Original Study

Health Belief Model Scale for Human Papilloma Virus and its Vaccination: Adaptation and Psychometric Testing

Gulten Guvenc RN, PhD [1,*], Memnun Seven RN, PhD [2], Aygul Akyuz RN, PhD [2]

[1] Gülhane Military Medical Academy, School of Nursing, Ankara, Turkey
[2] Koç University, School of Nursing, İstanbul, Turkey

A B S T R A C T

Study Objective: To adapt and psychometrically test the Health Belief Model Scale for Human Papilloma Virus (HPV) and Its Vaccination (HBMS-HPVV) for use in a Turkish population and to assess the Human Papilloma Virus Knowledge score (HPV-KS) among female college students.
Design: Instrument adaptation and psychometric testing study.
Setting and Participants: The sample consisted of 302 nursing students at a nursing school in Turkey between April and May 2013.
Interventions: Questionnaire-based data were collected from the participants.
Main Outcome Measures: Information regarding HBMS-HPVV and HPV knowledge and descriptive characteristic of participants was collected using translated HBMS-HPVV and HPV-KS. Test-retest reliability was evaluated and Cronbach α was used to assess internal consistency reliability, and exploratory factor analysis was used to assess construct validity of the HBMS-HPVV.
Results: The scale consists of 4 subscales that measure 4 constructs of the Health Belief Model covering the perceived susceptibility and severity of HPV and the benefits and barriers. The final 14-item scale had satisfactory validity and internal consistency. Cronbach α values for the 4 subscales ranged from 0.71 to 0.78. Total HPV-KS ranged from 0 to 8 (scale range, 0-10; 3.80 ± 2.12).
Conclusion: The HBMS-HPVV is a valid and reliable instrument for measuring young Turkish women's beliefs and attitudes about HPV and its vaccination.
Key Words: Adaptation, Psychometric testing, Health beliefs, HPV vaccination

Introduction

The human papilloma virus (HPV) is one of the most common sexually transmitted disorders. HPV is thought to cause more than half a million cases of cancer annually in developing countries, especially in women.[1] Primary protection from HPV includes the elimination of sexual risk factors and prophylactic vaccine administration.[2–4] The US Food and Drug Administration has approved 3 safe and effective vaccines that prevent infection by the most prevalent cancer-causing HPV: the bivalent HPV vaccine, the quadrivalent HPV vaccine and, a new 9-valent HPV vaccine. The bivalent HPV vaccine has been recommended for women aged 9-25 years for the prevention of cervical cancer, cervical intraepithelial neoplasia (CIN) 2, adenocarcinoma in situ, and CIN 1 caused by oncogenic HPV genotypes 16-18.[5] The quadrivalent HPV vaccine was approved for men and women aged 9-26 years to prevent a range of diseases, including genital warts, cervical cancer, cervical adenocarcinoma in situ, CIN, and high-grade vulvar and vaginal intraepithelial neoplasia caused by HPV genotypes 6, 11, 16, and 18.[1,4–6] The 9-valent HPV vaccine was also approved by the US Food and Drug Administration on December 10, 2014, for use in women aged 9-26 years, and men aged 9-15 years. The 9-valent HPV vaccine targets HPV 6, 11, 16, 18, and 5 additional cancer-causing HPV types (31, 33, 45, 52, and 58), which account for approximately 15% of cervical cancers.[7]

HPV vaccines have been shown to be safe and well tolerated with high immunogenicity in preapproval clinical studies. Postmarketing studies have also not revealed any serious safety concerns.[1,5] The Centers for Disease Control and Prevention (CDC) reports that an additional 53,000 cervical cancer cases could be prevented by increasing HPV vaccination rates to 80% in the target group.[5] Since vaccine licensure, the HPV vaccine coverage among adolescents has increased. However, it still remains low not only in the United States, but also around the world.[6,8,9]

Background

Many previous studies have determined the factors that influence the acceptance of HPV vaccines and have emphasized the importance of activities to eliminate the negative influence of such factors on vaccination. These studies have evaluated many factors thought to possibly affect the acceptance of vaccination, such as the demographic characteristics of the adolescents or parents, their knowledge about HPV and HPV vaccination, and their views, attitudes, and health beliefs.[2,9–13] HPV is a sexually transmitted disease, and the health beliefs related to HPV vaccination are therefore likely to be significantly influenced by sociocultural differences. However, there are only

The authors indicate no conflicts of interest.

* *Address correspondence to:* Gulten Guvenc, RN, PhD, Gülhane Military Medical Academy, School of Nursing, GATA hemşirelik Yüksek Okulu, 06010 Etlik Ankara, Turkey; Phone 0903123043946
E-mail address: guvencgulden@yahoo.com (G. Guvenc).

