

RESEARCH ARTICLE

Knowledge, Attitudes, Practices and Barriers Towards HPV Vaccination among Nurses in Turkey: a Longitudinal StudyEmre Yanikkerem^{1*}, Gokcen Koker²**Abstract**

Background: Human papilloma virus (HPV) occurs in women of all age groups, and causes cervical, anal, vaginal, vulvar, penile and oropharyngeal cancers. The aim of the study was to discover what nurses know about HPV infection, testing and vaccination and to determine vaccine practice of their daughters and perceived barriers. **Materials and Methods:** This cross-sectional and prospective study was carried out nurses who have worked in a hospital between January and June 2014. Pre-test and post-test were used to evaluate the nurses' knowledge about HPV infection, testing and vaccination. This study was performed with nurses who had girls between 9 and 26 years of age for evaluating the behavior of vaccination after three months of education. **Results:** The mean of pre-test and post-test scores about HPV infection, which included 22 items, were 8.2 ± 5.6 and 19.2 ± 1.5 , respectively. Before education the HPV testing knowledge score was remarkably poor (1.9 ± 1.7 over 5), after education it increased to 4.8 ± 0.5 . The mean HPV vaccine knowledge score were 3.7 ± 2.7 (pre-test) 7.3 ± 0.8 (post-test) on a 0-8 scale. The difference between mean total pre-test (13.9 ± 9.1) and post-test (31.3 ± 1.9) scores was statistically significant ($p < 0.001$). After three months of education, only two of the nurses' daughters were vaccinated. The main reason was noted by nurses were not willing to be vaccinated was cost, doubts about safety and efficacy related to the vaccine. About one-third of nurses declared that they would receive the vaccine for their daughter later. **Conclusions:** Nurses have a crucial role in the prevention, treatment, increasing public awareness and care for population. The education of the nurses about HPV infection, test and vaccination will play an important part decreasing cancer mortality and morbidity.

Keywords: Human papilloma virus - HPV - Turkish nurses - knowledge - attitude - education

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Introduction

In the middle age women, cervical cancer (CC) is the third most common (Ferlay et al., 2010; Wamai et al., 2013), the fourth leading cause of cancer mortality among women cancer in worldwide (Wamai et al., 2013) and with about 500.000 new cases and 250.000 deaths each year (Ferlay et al., 2010; Pinar et al., 2010; Ortashi et al., 2012; Ozyer et al., 2013). In Turkey, CC is the ninth most common cancer among women, the incidence was estimated to be 4.3/100,000 in 2007 (Naki et al., 2010; Ozyer et al., 2013) and estimated mortality rate for CC was found to be 14.9/100,000 which was ranks 13th among cancer-related deaths. Turkish National Cancer program have administrated cervical screening program which have included a population-based and covers about 70% of population (Naki et al., 2010; Uzunlar et al., 2013).

Human papilloma virus (HPV) is DNA viruses that infect epithelial (skin or mucosal) cells and is the one of the most common sexually transmitted infection (WHO, 2007; Ozyer et al., 2013). HPV includes more than 100 known genotypes and more than 40 of these viruses can

be easily spread through direct skin-to-skin contact during vaginal, anal, and oral sex (National Cancer Institute, 2013). The infection occurs in women of all age groups and it is estimated that over 50% of sexually active women are exposed to at least one HPV type (Pinar et al., 2010; Makwe and Anorlu, 2011; Ortashi et al., 2012). In the world around 440 million is estimated to cause about half a million new cancers every year, most of them affecting women in developing countries (WHO, 2007; Ozyer et al., 2013). The incidence of HPV infection in Turkey though hospital based studies report ranging from 2.1%-16.5% among low-risk Turkish women (Ozyer et al., 2013).

Most HPV infections are asymptomatic, transient, %70-90 of infection clear within one or two year not causing cancer (Hilton et al., 2011) and persistent infection occurred 10% of the cases. HPV types have been classified into lower and higher risk groups. The lower risk group (mainly 6 and 11) can cause genital warts (condyloma acuminatum) which grow on the cervix, vagina, vulva, or anus in women and the penis, scrotum, or anus in men. It also causes recurrent respiratory papillomatosis, an uncommon, but serious, condition of the larynx (WHO,

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2007). The higher risk group (mainly 16 and 18, also other type 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66) which plays the most important role in the etiology of CC responsible for about 70% of all CC (WHO, 2007; National Cancer Institute, 2013) and causes anal, vaginal, vulvar, penile and oropharynx cancers (WHO, 2007; Ozan et al., 2011; Makwe and Anorlu, 2011; Guvenc et al., 2012; National Cancer Institute, 2013).

World Health Organization (WHO) recognizes CC as the first type of carcinoma completely due to an infection and 99% of CC cases are linked to a HPV infection. Factors contributing to development of CC after HPV infection include immune suppression, multi-parity, early age at first delivery, cigarette smoking, long-term use of hormonal contraceptives, and co-infection with Chlamydia trachomatis or Herpes simplex virus (WHO, 2007). Many studies stated that risk of HPV related mortality and morbidity was seen in women who had socio-economical disadvantaged (Wang and Do, 2012).

Early diagnosis and treatment are an important in reducing the mortality of the CC and increasing the chance of treatment to %100, also decreasing the deaths 50% (Beydag, 2011). Etiologic link between carcinogenic HPV and CC, testing for molecular HPV testing is now being considered as an alternative for cytology-based CC screening. The sensitivity and specificity of the test for \geq CIN2 was determined between 90% and 98% (Kwan et al., 2012). Nowadays, it is suggested that making HPV-based screening is likely to be effective. The combination of HPV and cytology had 100% sensitivity and a referral rate of 7.9% (National Cancer Institute, 2013).

