Effects of information sources in HPV vaccine acceptance: prospective randomized trial

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**ABSTRACT**

**Background:** No study has evaluated the impact of written and visual resources in addition to information provided by healthcare workers on the acceptance of the HPV vaccine, which is the focus of the present research.

**Methods:** This prospective study was conducted between September 2020 and June 2021. The first group (Group 1) was given a 20-minute informative talk by professional healthcare providers about the benefits of HPV vaccination. For Group 2, the talk from the professional healthcare worker was supplemented with a 1200-word, three-page written information source about the HPV vaccine that was given to patients. In Group 3, participants again received information from professional healthcare providers, supplemented with video content. One week after the first visit, participants’ acceptance status of the HPV vaccination and concerns about the administration of HPV vaccine were reevaluated.

**Results:** At the end of the study period, 225 participants (75 for each group) were enrolled. After the education protocol, concerns about the HPV vaccination significantly decreased in Group 3 in compared with the other groups (p = 0.001). The HPV vaccine acceptance rate increased from 26.7% to 56.0% in group 1, from 24.0% to 58.7% in group 2, and from 28.0% to 82.7% in group 3 (p = 0.001).

**Conclusion:** The present study showed that information from the video supplementing the professional health worker’s talk was associated with significantly lower anxiety and concern level about the HPV vaccine, and significantly higher the HPV vaccine acceptance rate.

**Introduction**

Human papillomaviruses (HPV) are among the most common sexually transmitted viral disease. Persistent HPV infection and anogenital warts may be precursors for gynecological, anal, and oropharyngeal cancers. Therefore, HPV vaccine has proven beneficial effect on anogenital warts and anogenital intraepithelial neoplasia. The HPV vaccine has been used in many countries since the 2000s. According to the Centers for Disease Control and Prevention Agency, four out of every five sexually active women are exposed to HPV infection once in their lifetime [1]. Previous studies have revealed a close relation between persistent HPV infection and oropharyngeal cancers, anal dysplasia, anogenital warts, and gynecologic cancers [2]. To prevent HPV-related complications, HPV quadrivalent (types 6, 11, 16, and 18) recombinant vaccine was approved due to its proven beneficial effect on cervical warts, cervical cancer, cervical intraepithelial neoplasia, vulvar and vaginal neoplasms. Recently, the HPV vaccine was recommended for routine vaccination at age 11 or 12 years and for all those up to 26 years if not adequately vaccinated previously [3]. However, there are many factors in individuals’ acceptance of the vaccine, including education level, race, religion, knowledge of HPV, and source of information about HPV [4,5].

Previous reports underlined the importance of information protocol in accepting treatment and selecting treatment modalities in different diseases. Gomez and colleagues investigated the effect of information packages, including written and audiovisual content, in patients with chronic kidney disease. The authors concluded that these sources significantly improved patients’ knowledge of the disease and the different treatment options [6]. However, in the case of obesity, Sturesson et al. emphasized that the patient’s motivation and compliance with the treatment could be impaired by watching an excessive number of videos [7].

Previous studies investigated the factors affecting the acceptance of the HPV vaccine. Still, to our knowledge, no study has evaluated the impact of written and visual resources and information provided by healthcare workers in the acceptance of the HPV vaccine, which is the focus of the present research.

**Material and method**

The present study was planned in a prospective manner between September 2020 and June 2021, and included women of ≥ 18 years old, admitted to a gynecology
outpatient polyclinic. All patients were under 26 years old, the cutoff age for HPV vaccination recommendation. None of the participants were previously diagnosed with or had been treated for HPV infection. The study’s exclusion criteria were as follows: allergy to the HPV vaccine or its ingredients, exposure to sexual abuse, a history of psychological disease or gynecological cancers, presence of sexual penetration disorder, congenital or acquired immunodeficiency, or active urinary and/or sexually transmitted infection and participants who are against all vaccines (influenzas, tetanus, meningococcemia etc.). Ethical committee approval was obtained, and all participants signed informed consent before enrolling in the study. The study was planned in accordance with the principles of the Helsinki Declaration.

A questionnaire form was filled out by the participants and records were made of all participants’ demographic characteristics, including age, presence of chronic disease, age of first sexual intercourse, education status (illiterate, middle or elementary school, high school or university), employment status (working, part-time working, and not working), monthly income, smoking status, alcohol use, and gravity. A note was made of those who accepted the HPV vaccination. Also analyzed were women’s knowledge about HPV infection and vaccination and any concerns about the administration of the vaccine [8]. Lastly, all participants filled Beck Anxiety Inventory (BAI) form. Both questionnaires were administered by physicians.