1083-3188/$ - see front matter
http://dx.doi.org/10.1016/j.jpag.2015.09.007

a few studies on this subject.[2,8,11,12,14] These studies have been conducted to evaluate the health beliefs regarding HPV and HPV vaccination using various measures.

To identify the barriers and factors that facilitate HPV vaccination of individuals, the use of standard tools enables more accurate comparison of these factors across groups.[9] Allen et al evaluated the measures used in HPV vaccine acceptance studies and reported that the use of a theoretical framework, structural consistency, and more rigorous validation of measures in a larger number of samples are required to develop successful societal and clinical interventions.[15] These results indicate a need to evaluate factors that influence vaccination with standard measures and a more systematic approach in the national and international literature. A number of theories have been used to clarify, predict, and change health behavior.[16]

The Health Belief Model (HBM) is based on motivation theory and indicates how one's behavior to protect oneself is shaped and identifies the influential factors.[17] The HBM states that the development of a health behavior by an individual depends on the individual person at risk for the disorder, their beliefs that a disease and its consequences can be serious, the perception of benefit in the behavior of preventing or decreasing the risk of the disease, and the perception of obstacles related to realization of the behavior.[11] Perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action are the concepts that compose the HBM.

Perceived susceptibility refers to an individual's own perception of the chances of experiencing a condition that would adversely affect health. Perceived severity is the belief in the potential serious consequences of a health issue and interpretation of the degree of intensity of a disease. Perceived benefits are the beliefs in the advantages of adopting suggested prevention methods for a given health issue and actions taken to prevent disease. Perceived barriers refer to potential negative aspects of a particular health action or perceived barriers such as costs and side effects that would prevent individuals from practicing a recommended behavior. Self-efficacy is a belief that one can achieve the behavior required to execute the outcome, and cues to action refers to factors that trigger action.[17,18]

The HBM has been applied to numerous screening behaviors. Nurses can use the HBM to help determine health behavior, understand the behavior modification process, and support individuals for behavior modification in necessary areas.[3,17] The HBM has been used for predicting HPV vaccine acceptability. The literature on the role of HBM constructs is limited with regard to HPV vaccination acceptability among women.[19] No scale has been found in the national literature to evaluate individual health beliefs for HPV vaccination. Further understanding of how knowledge, sociocultural attitudes, and health beliefs predict HPV vaccination will guide the development of effective interventions to increase intentions of HPV vaccine use.

Aim of the Study

The aim of this study was to adapt the Health Belief Model Scale for Human Papilloma Virus and Its Vaccination (HBMS-HPVV) into Turkish, to explore its construct validity and reliability, and to evaluate health beliefs toward HPV and its vaccination, HPV-related knowledge, and the HPV vaccination intentions of female college students.

Materials and Methods

The study was an instrument adaptation and psychometric testing study.

Participants

Participants in this study were recruited from the nursing student population at a state university in Ankara in the academic year 2012-2013. The study sample consisted of a total of 390 participants made up of undergraduate students. A total of 324 students volunteered to participate in the study. Twenty-two students were dropped from the analysis because of incomplete data. Statistical analysis was carried out with a total of 302 participants (77.4%).

Instrument

Demographic Characteristics

A short questionnaire that included items about demographic characteristics of participants such as age, place of residence, and parents' educational level was used. Participant's previous status of hearing about HPV vaccination and infection were also determined in this questionnaire.

HPV Knowledge Scale

The original HPV Knowledge Scale (HPV-KS) was developed by Kim in 2012 and consists of 20 questions.[14] It is used to measure the level of knowledge of the subjects regarding HPV infection and HPV vaccination. We used the short form, which includes 10 knowledge statements from Kim's HPV-KS.[14] For every knowledge statement, 1 point was given for answering correctly (true or false), and no points were given for choosing the wrong answer or the “do not know” option. A total knowledge score was derived by summing the number of correct responses. In Kim's study, Cronbach α of the HPV-KS was 0.88.[13] In the current study, Cronbach α was calculated as 0.85.

The HBMS-HPVV

The health beliefs regarding HPV and its vaccination were measured using the HBMS-HPVV adapted from a scale developed by Kim in 2012 for measuring health beliefs toward HPV vaccination. In Kim's study, the items pertaining to health beliefs toward HPV vaccination consisted of 12 items on perceived benefits (3 items), perceived susceptibility (2 items), perceived severity (2 items), and perceived barriers (5 items).[14] The HBMS-HPVV is a 4-item Likert-type scale in which subjects are asked to evaluate their agreement with some statements on a scale from 1 (“not at all”) to 4 (“very much”). The Cronbach α values in the original study were 0.85, 0.83, 0.74, and 0.85.[14]

The language equivalence of the HBMS-HPVV was determined through 3 independent translations and using the “back-translation” method. The first translator translated the original scale from English to Turkish, and the

second translator translated the Turkish scale back into English. Then, the original English version and the retranslated English version were compared to see if the meanings of items had been maintained. The translations were almost identical and accurately conveyed the meaning of the original English version. No changes in wording were needed as a result of the last translation. Finally, 2 items about the effect on relationships (eighth item) and fear (ninth item) were added to the perceived severity subscale, and 1 item about the adverse effects (15th item) was added to the perceived barriers subscale, because it was thought to be appropriate to Turkish culture.