The U.S. Preventive Services Task Force (USPSTF) recommends screening for CC in women age 21 to 65 years with Pap smear every 3 years or, for women age 30 to 65 years, screening with a combination of cytology and HPV testing every 5 years. The USPSTF found new evidence about HPV testing combined with cytology as an acceptable screening strategy for women age 30 to 65 years who prefer to lengthen their screening interval beyond 3 years. The American Cancer Society, American Society for Colposcopy and Cervical Pathology, American Society for Clinical Pathology, had also recommended that women age 21 to 29 years be screened with cytology alone every 3 years. Women age 30 to 65 years should be screened with cytology and HPV testing every 5 years or cytology alone every 3 years (https://www.acog.org/About_ACOG/Announcements/New_Cervical_Cancer_Screening_Recommendations).

The HPV vaccine was introduced as a primary prevention strategy to reduce the incidence of CC (Boyce and Holmes, 2012; Wamai et al., 2013) and two types of HPV vaccine (bivalent for HPV 16 and 18; quadrivalent for HPV 6, 11, 16 and 18) were approved for use in CC prevention program for reducing the risk of pre-invasive and invasive neoplasia of the cervix (WHO, 2007; Pinar et al., 2010; Makwe and Anorlu, 2011; Uzunlar et al., 2013). It is estimated that the HPV immunization program will reduce deaths from CC by two-thirds if uptake reaches 80%. Many countries such as the UK, Australia, Canada, France, Greece, New Zealand, Norway and Sweden offer the HPV vaccine as part of their national immunization

program (Boyce and Holmes, 2012). The vaccine seems to be safe, well tolerated and effective if the vaccine has to be delivered before exposure to the virus, and preferably, at the preadolescence stage, as the antibody responses are higher (Ozyer et al., 2013; Uzunlar et al., 2013). The Center for Disease Control and Prevention recommends HPV vaccination among those the age of between 9 and 26 (Holder et al., 2013). There is no need to screen for HPV before offering vaccine to women. The duration of protection has not known yet, but there is evidence of protection for at least five years after vaccination. Studies have been continuing to evaluate the long-term protection. The cost of HPV vaccines will be a major determinant of the cost-effectiveness of vaccination (WHO, 2007).

In Turkey, cervical screening primarily based on Pap smear and HPV testing currently have a limited use because of its high cost. HPV testing is recommended to women with atypical squamous cells of undetermined significance (ASCUS). Pap smear is taken by doctors and trained nurses. The vaccines have been in use since 2007; however, the cost of vaccines has not covered by health insurance. Especially for in developing countries, health care providers play an important role in immunization programs for providing health education to public and to play a significant role in the success of effective HPV vaccine program (Naki et al., 2010; Makwe and Anorlu, 2011; Mc Sherry et al., 2012; Uzunlar et al., 2013).

Health care providers' especially nurses in developing countries play a crucial role in taking smear, giving an information and advising for their patients on HPV infection, HPV related condition, HPV testing and vaccination. Various international studies have demonstrated that health care professionals had a basic knowledge about CC, HPV and related disease, HPV tests and HPV vaccine; but lack detailed knowledge (Makwe and Anorlu, 2011; Phianmongkhol et al., 2011; Kwan et al., 2012; Ortashi et al., 2012) and also previous studies indicated that women have desired information about HPV and CC, parents and women considering having their daughters vaccinated for HPV vaccine recommendation from health professionals to be important predictor of vaccine receipt (Pinar et al., 2010; Yanikkerem et al., 2010; Wong and Do, 2012).

In Turkey most of studies evaluated the knowledge and attitudes of women (Pinar et al., 2010; Ozan et al., 2011; Ozyer et al., 2013), medical students (Onsuz et al., 2011), nursing students (Ozsaran et al., 2011; Guvenc et al., 2012; Uzunlar et al., 2013), university students (Yanikkerem et al., 2010), nurses (Pinar et al., 2007), physicians and non-physician health care professionals (Naki et al., 2010), and pediatricians (Yildirim et al., 2009) about HPV and vaccinations. Only one study had given education to university students about HPV and HPV vaccine (Yanikkerem et al., 2010). However, no published research was found a longitudinal design about vaccination.

It has been noted that although CC is a preventable disease, in many developing countries screening program is lack and nurses generally play a major role in health education and prevention (Phianmongkhol et al., 2011). The knowledge and perceptions of health professionals are

an important factors in influencing vaccine acceptability, however little is known about nurses knowledge and attitude on the HPV vaccination program. In Turkey there were no studies on the nurse's role play in implementing a HPV vaccination.

The aim of the study was (1) to evaluate the basic knowledge of nurses about HPV infection, HPV testing and HPV vaccine, (2) to determine effect of education program for nurses' level of knowledge about HPV infection, HPV testing and HPV vaccine and (3) to assess the effect of education session for nurses' attitudes towards vaccinations and (4) to explore nurses' practice of HPV vaccine to their daughters and perceived barriers of HPV vaccinations.

Materials and Methods

Sample of the study

The cross-sectional and prospective study was carried out nurses who have worked in Katip Celebi University, Ataturk Training and Research Hospital between January and June 2014. The hospital that is the central training hospital in Izmir, which is the third biggest cities of Turkey, provides services to adult in all departments of health conditions.

At the time of the study, there were 832 nurses that have employed in the hospital. This study was performed with 143 nurses who had girls between 9 and 26 years of age for evaluating the behavior of vaccination after education section. Overall, 143 nurses invited in the study, however 13 of them did not participate the research and education session, 10 nurses did not work in the hospital between the dates, 15 nurses participated the education session but did not want to complete the questionnaire. Finally, this study sample consisted of 105 nurses.

Questionnaire

The self-administered questionnaire, which was consisted of five parts, was designed by the researchers on the basis of published research, expert opinion and guidance (WHO, 2007; Yanikkerem et al., 2010; Makwe and Anorlu, 2011; Phianmongkhol et al., 2011; Kwan et al., 2012; Marlow et al., 2013; Wamai et al., 2013; National Cancer Institute, 2013).