Beck Anxiety Inventory (BAI)

The BAI questionnaire contains 21 items eliciting anxiety and depression status scored from zero (not at all) and three (severely) [9]. The total BAI score is calculated by summing the scores of all the items (score between zero and 21, low anxiety; a score between 22 and 35, moderate anxiety; a score of 36 and above, severe anxiety).

Study groups

Participants were divided into three groups in a 1:1:1 ratio, according to their information source about HPV vaccination. A computer-assisted randomization program was used for the selection of the groups [10]. The first group (group 1) was given a 20-minute informative talk by professional healthcare providers about the benefits of HPV vaccination in a quiet and warm room. For group 2, the talk from the professional healthcare worker was supplemented with a 1200-word, three-page written information source about the HPV vaccine, which was given to patients. In group 3, participants again received information from a professional healthcare provider, supplemented by video content. The five-minute video content was prepared according to HPV vaccination guidelines by a gynecologist. Also, a link to the video on YouTube was provided for future reference.

According to groups, one week after the first visit, there was a reevaluation of participants’ BAI score, acceptance status of HPV vaccination, and concerns about the administration of HPV vaccine. Also analyzed were factors affecting participants’ HPV vaccine acceptance after receiving information.

Statistical analysis

The Statistical Package for the Social Sciences version 25 (SPSS IBM Corp., Armonk, NY, USA) program was used. The normality of the distribution of the variables was confirmed by the Shapiro-Wilk test and Q-Q plots. One-way ANOVA test was used for comparison of the normally distributed variables between the groups, and Kruskal-Wallis test was used for non-normally distributed data. Quantitative data are shown as mean ± standard deviation values. Categorical variables were grouped and compared using the χ² test or Fisher’s exact test. The data were analyzed at a 95% confidence level, and the P-value of less than 0.05 was accepted as statistically significant.

Results

At the end of the study period, 225 participants were enrolled (75 for each group). The mean age was 25.4 years, and 18.7% of patients had a chronic disease. Totally, 164 (72.9%) women were sexually active. The most common education level was high school (43.1%), and most were not in employment (56%). Smoking and alcohol use were reported in 48 (21.3%) and 39 (17.3%) women, respectively. 30.2% had knowledge of HPV, and 17.8%, of HPV vaccination. 81.8% had concerns about HPV vaccination (Table 1).

There was no significant difference across groups in terms of mean age, presence of chronic disease, age of first sexual intercourse, education status and working situation (p = 0.254, p = 0.678, p = 0.467, p = 0.243 and p = 0.213). Additionally, groups were similar regarding monthly income, smoking status, alcohol use and gravity (p = 0.188, p = 0.459, p = 0.481 and p = 0.349, respectively). Groups were also similar in their knowledge about HPV, and the HPV vaccine, and concerns about the HPV vaccine (p = 0.436, p = 0.476 and p = 0.544) (Table 2).

After the education protocol, all groups showed a decrease in BAI score, but this decrease was significantly greater for participants receiving information from professional healthcare providers supplemented by video content (p = 0.001). Additionally, concerns about HPV vaccination significantly decreased in Group 3 in comparison with the other groups (p = 0.001). After the education program, HPV vaccine acceptance rate increased from 26.7% to 56.0% in group 1, from 24.0% to 58.7% in group 2, and from 28.0% to 82.7% in group 3 (p = 0.001) (Table 3).

Comparison of patients’ data after the information protocol revealed that participants accepting the HPV vaccine had a higher education level (p = 0.001). Also, the rate of HPV infection in acquaintances was significantly higher in those who accepted vaccine compared to those who did not (15.7% and 7.8%, respectively). Additionally, the HPV vaccine acceptance rate was significantly higher in participants who received video content in addition to information from a professional health worker (p = 0.001) (Table 4).

Discussion

Previous studies have shown that both the patient’s level of knowledge and information source affect the choice of treatment and treatment outcomes [11,12]. However, there is a lack of agreement over the best information source and delivery
method in HPV vaccination programs. HPV is one of the most common sexually transmitted diseases, and the vaccine has an important role in the prevention of HPV-related complications. Therefore, it is important to increase vaccination acceptance by disseminating knowledge of the HPV vaccine and reducing women’s concerns. In the present study, we found significantly lower anxiety about HPV, less concern about the HPV vaccine, and a lower vaccine rejection rate for those who accessed video content in addition to the professional health worker advice. In addition, participants with better education and with relatives with HPV were significantly more accepting of vaccination after receiving information.