The content validity and the cultural appropriateness of the translated scale were evaluated by 5 bilingual health care professionals: 2 gynecological oncologists and 3 nursing faculty. Minor changes in wording were suggested, and the instrument was revised accordingly. Finally, a preliminary application was performed with 12 subjects to evaluate the conceptual equivalence of the Turkish version, and the scale was finalized with minor modifications.

At the beginning of the study our scale consisted of 15 items. After the validity and reliability analyses, 1 of the items (item 14) was deleted. The final version of the HBMS-HPVV has 14 items in 4 subscales: perceived severity (items 6-9), perceived barriers (items 10-13 and 15), perceived benefits (items 1-3), and perceived susceptibility (items 4 and 5). The items of subscales have 4-point Likert-type response choices ranging from 1 (“not at all”) to 4 (“very much”). There is no Cronbach α value for the entire scale, and each subscale has a Cronbach α value. Higher scores indicate stronger beliefs about the dimension. Except for barriers, all subscales are positively related to vaccination.

Ethical Considerations

We obtained the necessary permission from Dr Kim in e-mail to adapt the health beliefs toward HPV vaccination for Turkish culture, to test the psychometric characteristics, and to use the HPV-KS.[14] The study was conducted after the approval of the institutional review board of Gulhane Military Medical Academy.

Data Collection

Data were collected between April and May 2013. Participants were informed about the study aim and methods before their participation. All participants provided verbal informed consent before the instruments were distributed. Participants received 2 concurrent administrations of the HPV-KS and HBMS-HPVV with a 2-week interval between tests and retests. The sample was tested in classroom settings with supervision of the primary researcher, and retest administration involved the same procedure over the following 2 weeks.

Data Analyses

The data were analyzed using SPSS version 18.0 (SPSS, Chicago, IL). Descriptive statistics (mean, SD, frequency, and percentage) were used to describe demographic characteristics. Exploratory factor analysis and principal component extraction with a varimax rotation were used to examine the construct validity. The criterion for including factors was an eigenvalue of 1.0 or more. The Kaiser-Meyer-Olkin measurement of sampling adequacy and Bartlett test of sphericity were used to determine sampling adequacy for factor analysis. The sample size of 324 participants was deemed satisfactory because it exceeded the recommended 10:1 ratio between subjects and item numbers.[20] Reliability was evaluated using item-total subscale correlations and Cronbach α coefficients. Cronbach α values of greater than 0.7 and item-total correlations of greater than 0.3 and greater than 0.7 were used as cutoff scores for satisfactory reliability.[21] The stability of the measures was assessed through test-retest. The Kruskal-Wallis test and the Mann-Whitney *U* test were used to determine whether medians were different between comparison groups. A level of *P* less than .05 was considered statistically significant.

Results

Sociodemographic Characteristics and HPV Awareness

The study was conducted with 302 nursing students. The mean age of the participants was 20.52 ± 1.12. Among the participants' parents, 66.2% of the mothers (n = 200) and 46% of their fathers (n = 139) were primary school graduates. Most of the participants' mothers (79.8%) were unemployed (housewives), and most of their fathers were employed (65.9%). Among the participants, 84.1% stated that they had heard about HPV, and 75.8% had heard about the HPV vaccine. They had mostly heard of HPV and the HPV vaccine from their lectures at the school of nursing. Only 1.3% (n = 4) of the participants had undergone HPV vaccination. Among those who did not receive HPV vaccination, 15.1% (n = 45) said they were extremely likely to have it done, and 5.7% (n = 17) said they were slightly unlikely to have it done. In addition, 19.5% (n = 59) said they were extremely likely to recommend to their friends to have it done.

Construct Validity

The results of the factor analysis are shown in Table 1. Four factors with an eigenvalue of more than 1 were extracted, with 61.47% of the variance explained. Factor 1 accounted for 29.12% of the variance and represented all 4 items of the perceived severity subscale. The items related to the perceived severity addressed HPV as a serious disease with negative consequences. Factor 2 accounted for 16.18% of the variance and included 5 items of the perceived barriers subscale that explain effectiveness, costs, and side effects that would prevent an individual from taking the vaccine. One item (item 14) of the perceived barriers subscale was deleted because of a loading of less than 0.30. Factor 3 accounted for 9.00% of the variance and involved all 3 items of the perceived benefits subscale, which explained the advantages and benefits of the HPV vaccine. Finally, 2 items of the perceived susceptibility subscale were loaded together as factor 4 and accounted for 7.27% of the variance.