The first section included 14 questions to elicit information about nurses' demographic, professional and fertility characteristics, i.e. age, level of education, marital status, number of previous pregnancies and the number of children. The sources of information about HPV also asked in the part.

The second section comprised pretest and the third part involved posttest questions about HPV. The content validity was assessed by obstetricians and gynecology experts and revised for suggestion. The pretest and post-test questionnaire which consisted of 35 items about HPV in order to determine the knowledge related to HPV infection (22 items), HPV testing (5 items) and HPV vaccine (8 items). Nurses were given information about the aim of the study. We asked nurses before the education session, "Before today, have you ever heard about HPV?" And we explain the nurses "Please full the questionnaire

and if you did not heard of HPV, please check in "I don't know". The response option for all items in pretest was true/false/ I don't know. After in pretest section education was given to nurses about HPV by the second author. However, in posttest the response option was true and false. The questions and correct answers as supported by evidence were shown in Table 1 and 2.

Education session was developed from the literature and guidelines by the researchers. The session was included information about HPV infection (transmission, related condition, risk factors), HPV testing and HPV vaccine. Nurses were gathered in the hospital seminar room by hospital management organization during working hours. The average number of nurses in the seminar hall was 21 were educated at different times. After gathering in the seminar room, nurses first completed the first part of questionnaire which included socio-demographic questions and the pre-test questionnaire. After the education session, the post-test and the fourth part of questionnaire were administered.

The fourth part of questionnaire included 8 items to assess about nurses' attitudes towards HPV vaccination and the part was completed after the education session. A three-point Likert scale was used to determine attitude towards the HPV vaccine. The items are close-ended with possible responses including "I agree", "I undecided", and "I disagree".

After three months of education, the last part was asked by using telephone interview. The part was aimed to assess nurses' behaviors towards vaccinations of their own daughters and included barriers of HPV vaccination and reason for uptake HPV vaccine. The interviews lasted an average one hour (pretest 15 minutes, education session 30 minutes, post-test 15 minutes, attitude questionnaire 5 minutes, telephone interview 5 minutes for every nurse).

Ethics of the study

Before pretest the objectives of the study were explained to the nurses and informed consent was taken from all nurses. Ethics approval was obtained from Katip Celebi University.

Analysis

Data were recorded and analyzed by using SPSS version 17.0. Basic descriptive findings were analyzed using frequency distributions. The 22 questions' for HPV infection, 5 questions for HPV testing and 8 questions for HPV vaccination correct answers were summed to create knowledge score. A total HPV knowledge score was computed by determining the total number of correct responses range between 0 and 35. Two knowledge scores were calculated for each part: before the education intervention (pretest), after the education intervention (post-test). In the pretest questionnaire, a score of 1 was given for each correct response and 0 for each incorrect or don't know response. One (1) mark was given for every correct response and zero (0) for an incorrect response in the post test section.

Both the mean values for each question and total knowledge score were compared (pre-test and post-test) by using paired t-test, in order to evaluate whether baseline

knowledge improved significantly after the education intervention was administered. A p value of less than 0.05 was considered to be statistically significant. Association between nurses' demographics/ professional characteristics and pretest questionnaire (total knowledge score about HPV infection, HPV test and HPV vaccinations) were analyzed by using t-test, Anova, Mann Whitney U and Kruscal Wallis test.

Results

Characteristics of study population

Out of 145 nurses 105 participated in the study and a response rate was found to be 87.5%. In the study, 51.4% (n=54) of nurses were less than 40 years old and the mean age was 39.8 ± 5.4 years of nurses ranged in age from 29 to 54 years. It was determined that 52.4% of nurses had over 20 years of experience, 86.7% (n=91) of them married, 42.6% (n=45) of them had university education (graduate and undergraduate). Overall, 58.1% (n=61) had ≥2 parity, 35.2% (n=37) had girl and boy, 64.8% (n=68) had only girl child. Forty-two (40.0%) nurses reported ever having an annual gynecological examination, 65.7% (n=69) of the nurses visited outpatient clinic for Pap smear once a year and 13.3% (n=14) of the participants had CC history their relatives and friends.

The present study, 90.5% (n=95) and 14.5% (n=90) of the respondents stated that they had heard about HPV and its vaccines previously, respectively. Only fourteen nurses (13.3%) had taken education or course about HPV and vaccination. Among those who had heard of the HPV infection, their main source of information was written material (newspaper, magazines, journals) (31.4%), television (17.1%), internet (15.2%), friends (14.3%), professional training course (12.4%) and other (9.5%). Nurses who had heard of HPV vaccine had learned about it from written material (34.3%), friends (16.2%), internet (12.4%), television (11.4%), professional training course (11.4%) and other (14.3%) (Data not shown).

Nurses' knowledge about HPV infection before and after education

Data regarding pre- and post-test knowledge about HPV infection were presented in Table 1. In pretest findings, only 36.2% and 45.7% of nurses knew HPV infection occurs in both women and men and HPV infection is generally asymptomatic, respectively. Only 12.4% of nurses recognized HPV is an infection as resolved on their own 1 to 2 years. HPV infection is transmitted by