At present, patients and their relatives often seek alternative sources of information about disease instead of, or in addition to information from, healthcare workers [13]. Bora and colleagues noted that many individuals rely on YouTube videos for information about the infectious disease [14]. However, the reliability of the videos published on this subject is controversial. The videos do not provide sufficient information about the HPV vaccine and may increase the reservations of the patients by focusing on the side effects of the vaccine. According to a study by Kumar et al., many people receiving information about hypertension from healthcare professionals also seek further sources [15]. In a study comparing the effectiveness of videos, written texts, and audio contents as information sources, Freeman and colleagues found that video contents are significantly more effective than the other information tools [16]. In the present study, we determined that the HPV vaccine acceptance rate was significantly higher in participants receiving information from the supplementary video in addition to the professional health worker’s advice when compared to those who received supplementary written texts or no supplementary sources. We believe that this outcome was due to a more significant reduction in anxiety and concerns about vaccination among those receiving information from the video source in addition to healthcare professionals’ advice. It is obvious that patient information and education are difficult in routine clinical practices. Online training programs organized by professionals can facilitate this situation.

A higher education level facilitates understanding of the effectiveness and usefulness of the vaccine. Ferris et al., investigating the factors affecting HPV vaccine acceptance in men, concluded that education level was a positive predictive factor in this regard [17]. Rosenthal et al. found that parents with a university education were more likely to approve HPV vaccinations for their daughters than those with high school education [18]. Similarly, Constantine and Jerman found a statically significant relationship between higher education level and HPV vaccine acceptance [19]. In concordance with the literature, we found that participants who accepted HPV vaccination after the information program had a significantly better education level in comparison with those who did not.

The illnesses or deaths of friends and relatives may have an impact on people’s psychology and behavior. Sparla and colleagues investigated the effect of advanced lung cancer on the emotional status of patient’s relatives, and the authors concluded that they experienced feelings of helplessness as the patient’s health deteriorated [20]. In another study, Polomeni analyzed the difficulties faced by relatives of patients during allogeneic-hematopoietic stem cell transplantation, finding that these individuals’ social and family lives were seriously affected by concerns during therapy [21]. In the present study, we found that the HPV vaccine acceptance rate was significantly higher in participants with a previous acquaintance with HPV. We believe that this is due to their greater understanding of the seriousness of the disease and the importance of the vaccine.

The present study has three main limitations. First, in the analysis, we did not consider the effect of the information program on their decision whether or not to be vaccinated. Secondly, the present study was conducted as a survey study, in which answers could be affected by internal factors such as mental status and physical fatigue, as well as external factors. To mitigate these drawbacks, participants were given a warm and quiet room to complete the questionnaire and no time pressure. The appropriate age for HPV vaccine is patients under 15 years of age. This group is very likely to be exposed to HPV and unaware of the infection. This reduces the effectiveness of the HPV vaccine. Finally, there was only one study site, a tertiary academic center located in a cosmopolitan city. Future studies involving rural areas and multiple academic centers will contribute to the further understanding of this topic.

**Conclusions**

The present study showed that information from the video supplementing the professional health worker’s talk was associated with a significantly lower BAI score and concern level about the HPV vaccine and a substantially higher HPV vaccine acceptance rate. Additionally, after the information protocol, the HPV vaccine acceptance rate was significantly higher in better-educated participants and those familiar with cases of HPV in others. However, it will be important to review the present study’s findings in light of further prospective studies with larger patient volumes.
Table 2. Comparison of demographic characteristics of participants between groups.

|                              | Group 1 (n:75) | Group 2 (n:75) | Group 3 (n:75) | P value |
|------------------------------|----------------|----------------|----------------|---------|
| Age (years)*                 | 25.1±4.6       | 26.2±3.9       | 24.9±4.6       | 0.254   |
| Presence of chronic disease  | 15 (20.0%)     | 13 (17.3%)     | 14 (18.7%)     | 0.678   |
| Age at first sexual intercourse* | 19.1±4.2     | 19.0±4.4       | 18.6±5.1       | 0.467   |
| Sexually active              | 55 (73.3%)     | 53 (70.7%)     | 56 (74.7%)     | 0.766   |
| Education status             |                |                |                | 0.243   |
| Illiterate                   | 3 (0.4%)       | 4 (5.3%)       | 4 (5.3%)       |         |
| Elementary or middle school | 11 (14.7%)     | 10 (13.3%)     | 12 (16.0%)     |         |
| High school                  | 34 (45.3%)     | 32 (42.7%)     | 31 (41.3%)     |         |
| University or undergraduate  | 27 (36.0%)     | 29 (38.7%)     | 28 (37.3%)     |         |
| Working frequency            |                |                |                | 0.213   |
| Working                      | 25 (33.3%)     | 20 (26.7%)     | 23 (30.7%)     |         |
| Part time working            | 8 (10.7%)      | 12 (16.0%)     | 11 (14.7%)     |         |
| Not working                  | 42 (56.0%)     | 43 (57.3%)     | 41 (54.7%)     |         |
| Monthly income               |                |                |                | 0.188   |
| <3000 TL                     | 15 (20.0%)     | 12 (16.0%)     | 14 (18.7%)     |         |
| 3000 TL - 7000 TL            | 48 (64.0%)     | 51 (68.0%)     | 51 (68.0%)     |         |
| >7000 TL                     | 12 (16.0%)     | 12 (16.0%)     | 10 (13.3%)     |         |
| Smoking status               | 16 (21.3%)     | 17 (22.7%)     | 15 (20.0%)     | 0.459   |
| Alcohol use                  | 12 (16.0%)     | 14 (18.7%)     | 13 (17.3%)     | 0.481   |
| Gravidity                    |                |                |                | 0.349   |
| Nulligravid                  | 56 (74.7%)     | 53 (70.7%)     | 58 (77.3%)     |         |
| Multigravid                  | 19 (25.3%)     | 22 (29.3%)     | 17 (22.7%)     |         |
| Who thinks she knows about HPV | 21 (28.0%)   | 23 (30.7%)     | 24 (32.0%)     | 0.436   |
| Who thinks she knows about HPV vaccine | 12 (16.0%)  | 14 (18.7%)     | 14 (18.7%)     | 0.476   |
| Hesitant about the HPV vaccine | 62 (82.7%)    | 62 (82.7%)     | 60 (80.0%)     | 0.544   |
| Who had HPV infection in their acquaintances | 8 (10.7%) | 9 (12.0%)      | 7 (9.3%)       | 0.466   |