Table 1
Rotated Factor Analysis of Health Belief Model Scale for Human Papilloma Virus and Its Vaccination

Factor 1: Perceived Severity		Factor 2: Perceived Barriers		Factor 3: Perceived Benefits		Factor 4: Perceived Susceptibility	
Item	Loading	Item	Loading	Item	Loading	Item	Loading
6 Severity	0.67	10 Barriers	0.76	1 Benefits	0.72	4 Susceptibility	0.83
7 Severity	0.66	11 Barriers	0.75	2 Benefits	0.84	5 Susceptibility	0.79
8 Severity	0.73	12 Barriers	0.56	3 Benefits	0.78		
9 Severity	0.78	13 Barriers	0.57				
		14 Barriers	0.26*				
		15 Barriers	0.74				
Eigenvalue	4.06		2.26		1.26		1.01
Variance explained	29.12		16.18		9.00		7.27

* Loading <0.30.

Factor 4 included items related to the perceived risk of acquiring HPV and its consequences (Table 1).

The result of the factor analysis showed that the Kaiser-Meyer-Olkin value was 0.81, which indicates that the sample size was adequate for principal component analysis. The results of the Bartlett test of sphericity ($P < .0001$) also indicated that the variables were correlated and therefore suitable for factor analysis.

Reliability

Internal Consistency and Item-Total Correlation Analysis

Table 2 shows item means, SDs, and item-total correlations. One item from the perceived barriers subscale, "HPV vaccination is not currently a mandatory program" (barrier 14), was deleted because of low correlation between the item and subscale scores ($r = 0.21$). All other items met the criteria for inclusion. Item-total correlations of the 14 items ranged between 0.36 and 0.64, which indicated satisfactory homogeneity of the items, as suggested by Streiner and Norman (Table 2).[21]

Subscale mean scores, item-total subscale correlation, Cronbach α values, test-retest intraclass correlation, and retest Cronbach α coefficients are presented in Table 3. After deleting 1 item from the perceived barriers subscale, Cronbach α coefficient increased from 0.68 to 0.71. Internal consistency of the subscales was established by Cronbach α, and values between 0.71 and 0.78 were obtained.

Test-Retest Reliability

Test-retest reliability was assessed to test the stability of the measures. The interval between the first and second tests was 2 weeks. The test-retest reliability intraclass coefficients ranged from 0.81 to 0.88 (Table 3).

HPV Knowledge

Total HPV knowledge scores ranged from 0 to 8 (scale range, 0-10; mean, 3.80 ± 2.12). These scores indicate a generally low level of HPV knowledge. The most correctly answered statement was, "HPV is related to the development of cervical cancer" (77.5%). Participants were least knowledgeable about the control intervals for HPV examinations (Table 4).

Although it is not shown in the table, the relationship between HBMS-HPVV scores and HPV knowledge score was examined. Total HPV knowledge score was positively correlated with perceived severity and benefits ($P < .001$). Conversely, it was negatively associated with perceived barriers ($P = .04$). Table 5 shows a comparison between the HPV vaccination intention of the students and the median HBMS-HPVV and median knowledge scores. There was a statistically significant relationship between the median HBMS-HPVV ($P < .001$) and median knowledge scores ($P < .001$) and the HPV vaccination intention. Paired comparisons revealed that participants who were extremely likely to undergo HPV vaccination showed higher perceived severity, perceived susceptibility, and perceived benefits,

Table 2
Item Analysis and Internal Consistency of Health Belief Model Scale for Human Papilloma Virus and its Vaccination

Item	Mean	SD	Item: Total Correlation
1. HPV vaccine can prevent genital warts and genital cancer	3.07	0.57	0.62
2. HPV vaccine can prevent cervical cancer (for boys, in future sexual partners)	2.95	0.65	0.62
3. I trust the safety and efficacy of the HPV vaccine	2.90	0.59	0.59
4. Likelihood of getting genital warts is high if they are not vaccinated against HPV	2.79	0.58	0.57
5. Likelihood of getting cancer is high (girls, cervical cancer; boys, anal or penile cancer) if they are not vaccinated against HPV	2.91	0.63	0.57
6. HPV infection is a serious disease that can disturb school life	2.91	0.70	0.57
7. HPV infection can cause death	2.90	0.69	0.52
8. HPV infection would threaten a relationship with my boyfriend, husband, or partner	3.15	0.63	0.60
9. The thought of HPV infection scares me	3.21	0.63	0.64
10. I doubt the safety and efficacy of the vaccine	2.55	0.67	0.55
11. I have difficulty deciding on the earliest age for HPV vaccination	2.63	0.70	0.54
12. HPV vaccination increases sexual curiosity or causes earlier exposure to sexual intercourse	2.11	0.69	0.36
13. HPV vaccination is expensive	2.61	.66	0.43
14. HPV vaccination is not currently a mandatory program	3.06	0.67	0.21*
15. Possible side effects of HPV vaccination make me worry	2.78	0.65	0.56

HPV, human papilloma virus
* Removed because <0.30.