Table 1. Pre- and Post-Test Mean Values Regarding HPV Infection Knowledge

Items on knowledge about HPV infection	Pretest		Posttest		Correct n (%)	Pretest Mean±SD	Posttest Mean±SD	Test p=0.000
	Don't know n (%)	Incorrect n (%)	Correct n (%)	Incorrect n (%)				
1. HPV infection occurs in both women and men (T).	35 (33.3)	32 (30.5)	38 (36.2)	1 (1.0)	104 (99.0)	0.01±0.1	0.99±0.1	p=0.000
2.HPV infections are sometimes asymptomatic (T)	40 (38.1)	17 (16.2)	48 (45.7)	4 (3.8)	101 (96.2)	0.4±0.5	0.96±0.2	p=0.000
3. Most women will acquire HPV infections at some time in their life (T)	28 (26.7)	8 (7.6)	69 (65.7)	1 (1.0)	104 (99.0)	0.6±0.5	0.99±0.1	p=0.000
4. HPV can stay inactive inside the body for many years (T).	47 (44.8)	7 (6.7)	51 (48.6)	4 (3.8)	101 (96.2)	0.5±0.5	0.96±0.2	p=0.000
5. Most genital HPV infections can resolve spontaneously without causing any disease (T).	56 (53.3)	29 (27.6)	20 (19.0)	18 (17.1)	87 (82.9)	0.2±0.4	0.8±0.4	p=0.000
6.A women should wait until her HPV infection has cleared before attempting pregnancy (F)	54 (51.4)	18 (17.1)	33 (31.4)	43 (41.0)	62 (59.0)	0.2±0.4	0.4±0.5	p=0.000
7. There are more than 100 known HPV genotypes (T).	66 (62.9)	3 (2.9)	36 (34.3)	4 (3.8)	101 (96.2)	0.3±0.5	0.9±0.2	p=0.000
8.Some types of HPV may cause genital warts (T).	42 (40.0)	1 (1.0)	62 (59.0)	-	105 (100.0)	0.6±0.5	1.0±0.0	p=0.000
9.Some types of HPV infection lead to cervical cancer (T).	30 (28.6)	-	75 (71.4)	-	105 (100.0)	0.7±0.4	1.0±0.0	p=0.000
10.Some types of HPV infection lead to penis cancer (T).	56 (53.3)	14 (13.3)	35 (33.3)	4 (3.8)	101 (96.2)	0.3±0.5	0.96±0.2	p=0.000
11. Some types of HPV infection may cause vaginal cancers (T).	42 (40.0)	7 (6.7)	56 (53.3)	1 (1.0)	104 (99.0)	0.5±0.5	0.99±0.1	p=0.000
12.Some types of HPV infection are associated with cancer of the vulva(T).	56 (53.3)	6 (5.7)	43 (41.0)	11 (10.5)	94 (89.5)	0.4±0.5	0.9±0.3	p=0.000
13.Some types of HPV infection may cause breast cancer(F).	63 (60.0)	34 (32.4)	8 (7.6)	78 (74.3)	27 (25.7)	0.3±0.5	0.7±0.4	p=0.000
14.Some types of HPV infection may lead to anus cancer (T).	58 (55.2)	22 (21.0)	25 (23.8)	22 (21.0)	83 (79.0)	0.2±0.4	0.8±0.4	p=0.000
15.10% of HPV can become persistent infections (T).	61 (58.1)	8 (7.6)	36 (34.3)	17 (16.2)	88 (83.3)	0.3±0.5	0.8±0.4	p=0.000
16.HPV infection is transmitted by genital skin-to-skin contact even in the absence of sexual intercourse (T)	40 (38.1)	21 (20.0)	44 (41.9)	4 (3.8)	101 (96.2)	0.4±0.5	0.96±0.2	p=0.000
17.HPV infection could be transmitted only sexual intercourse (F)	40 (38.1)	21 (20.0)	44 (41.9)	4 (3.8)	101 (96.2)	0.4±0.5	0.96±0.2	p=0.000
18.HPV infection risk increases with the number of sex partner and starting to have sex at an early age(T)	48 (45.7)	14 (13.3)	43 (41.0)	43 (41.0)	62 (59.0)	0.2±0.3	0.4±0.5	p=0.000
19.Condom use lowers the risk of genital HPV infection but did not protect completely (T)	48 (45.7)	14 (13.3)	43 (41.0)	43 (41.0)	62 (59.0)	0.2±0.3	0.4±0.5	p=0.000
20.Antibiotics are available to cure an HPV infection (F)	34 (32.4)	2 (1.9)	69 (65.7)	1 (1.0)	104 (99.0)	0.6±0.5	0.99±0.1	p=0.000
21.Majority of HPV infections can be cleared on their own within 1 to 2 years (T)	30 (28.6)	3 (2.9)	72 (68.6)	4 (3.8)	101 (96.2)	0.7±0.5	0.96±0.2	p=0.000
22.HPV infection can increase the use of oral contraceptives (T).	30 (28.6)	3 (2.9)	72 (68.6)	4 (3.8)	101 (96.2)	0.7±0.5	0.96±0.2	p=0.000
HPV infection knowledge score (mean)					8.2±5.6 (0-21)		19.2±1.5 (13-22)	

