research findings do not address

the health care system or policy-level factors that may affect HPV vaccination and preventative behaviors.

Assessing the HBM constructs among adolescent and young age groups and considering mental norms and religious beliefs in adopting preventive behavior (rational choice theory) are suggested for future research.

Conclusion

The successful development and implementation of a health promotion program in STD prevention mainly depend on identifying the determinants of preventive behavior among the target group to design educational interventions effectively. According to the results, developing programs to prevent HPV infection, considering the perceptual role of perceived sensitivity and self-efficacy increases the likelihood of effective interventions.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

The authors wish to thank for the Vice Chancellery for Research of Shahroud University of Medical. Sciences for supporting this research project. We hereby acknowledge the participants in study.

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Citation: Mohammadi S, Rabiei Z, Pajohideh ZS, Barati Z, Talebi SS, Keramat A. **Evaluating the Health Belief Model Constructs in Adopting the HPV Preventive Behavior.** J Family Reprod Health 2023; 17(1): 37-44.