Table 3
Reliability Coefficients for Health Belief Model Scale for Human Papilloma Virus and its Vaccination

Subscale	Scale Items, n	Mean	SD	Item Total Subscale Correlation (n = 302)	Cronbach α (n = 302)	Test-retest Intra-class Correlation (n = 76)	Retest Cronbach α (n = 76)
Perceived Severity	4	3.06	0.51	0.52-0.64	0.78	0.88	0.83
Perceived Barriers	5	2.52	0.46	0.36-0.55	0.71	0.81	0.69
Perceived Benefits	3	2.98	0.50	0.58-062	0.78	0.84	0.82
Perceived Susceptibility	2	2.85	0.54	0.59-0.62	0.72	0.83	0.70

and lower perceived barriers and higher knowledge scores ($P < .05$; Table 5).

Discussion

The aim of this study was to adapt a scale for measurement of health beliefs toward HPV vaccination into Turkish and to explore its construct validity and reliability to evaluate health beliefs, HPV-related knowledge, and HPV vaccination intentions of female college students.

Factor Analysis and Reliability

As a result of exploratory factor analysis, 1 of the items (item 14, "HPV vaccination is not currently a mandatory program") was deleted after exploratory factor analysis because of a loading less than 0.30. The national vaccination program in Turkey currently does not include HPV vaccines. The subjects might have known this and replied to the statement accordingly. The item might therefore have been inadequate for defining an individual obstacle.

It is recommended that researchers delete items with factor loadings less than 0.32 or cross-loadings with differences less than 0.15 from an item's highest factor loading.[22] The same barrier item (item 14) was also removed because of low correlation between the item and subscale scores. Item-total correlations can also be used to assess internal consistency. Kline suggested deletion of any questionnaire item with a corrected item-total correlation of less than 0.30.[23]

The 14 remaining items were loaded on 4 factors: perceived severity (4 items), perceived barriers (5 items), perceived benefits (3 items), and perceived susceptibility (2 items). The items of the HBMS-HPVV were loaded consistently with the results of Kim.[14] During the scale adaptation process, 3 new items were added. Two items relating to "fear of HPV infection" (item 8) and "threat to a relationship with a boyfriend, husband, or partners" (item 9) were added to the perceived severity subscale. The added items were found to be suitable additions to the construct of perceived severity. One item relating to worry about possible side effects of HPV vaccination (item 15) was also found to be a valid addition to the construct of perceived barriers.[14]

The range of Cronbach α values for HBMS-HPVV was calculated as 0.71-0.78. If the items show good internal consistency, Cronbach α value should exceed 0.70 for a developing questionnaire. Assessing the stability of a measure over time involves a procedure that evaluates test-retest reliability.[24] In this study, test-retest reliability intraclass coefficients ranged from 0.81 to 0.88. An intraclass correlation coefficient of less than 0.4 indicates poor reproducibility, less than 0.75 indicates fair to good reproducibility, and 0.75 indicates excellent reproducibility.[25]

Health Beliefs and Knowledge Regarding HPV

Most of the participants included in this study had heard of HPV (84.1%) and HPV vaccination (75.8%). The source for most of these participants was the lectures at the nursing school. However, the mean knowledge level of the participants was 3.8 (of a possible 10). The best known statement (77.5%) was, "HPV is related to the development of cervical cancer (T)," and only 3.6% could correctly answer the statement, "Sexually active women should undergo an HPV exam annually (F)." The students thought HPV needed to be checked annually. These results are important because they indicate more information should be provided to health care staff regarding HPV infection and vaccines.