Table 2. Pre- and Post-Test Mean Values Regarding HPV Test and Vaccine Knowledge

Items on knowledge about HPV test	Pretest Don't know n (%)	Pretest Incorrect n (%)	Correct n (%)	Posttest Incorrect n (%)	Correct n (%)	Pretest Mean±SD	Posttest Mean±SD	Test p=0.000
23. After 3 years start from sexual life, HPV infection test should be done every 3 years (T).	59(56.2)	13 (12.4)	33 (31.4)	8(7.6)	97(92.4)	0.3±0.5	0.9±0.3	p=0.000
24.HPV infection test and Pap smear test should be performed together for cervical cancer screening (T).	36(34.3)	3(2.9)	66(62.9)	3(2.9)	102(97.1)	0.6±0.5	0.97±0.2	p=0.000
25.If both Pap smear and HPV testing is negative, women should continue to get pap test at least once every 3 years (T).	59(56.2)	5(4.8)	41(39.0)	3(2.9)	102(97.1)	0.4±0.5	0.97±0.2	p=0.000
26. If Pap smear is normal, HPV DNA test is positive; both of the tests are repeated after 6 months. If a repeat HPV DNA test is abnormal, colposcopy is recommended (T).	71 (67.6)	1 (1.0)	33 (31.4)	4 (3.8)	101 (96.2)	0.3±0.5	0.96±0.2	p=0.000
27. If Pap smear and HPV DNA test is found to be abnormal, colposcopy is performed directly (T). Knowledge about HPV vaccine	70(66.7)	-----	35(33.3)	1(1.0)	104(99.0)	0.3±0.5	0.99±0.1	p=0.000
28.HPV vaccine is administered only to girls (T).	34(32.4)	13(12.4)	58(55.2)	19(18.1)	86(81.9)	1.9±1.7	4.8 ±0.5	p=0.000
29.HPV vaccines are suggested ideally between 9 and 26 years of age (T).	45(42.9)	9(8.6)	51(48.6)	8(7.6)	97(92.4)	0.5±0.5	0.8±0.4	p=0.000
30.HPV vaccine is administered three-dose schedule (T).	63(60.0)	1(1.0)	41(39.0)	-----	105(100.0)	0.5±0.5	0.9±0.3	p=0.000
31.HPV vaccine is a primary prevention strategy to reduce the incidence of CC (T).	59(59.1)	1(1.0)	45(42.9)	3(2.9)	102(97.1)	0.4±0.5	1.0±0.000	p=0.000
32.HPV vaccine is used for prevention genital warts (T).	65(61.9)	3(2.9)	37(35.2)	10(9.5)	95(90.5)	0.4±0.5	0.97±0.2	p=0.000
33.Women who have been vaccinated should continue to be screened (T)	37(35.2)	1(1.0)	67(63.8)	4(3.8)	101(96.2)	0.3±0.5	0.9±0.3	p=0.000
34. HPV vaccines are more effective in women prior to exposure the virus (T).	54(51.4)	6(5.7)	45 (42.9)	9(8.6)	96(91.4)	0.6±0.5	0.96±0.2	p=0.000
35. There is less need to using condom people if they vaccinated for HPV (F).	53(50.5)	43(41.0)	9(8.6)	84(80.0)	21(20.0)	0.4±0.5	0.9±0.3	p=0.000
Total HPV knowledge score (mean for 35 items)						3.7±2.7	7.3±0.8	p=0.000

genital skin to skin contact was known only 41.9% of the nurses. According to pretest results, only a third of the nurses (34.3%) knew high-risk HPV type could lead to persistent infection. Only 13.3% of nurses knew correctly the statement "HPV could transmit through only sexual intercourse". Of the nurses 65.7% answered correctly "having multiple sex partners and starting to have sex at an early age increases the risk of HPV infection".

Seven out of ten nurses (71.4%) were aware of the relationship between CC and HPV infection, more than half of the nurses (59.0% and 53.3%) were aware of HPV might cause genital warts and vaginal cancer, respectively. Overall, 41.0%, 23.8% and 33.3% of them knew "some types of HPV infection are associated with vulvar, anal and penile cancer", respectively. Knowledge of the no association between HPV and breast cancer increased over tenfold from 7.6% to 74.3%. About one out of four nurses (26.7%) stated that HPV cannot be cured with antibiotics.

Before education, nurses completed a 22 item HPV infection questionnaire and the mean number of items correctly was 8.2±5.6. After education the mean value increased as 19.2±1.5 and nurses were able to provide the correct answers to most of the questions about HPV infection. The difference between mean pre- and post- test scores was statistically significant (p<0.001) (Table 1).

Nurses' knowledge about HPV testing and vaccination before and after education

Nurses knowledge about HPV testing and vaccination increased significantly for all items and comparison of pre-posttest questionnaire was performed in Table 2. Only 31.4% responded to questions correctly on the frequency of HPV testing and more than one-third of the nurses (37.2%) answered incorrectly CC could be prevented with both HPV test and Pap smear test together. The majority of respondent (66.7%) did not know "If Pap smear and HPV DNA test was found abnormal, colposcopy was performed directly". After education, the ratio was increased 99.0% among the nurses. In the pretest question, "If both Pap smear and HPV test is negative, women should continue to get Pap test at least once every 3 years" was answered correctly by 39.0% of nurses. After education session, 97.1% nurses answered this question. There were significant differences in nurses' pretest and posttest result (p<0.001).

In the pretest section, almost half of nurses (48.6%) knew correctly 9-26 years of age is the appropriate age of vaccination and only 39.0% knew the dosing scheme of the HPV vaccine. Before education, 42.9% of nurses mentioned that HPV vaccine is a primary prevention strategy to reduce the incidence of CC. About a third of nurses (35.2%) correctly answered HPV vaccine was used for genital warts.

In pretest, about one-third of nurses (35.2%) did not know women who had been vaccinated should continue to be screened and correct response went from 63.8% to 96.2% after education. "HPV vaccines

are more effective in women prior to exposure the virus” and “There is less need to using condom if they vaccinated for HPV” questions had correct response rate on the pre-test questionnaire (42.9% and 41.0% respectively). After education, correct answers reached 91.4% and 80.0% respectively. There was significant increase in knowledge scores between pre-test and post-test questions ($p<0.001$).

The HPV testing knowledge score in pretest was remarkably poor (1.9 over 5) and the mean HPV vaccine knowledge score was found 3.7 ± 2.7 on a 0-8 scale.

Relationship between nurses' characteristics and pre-test scores

No statistically significant relationship has been determinate between the nurses' knowledge about HPV (HPV infection, HPV testing, HPV vaccination and total score of HPV) and the demographic characteristics (nurses' age, duration of working time, marital status, parity, income level, number of children, gender of children). The study found that knowledge of HPV infection score was significantly higher in higher educated nurses. Nurses with undergraduate education and over had higher level of knowledge about the HPV infection.