*mean ± standard deviation
HPV: Human papilloma virus, TL: Turkish Lira

Table 3. Comparison of participants’ pre- and post-briefing opinions between groups.

|                                | Group 1 (n:75) | Group 2 (n:75) | Group 3 (n:75) | P value |
|--------------------------------|----------------|----------------|----------------|---------|
| BAI score                      |                |                |                |         |
| Before information             | 25.5±10.6      | 24.9±11.2      | 24.2±10.8      | 0.246   |
| After information              | 16.7±6.7       | 15.2±5.6       | 10.1±4.8       | 0.001   |
| Hesitant about the HPV vaccine |                |                |                |         |
| Before information             | 62 (82.7%)     | 62 (82.7%)     | 60 (80.0%)     | 0.896   |
| After information              | 18 (24.0%)     | 20 (26.7%)     | 8 (10.7%)      | 0.001   |
| Who want to get HPV vaccine    |                |                |                |         |
| Before information             | 20 (26.7%)     | 18 (24.0%)     | 21 (28.0%)     | 0.678   |
| After information              | 42 (56.0%)     | 44 (58.7%)     | 62 (82.7%)     | 0.001   |

BAI: Beck Anxiety Inventory, HPV: Human papilloma virus

Table 4. Comparison of post-informative opinions of patients who do not want to be vaccinated.

|                              | Accepted (n:89) | Rejected (n:77) | P value |
|------------------------------|----------------|----------------|---------|
| Age (years)*                 | 25.0±5.2       | 25.4±4.1       | 0.768   |
| Present chronic disease      | 13 (14.6%)     | 11 (14.3%)     | 0.953   |
| Sexually active              | 72 (80.9%)     | 62 (80.5%)     | 0.941   |
| Education status             |                |                | 0.001   |
| Illiterate                   | 3 (3.4%)       | 7 (9.1%)       |         |
| Elementary or middle school  | 12 (13.5%)     | 16 (20.8%)     |         |
| High school                  | 44 (49.4%)     | 44 (57.1%)     |         |
| University or undergraduate  | 50 (56.9%)     | 10 (12.9%)     |         |
| Monthly income               |                |                | 0.386   |
| <3000 TL                     | 16 (18.0%)     | 14 (18.2%)     |         |
| 3000 TL - 7000 TL            | 62 (69.7%)     | 53 (68.9%)     |         |
| >7000 TL                     | 11 (12.9%)     | 10 (13.0%)     |         |
| Smoking status               | 18 (20.2%)     | 16 (20.8%)     | 0.930   |
| Alcohol use                  | 13 (14.6%)     | 11 (14.3%)     | 0.953   |
| HPV infection in their acquaintances | 14 (15.7%)  | 6 (7.8%)       | 0.001   |
| Yes                          | 14 (15.7%)     | 6 (7.8%)       |         |
| No                           | 75 (84.3%)     | 71 (92.2%)     |         |
| Information type             |                |                | 0.001   |
| Group 1                       | 22 (24.7%)     | 33 (42.9%)     |         |
| Group 2                       | 26 (29.2%)     | 31 (40.2%)     |         |
| Group 3                       | 41 (46.1%)     | 13 (16.9%)     |         |

BAI: Beck Anxiety Inventory, HPV: Human papilloma virus
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