Similarly, in a systematic review on barriers related to HPV vaccination, Holman et al stated that health care

Table 4
HPV Knowledge of the Participants

HPV Knowledge Item	Correct Answer		Incorrect Answer		Not sure	
	n	%	n	%	n	%
1. HPV is related to the development of cervical cancer (T)	234	77.5	9	3.0	59	19.5
2. Low-risk virus does not cause cervical cancer (T)	61	20.2	90	29.8	151	50.0
3. HPV is almost asymptomatic (T)	78	25.8	98	32.5	126	41.7
4. HPV is a sexually transmitted infection (T)	229	75.8	15	5.0	58	19.2
5. HPV can infect the oral cavity, respiratory tract. and eyes (T)	114	37.7	57	18.9	131	43.4
6. Condoms prevent HPV infection (F)	21	7.0	197	65.2	84	27.8
7. The incubation period of HPV varies from several months to more than 1 year (T)	132	43.7	14	4.6	156	51.7
8. If immunity is strong, HPV might gradually disappear (T)	66	21.9	77	25.5	159	52.6
9. Sexually active women should undergo an HPV examination annually (F)	11	3.6	198	65.6	93	30.8
10. Vaccination will prevent certain types of HPV (T)	212	70.2	8	2.6	82	27.2

F, false; HPV, human papillomavirus; T, true
Cronbach α = 0.85; mean knowledge score = 3.80 ± 2.12 (range, 0-8).

Table 5
Comparison of HPV Vaccination Intention Between Health Belief Model Scale for Human Papilloma Virus and its Vaccination Median Scores and Knowledge Median Scores

Thinking About HPV Vaccination	Perceived Severity		Perceived Barriers		Perceived Benefits		Perceived Susceptibility		Knowledge Score	
	Median	Min-Max	Median	Min-Max	Median	Min-Max	Median	Min-Max	Median	Min-Max
Slightly unlikely	3.00	1.25-4.00	2.40	1.80-3.00	3.00	1.33-4.00	2.50	2.00-4.00	3.00	0.00-7.00
Neutral	3.00	1.75-4.00	2.60	1.80-4.00	3.00	1.67-4.00	3.00	2.00-4.00	3.00	0.00-8.00
Slightly likely	3.00	1.00-4.00	2.60	1.00-3.40	3.00	1.00-4.00	3.00	2.00-4.00	5.00	0.00-8.00
Extremely likely	3.50	2.00-4.00	2.20	1.00-3.00	3.33	2.00-4.00	3.00	2.00-4.00	4.00	0.00-8.00
χ^2	18.76		25.97		24.56		14.11		27.11	
P	< .001		< .001		< .001		.003		< .001	

HPV, human papillomavirus; Max, maximum; Min, minimum

professionals' knowledge level about the relationship between HPV infection and genital warts or HPV and non-cervical cancers is insufficient.[9] Dany et al reported that despite significantly higher knowledge scores of students in graduate programs, health-related majors, and those who were vaccinated compared with students in undergraduate programs and non-health-related majors, the mean knowledge score of university students was 52.7 ± 1.71 (out of a possible 100), which reflects poor to moderate knowledge.[4]

The CDC reported in 2013 that when health care professionals eliminate missed opportunities regarding HPV vaccination (which is defined as a health care encounter occurring on or after a woman's 11th birthday in which at least 1 vaccine is given but not the HPV vaccine), the rate of receiving at least 1 dose of HPV vaccine in the targeted group could reach 92.6%.[26] Health care and especially nurses play an important role in providing training while acting as a consultant for parents and the target group. Recommendation of HPV vaccination by physicians or nurses plays a crucial role when the target group is making the decision to be vaccinated. Health care workers need to have correct and current information on HPV infection and vaccination so that they can properly assume this responsibility.

In this study, only 1.3% of young women aged 18-22 years stated they had undergone HPV vaccination, and 15.1% stated they were extremely likely to do so. The CDC reported that slightly more than 50% of young women aged 13-17 years in the United States have undergone HPV vaccination, and approximately 33% have received all 3 doses of the vaccine.[26] Similarly, Bowyer et al reported that 67.2% of women aged 16-17 years in the United Kingdom have strong intention to undergo HPV vaccination.[27] A study among university students in Turkey reported a low vaccination rate of 0.4%,[9] and 2 other studies found that none of the adolescents had undergone vaccination.[13,28]

The American College of Obstetricians and Gynecologists reported that the HPV vaccine is 100% effective in preventing condylomatous vulvar disease related to CIN 2, CIN 3, and the HPV genotypes included in the vaccine.[5] The low vaccination rate indicates a need for emphasis on the acceptance and accessibility of vaccination. Removing obstacles to HPV vaccination is therefore an important approach. To remove the difficulty related to the cost of the vaccine, which is presented as one of the potential obstacles,[9] all new health care plans in the United States are now required to cover HPV vaccination for girls and boys without cost to patients according to the Affordable Care Act.[6] Also, HPV vaccines are available through the Vaccines for Children Program (VFC) at no cost for eligible children younger than the age of 19 years.[6] The vaccine has not been included in the scope of state or private insurance in Turkey, and individuals have to pay for it themselves.