A statistically significant relationship was found between HPV total knowledge score and having been previously informed about HPV. The mean HPV total knowledge score for nurses who had training course was 17.4 ± 8.8 and nurses who had training course about HPV had higher mean knowledge scores about HPV vaccination than nurses who had not. Details of the data were given in Table 3.

Nurses attitudes towards HPV vaccination

Nurses' attitudes towards HPV vaccination were shown in Table 4. After education, the most common reasons against vaccination given by nurses concerned about cost of vaccine (79.0%), vaccine safety (41.9%) and vaccine efficacy (44.8%). Overall, 71.4% of nurses disagreed that giving the vaccine would increase risky behavior and early onset of sexual activity.

In the study, 26.7% of nurses thought it were not necessary to vaccinate boys, whereas only 37.1% of nurses believed it was necessary to vaccinate boys. Most of the nurses (91.4%) felt that adolescent sex education should be given before recommending the vaccine. Majority of the participants (91.4%) stated that adolescent sex education

Table 3. Relationship between Nurses' Characteristics and Pre-Test Scores

Characteristics of the nurses	Knowledge about HPV infection		Knowledge about HPV test		Knowledge about HPV vaccine		Knowledge about total HPV items	
	Mean±SD	Test	Mean±SD	Test	Mean±SD	Test	Mean±SD	Test
Age of nurses		t=-0.728		t=-0.669		t=-0.885		t=-0.828
40 age ≤	7.8±5.8	df=103	1.9±1.7	df=103	3.5±2.8	df=103	13.1±9.0	df=103
40age ≥	8.6±5.4	p=0.468	2.1±1.8	p=0.505	3.9±2.8	p=0.409	14.6±9.2	p=0.409
Education of nurses		t=-2.240		t=-1.702		t=-0.903		t=-1.947
High school degree	7.1±5.5	df=103	1.7±1.7	df=103	3.4±2.6	df=103	12.4±9.0	df=103
Graduate or postgraduate degree	9.6±5.3	p=0.027	2.3±1.7	p=0.092	3.9±2.6	p=0.369	15.8±9.0	p=0.054
Duration of working time		t=-0.842		t=-1.131		t=-1.887		t=-1.273
20 years ≤	7.7±5.6	df=103	1.8±1.7	df=103	3.9±2.3	df=103	12.7±8.8	df=103
20 years ≥	8.6±5.5	p=0.402	2.2±1.8	p=0.260	4.1±2.9	p=0.062	14.9±9.4	p=0.206
Marital status		MWU=578.0		MWU=598.0		MWU=623.5		MWU=585.0
Married	8.3±5.6	p=0.577	2.0±1.8	p=0.708	3.7±2.7	p=0.898	14.0±9.3	p=0.624
Unmarried	7.6±5.2		1.7±1.5		3.6±2.5		12.3±8.3	
Parity		t=-0.917		t=-1.043		t=-1.669		t=-1.240
1	7.6±5.8	df=103	1.8±1.7	df=103	3.2±2.6	df=103	12.6±9.4	df=103
2 ≥	8.6±5.3	p=0.362	2.1±1.8	p=0.299	4.0±2.6	p=0.098	14.8±8.9	p=0.218
Gender of children		t=-0.095		t=-1.024		t=-0.048		t=-0.266
Girl	8.2±5.6	df=103	1.8±1.6	df=103	3.7±2.7	df=103	13.7±9.3	df=103
Girl and boy	8.3±5.5	p=0.924	2.2±1.9	p=0.308	3.7±2.6	p=0.962	14.1±8.9	p=0.791
Have you ever heard of HPV?								
Yes	8.7±5.3	MWU=209.5	2.0±1.7	MWU=358.5	3.9±2.6	MWU=267.0	14.6±8.8	MWU=235.0
No	3.2±5.8	P=0.004	1.3±1.5	P=0.195	1.9±2.5	P=0.022	6.4±9.4	p=0.009
Sources of knowledge about HPV								
Written material	10.5±4.4		2.1±1.6		4.2±2.3		16.9±7.3	
Television	9.0±4.8		2.4±1.9	KW=6.658	4.5±2.3	KW=8.672	15.9±8.3	KW=11.996
Professional course	9.9±5.3	KW=12.945	2.8±1.9	df=4	4.7±2.6	df=4	17.4±8.8	df=4
Friends	5.1±6.3	df=4	1.5±1.7	p=0.155	2.9±3.2	p=0.070	9.5±10.6	p=0.017
Internet	7.0±4.9	p=0.012	1.4±1.5		2.6±2.4		11.1±7.9	
Other	8.7±5.3		2.0±1.7		3.9±2.6		14.6±8.9	

Table 4. Nurses Attitudes' Towards HPV Vaccination

Nurses attitudes' towards HPV vaccination	I agree	I undecided	I disagree
I am concerned about the effectiveness of the HPV vaccine	47 (44.8)	51 (48.6)	7 (6.7)
I am concerned about the reliability of the HPV vaccine	44 (41.9)	46 (43.8)	15 (14.3)
HPV vaccine is very expensive, so people could not vaccinated	83 (79.0)	7 (6.7)	15 (14.3)
HPV vaccine may encourage unprotected sexual intercourse	27 (25.7)	14 (13.3)	64 (61.0)
HPV vaccine may encourage starting to have sex at an early age	17 (16.2)	13 (12.4)	75 (71.4)
Boys should be vaccinated although the vaccine is not recommended	39 (37.1)	38 (36.2)	28 (26.7)
Adolescent sex education should be given prior to vaccination.	96 (91.4)	2 (1.9)	7 (6.7)
Health care providers and teachers should be informed about HPV infection and HPV vaccine.	102 (97.1)	-----	3 (2.9)

should be provided before the vaccination.

Vaccination status of nurses' daughters and reasons for not receive vaccination

Only two of the nurses' daughters were vaccinated after 3 months of education and the main reason listed among nurses were not willing to be vaccinated was cost (n=40, 38.8%), doubts about safety (n=16, 15.5%) and efficacy (n=12, 11.4%) related the vaccine. Overall, 37 of nurses (35.2%) stated that they would receive the vaccine their daughter later (data not shown).

Discussion

The aim of the present study was one of the first to evaluate the knowledge regarding HPV infections, testing and vaccine and provides a detailed picture of knowledge, attitude, practice and barriers towards vaccination among Turkish nurses who participated training course about the issue. Nurses' knowledge about HPV was evaluated in the study because nurses are often the first point of contact with patients; play an important role in promoting/delivering immunizations programs for vaccines and increasing public awareness about the HPV and CC. And also nurses have an important role in the prevention, treatment, education and care for patients and they are working in all parts of population for helping women to give positive and true knowledge. It has been noted that although CC is a preventable disease, in many developing countries screening program is lack and nurses generally play a major role in health education and prevention. The earlier studies also stated that participants were more likely to agree to HPV vaccination when recommended by their health care providers (Yanikkerem et al., 2010; Rosenthal et al., 2011).

In the light of the study findings, before education sessions most of the nurses had inadequate basic knowledge about HPV infections, tests and vaccines and low points of pretest questionnaire. Almost one out of ten nurses (9.5%) stated that they had never heard about HPV infection and 14.3% of them had not heard of the vaccine. Similarly with other previous studies, in United Arab Emirates nearly all of school nurses (97%) (Ortashi et al., 2012), in Nigeria 84.8% of the nurses (Makwe and Anorlu, 2011), 81.0% of non-physician health care providers and 97.2% of physician (Naki et al., 2010) and in Ankara, Turkey 55.7% of the nurses students (Guvenc et al., 2012) had heard of HPV infection. According to Marlow et al (2013) study findings, 61.1% of participants had heard of HPV. In South Africa 73.3% of the nurses were aware of HPV; however nurses had poor knowledge regarding HPV infection and the vaccine (Hoque et al., 2014). In Cameroon, nurses had moderately low levels of knowledge about HPV infection, however moderately high level of knowledge about HPV vaccine (Wamai et al., 2013). Contrary to our results, one study stated that the level of knowledge for midwives and nurses about HPV vaccine and CC was found to be sufficient (Beydag, 2011).

Written materials, television and internet were the most important source of knowledge among nurses who had heard about the HPV while a small proportion of nurses

had heard about it through the training course. Similarly, most of studies stated that source of information about HPV and HPV vaccine was written material, media and television (Beydag, 2011; Phianmongkhol et al., 2011). One study in nursing students in Turkey stated that the major source of information about HPV vaccine was the media, internet and their friends (Uzunlar et al., 2013).

In the study, almost two-third of the nurses was unaware of that both men and women have an equal risk of infection. In Cameroon the ratio was found 40.8% (Wamai et al., 2013). Most of the nurses did not know that HPV infection was generally asymptomatic. The finding is similar to other studies (Phianmongkhol et al., 2011). Although HPV could be transmitted by skin-to-skin contact, in the study, less than half of the nurses identified genital skin-to-skin contact as way of transmission of HPV and nurses mistakenly believed that HPV infection can be contaminated only sexual intercourse. Similarly almost half of the nursing students in Turkey identified sexual intercourse as a way of transmission of HPV (Uzunlar et al., 2013). In Nigeria 7.3% of nurses knew HPV infection was contacted by genital skin to skin contact (Makwe and Anorlu, 2011). Consistent with our findings, one study in Thailand more than 70% of the nurses were correctly identified risk factors for CC as smoking, having multiple sexual partners and starting to sex an early age (Phianmongkhol et al., 2011).

It was determined that the misbelieved about HPV could be treated using antibiotics and did not recognize HPV infection was incurable diseases (55.2% of them said did not know, 18.1% of them marked incorrect answer). Of the nurses 12.4% answered correctly that majority HPV infection could clear on their own within 1-2 years. However, the knowledge about the information was quite low. Similarly in our findings, in Cameroon 26.3% of the nurses (Wamai et al., 2013) and in Christchurch 52% of the participants were unaware of most HPV infections can be disappeared without medical treatment on their own (Henninger, 2009).

Using condom can be decreased risk of HPV dramatically, but condom is not as protective against HPV (Marlow et al., 2013). Condoms are an effective tool for preventing STI if used consistently and correctly. Studies have been noted that although use of condoms decreases the risk of HPV, the incidence of HPV among condom users still remains high (Phianmongkhol et al., 2011). In the study before education 68.6% of the nurses decelerated that condom use lowers the risk of genital HPV infection but did not protect completely. In one study, 59.2% of the nurses considered condom use as an important means of protection against HPV infection (Wamai et al., 2013).

Before education most of the nurses (71.4%), after education all of nurses knew correctly HPV infection was related to CC. Similarly, when the literature was viewed, it was seen that of nurses 70.1% in Nigerian (Makve and Anorlu, 2011), 78.5% in Greece (Dinas et al., 2009), 710% in New Zealand (Henninger, 2009), 80.0% in United Arab Emirates (Ortashi et al., 2012) and 81.8% in Thailand (Phianmongkhol et al., 2011) knew about the relationship between CC and HPV infection. In Turkey 92.9% of the pediatricians (Yildirim et al., 2009), 76.9%

of nursing students (Uzunlar et al., 2013), in Christchurch 73.0% of health care providers (Henninger et al., 2009) and in Hong Kong 44.4% of primary care physicians (Wong et al., 2013) knew that HPV infection was the most important risk factor for CC. Other study stated that 90.8% of the participants knew that CC is directly linked to HPV infection (Wamai et al., 2013).