In the current study, there was a significant relationship between the health belief subdimensions and knowledge scores of the participants and their intention to undergo vaccination. Participants who planned to be vaccinated for HPV showed higher perceived severity, perceived susceptibility, and perceived benefits, and lower perceived barriers and higher knowledge scores. The HBM suggests that HPV vaccination intention and acceptance can be predicted by individuals' perceived severity and susceptibility to HPV infection or cervical cancer, and their beliefs about the benefits and barriers involved in being vaccinated.[27] Our results are consistent with other studies that showed that higher perceived susceptibility,[14,19,29,30] higher perceived severity of HPV,[2,29] and higher perceived benefits to HPV vaccination[14,29,31] are positively associated with intention to receive the HPV vaccine. Higher perceived barriers were negatively associated with intention to receive the vaccine.[8,29] Similarly, perceived susceptibility,[32] benefits,[32] and barriers[33] have all shown associations with HPV vaccine use.

An increased knowledge score of the participants correlated with a greater desire to undergo vaccination in this study, and the perceived severity and perceived benefits related to HPV were also greater in students with higher knowledge scores. This result indicates that the perception of benefits of vaccination and the seriousness of HPV of individuals influence the decision to undergo vaccination. Similar to our study results, Bowyer et al stated that girls were more likely to have received the vaccine at follow-up if they had greater knowledge of HPV and the HPV vaccine at baseline, and if they thought that HPV was severe and that they were susceptible to HPV.[27] Kim stated that perceptions of benefits and susceptibility toward vaccination were important factors for the acceptability of HPV vaccination for girls.[14] Kahn et al reported that higher HPV knowledge, higher perceived severity of HPV and HPV-related disease, and higher perceived benefits of HPV vaccination were positively associated with intention to receive the HPV vaccine.[2] Similarly, Donadiki et al reported that ensuring correct knowledge regarding HPV infections and vaccination through public education programs and focusing on the risk perception, benefit

perception, and attitudes of individuals toward HPV will increase HPV vaccination rates.[8]

Conclusions

HBMS-HPVV was found to be reliable and showed satisfactory content and construct validity for evaluation of the health beliefs toward HPV and its vaccination in a Turkish sample of young women. The knowledge level of the participants regarding HPV and its vaccination was low, and good knowledge on the matter had a positive effect on intention to undergo vaccination and health beliefs related to vaccination. The HBM is particularly important in the planning stages of health education. Taking the beliefs seen in the constructs of the model into account will strengthen educational interventions for health care professionals. Although the instrument showed good levels of validity and reliability, it has not been tested for effectiveness in developing strategies to create awareness and increase the acceptability and rate of HPV vaccination.

Implications for Practice

This scale can be used to investigate the health beliefs of young women in relation to HPV and its vaccination and to evaluate the effectiveness of intervention strategies to promote HPV vaccination intentions and use. Understanding of how knowledge and health beliefs predict HPV vaccination will help health care professionals in the development of effective interventions to increase intentions to receive the HPV vaccine. Additional research with women from different ages and cultures is recommended to test the psychometric properties of this scale.

Limitations

The validity and reliability of the HBMS-HPVV were evaluated in a group of nursing students in this study, but studies on adolescents from various backgrounds in the Turkish population are required. We also evaluated only the attitudes of young women toward HPV vaccination. HPV vaccination for men has not yet been approved by the Ministry of Health in Turkey, but various studies recommend evaluation of the health beliefs of men regarding HPV vaccination.

References

1. Klein NP, Hansen J, Chao C, et al: Safety of quadrivalent human papillomavirus vaccine administered routinely to females. Arch Pediatr Adolesc Med 2012; 166:1140
2. Kahn JA, Rosenthal SL, Jin Y, et al: Rates of human papillomavirus vaccination, attitudes about vaccination and human papillomavirus prevalence in young women. Obstet Gynecol 2008; 111:1103
3. Wamai RG, Ayissi CA, Oduwo GO, et al: Awareness knowledge and beliefs about HPV cervical cancer and HPV vaccines among nurses in Cameroon: An exploratory study. Int J Nurs Stud 2013; 50:1399
4. Dany M, Chidiac A, Nassara AH: Human papillomavirus vaccination: assessing knowledge, attitudes, and intentions of college female students in Lebanon, a developing country. Vaccine 2015; 33:1001
5. American College of Obstetricians and Gynecologists (ACOG) Human papillomavirus vaccination Committee Opinion No 588. Obstet Gynecol 2014; 123:712
6. National Cancer Institute (NCI): Accelerating HPV Vaccine Uptake: Urgency for Action to Prevent Cancer. A Report to the President of the United States from the President's Cancer Panel. Bethesda, MD 2014.
7. Petrosky E, Bocchini JA, Hariri S, et al: Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the Advisory Committee on Immunization Practices. MMWR Morb Mortal Wkly Rep 2015; 64:300
8. Donadiki EM, Jiménez-García R, Hernandez-Barrera V, et al: Health Belief Model applied to non-compliance with HPV vaccine among female university students. Public Health 2014; 12:268
9. Holman DM, Benard V, Roland KB, et al: Barriers to human papillomavirus vaccination among US adolescents; a systematic review of the literature. JAMA Pediatr 2014; 168:76
10. Durusoy R, Yamazhan M, Taşbakan MI, et al: Vaccine awareness and willingness of first-year students entering university in Western Turkey. Asian Pac J Cancer Prev 2010; 11:1
11. Hsu YY, Hsu KF, Cheng YM, et al: Health beliefs of Taiwanese women seeking HPV vaccination. Vaccine 2010; 28:4224
12. Liau A, Stupiansky NW, Rosenthal SL, et al: Health beliefs and vaccine costs regarding human papillomavirus (HPV) vaccination among a US national sample of adult women. Prev Med 2012; 54:277
13. Kilic A, Seven M, Guvenc G, et al: Acceptance of human papillomavirus vaccine by adolescent girls and their parents in Turkey. Asian Pac J Cancer Prev 2013; 13:4267
14. Kim HW: Knowledge about human papillomavirus (HPV) and health beliefs and intention to recommend HPV vaccination for girls and boys among Korean health teachers. Vaccine 2012; 30:5327
15. Allen JD, Coronadoc GD, Williams RS, et al: A systematic review of measures used in studies of human papillomavirus (HPV) vaccine acceptability. Vaccine 2010; 28:4027
16. Britt RK, Hatten KN, Chappuis SO: Perceived behavioral control, intention to get vaccinated, and usage of online information about the human papillomavirus vaccine. Health Psychol Behav Med 2014; 2:52
17. Guvenc G, Akyuz A, Acikel CH: Health Belief Model Scale for Cervical Cancer and Pap Smear Test: psychometric testing. J Adv Nurs 2011; 67:428
18. Rosenstock IM: Health belief model. In: Kazdin AE, editor. Encyclopedia of Psychology, 4. Washington, DC, American Psychological Association, 2004, pp 78–80
19. Brewer NT, Fazekas KI: Predictors of HPV vaccine acceptability: a theory informed systematic review. Prev Med 2007; 45:107
20. Nunnally JC, Bernstein IH: Psychometric Theory. New York, McGraw-Hill, 1994
21. Streiner DL, Norman GR: Health Measurement Scales. Oxford, Oxford University Press, 2008
22. Worthington RL, Whittaker TA: Scale development research: a content analysis and recommendations for best practices. Couns Psychol 2006; 34:806
23. Kline P: The Handbook of Psychological Testing, (2nd ed.). London, Routledge, 2000
24. Polit DF, Beck CT: Nursing Research: Principles and Methods, (7th ed.). Philadelphia, Lippincott, Williams & Wilkins, 2004, pp 417–419
25. Fidanci BE, Acikel C, Fidanci K, et al: Validity and reliability: to use in pediatrics. Ann Pediatr Rheumatol 2012; 1:147
26. The Centers for Disease Control And Prevention (CDC): Human Papillomavirus Vaccination Coverage Among Adolescent Girls, 2007–2012, and Postlicensure Vaccine Safety Monitoring, 2006–2013 — United States. MMWR Morb Mortal Wkly Rep 2013; 62:591
27. Bowyer HL, Forster AS, Marlow LA, et al: Predicting human papillomavirus vaccination behaviour among adolescent girls in England, results from a prospective survey. J Fam Plann Reprod Health Care 2014; 40:14
28. Guvenc G, Seven M, Akyuz A: Determination of the knowledge and attitudes of nursing students about human papilloma virus infection and its vaccines [Hemşirelik yüksek okulu öğrencilerinin human papilloma virüs enfeksiyonu ve aşıları ile ilgili bilgi ve tutumlarının belirlenmesi]. Gulhane Med J 2012; 54:104. [in Turkish].
29. Marlow LA, Waller J, Evans RE, et al: Predictors of interest in HPV vaccination: a study of British adolescents. Vaccine 2009; 27:2483
30. Di Giuseppe G, Abbate R, Liguori G, et al: Human papillomavirus and vaccination: knowledge, attitudes, and behavioural intention in adolescents and young women in Italy. Br J Cancer 2008; 99:225
31. Bennett KK, Buchanan JA, Adams AD: Social-cognitive predictors of intention to vaccinate against the human papillomavirus in college-age women. J Soc Psychol 2012; 152:480
32. Juraskova I, Bari RA, O'Brien MT, et al: HPV vaccine promotion: does referring to both cervical cancer and genital warts affect intended and actual vaccination behavior? Womens Health Issues 2011; 21:71
33. Bynum SA, Brandt HM, Sharpe PA, et al: Working to close the gap: identifying predictors of HPV vaccine uptake among young African American women. J Health Care Poor Underserved 2011; 22:549–61