In the study, about four out of five nurses did not know about the link between HPV and anal cancer, almost two-thirds of the participants were unaware of the virus may cause penis cancer. HPV infection is acknowledged incorrectly as a causal factor for breast cancer and the information is not well known among nurses in the present study. Knowledge about HPV related diseases also increased significantly, after education. Consistent with the findings, one study determined that most of the nurses answered incorrectly the question HPV commonly caused of anal cancer (Phianmongkhol et al., 2011). In the pretest section, the level of knowledge about HPV infection was significantly higher in nursing group who were participated training program about HPV and had higher education level.

Another finding of the study was that nurses' knowledge about HPV testing might be considerably inadequate and most were still unaware of HPV testing, despite nurses had a general knowledge of HPV infection. Nurses in the study have worked in different clinics in the hospital and the situation might cause the lower knowledge of HPV testing. Similar findings have been reported in other researches (Linnehan et al., 1996; McSherry et al., 2012).

Almost 10 years had passed since the US FDA Licensed the HPV vaccine; however the light of the study findings indicated that nurses' HPV vaccine knowledge was found an inadequate. Six out of ten nurses had poor knowledge about HPV vaccine. In the present study, less than half of respondents knew CC could be prevented by HPV vaccine. As reported in some studies, in Nigeria only 13.0% of the nurses (Makwe and Anorlu, 2011), in Thailand, 47.7% of nurses (Phianmongkhol et al., 2011), in Ankara and Izmir, Turkey, 54.8% and 75.7% nursing students, respectively (Ozsaran et al., 2011; Guvenc et al., 2012), in Turkey 76.9% of the pediatricians (Yildirim et al., 2009) knew CC could be prevented through vaccine. In one study Ankara, Turkey 78.0% nursing students had heard of HPV vaccine (Uzunlar et al., 2013).

Wamai et al (2013) stated that 78.9% of nurses recognized HPV vaccine as an important means of protection against HPV infection. Klug et al (2008) stated that in their systematic review, there were no differences between countries in regard to knowledge of HPV and since HPV vaccination became available, awareness of HPV has increased (Klug et al., 2008). One study was carried out 2409 participants in three countries and found that awareness of HPV and vaccination was higher in the US than in Australia and the UK (Marlow et al., 2013). Education program about the vaccine should focus on the health care providers as well as the women. In the study more than half of nurses were aware of vaccination does not rule out the need for future CC screening. Studies stated that messages about the need for future screening

may need to be pointed out with clear information about the vaccine which did not prevent all CC (Marlow et al., 2013).

Less than half of nurses knew that HPV vaccine was most effective if given to people who have never had sex. The reason for low level of knowledge in nurses might be there was no vaccination program and clinical guidelines about HPV in Turkey. In particular, correct identification of three dose schedule for HPV vaccine increased from 39% to 100%. The study findings suggest that there is need for education program, which includes specifics information about HPV vaccine such as timing, dosing and connection between HPV vaccine and Pap test, for health providers to developing knowledge, behaviors and attitude. After education session most of knowledge items on HPV were answered correctly by the nurses in the posttest questionnaire (30 of the 37 items) and it was determined that the nurse's knowledge of HPV was found higher rate.

Studies was pointed out that recommendation of HPV immunization by health care providers has been determined as one of the most influential factors in the individual's willingness to receive vaccine. Research indicated that attitudes and supports of nurses and physicians towards HPV vaccine influenced vaccination uptake and increase vaccination rates (Riedesel et al., 2005; Kwan et al., 2012). It is important that women should be informed about HPV and HPV vaccine for women and their family member's health. Nurses are a key people for increasing women's knowledge.

Many nurses (98.1%) in the current study had not vaccinate their children after education intervention cost of vaccine, nurses' concern about vaccine safety and efficacy were determined as major barriers. The main barriers about HPV vaccination in the study was found similar to previous researches (Duval et al., 2009; Naki et al., 2010; Hilton et al., 2011; Wamai et al., 2013; Wong et al., 2013; Ozyer et al., 2013). Oldac and Katz, (2012) study conducted 46 public health departments which served to 32 countries of Ohio Appalachia. The most common barriers reported for nurses were lack of knowledge about HPV vaccines, concerns about vaccine side effects, the newness of HPV vaccines, parents believing their children are not sexually active/too young. The vaccine is being used in more than 100 countries and some of the countries have implemented to HPV vaccination as part of a national routine immunization program. But this has not occurred in Turkey yet.

In Turkey studies have examined about barriers on HPV vaccine; 80.5% of medical students stated that possibility to suggest the vaccine might increase in case the vaccine would be free. High price of vaccine (51.6%) and the belief about the vaccine would increase unprotected sexual intercourse (45.9%) were found the most important drawback points of the students in suggesting vaccine to girls' parents (Onsuz et al., 2011). Other study also underlined the concern of 76.9% of the pediatricians, not recommending vaccination, was the vaccination cost, while 46.2% of them had concerns considering the worries of parents about the probability for the vaccination to cause risky sexual behaviors (Yildirim et al., 2009).

Lack of information also determined the most important barrier to vaccination (Ozyer et al., 2013). The attitude of nurses regarding HPV vaccine will play a critical role in the administration of the vaccine. Other study underlined the most important factors for recommending the vaccine was effectiveness (56.6%) and safety side effects (11.8%) and cost was less of concern (6.6%) (Wamai et al., 2013).

HPV infection can affect both women and men. For control of HPV transmission the role of men should be considered. Consistently Hilton et al's (2011) study findings, in the present study higher in one thirds of the nurses (37.1%) stated that boys should be vaccinated although recommended routinely. Immunization of males with the quadrivalent vaccine, although permitted, was not recommended routinely. Holder et al (2013) study stated that 84% of adolescent health care providers offered the quadrivalent vaccine to males despite the lack of a routine recommendation from the CDS (Holder et al., 2013).

It was emphasized in many studies education about HPV and HPV vaccine has played a crucial role in vaccine acceptability in the general population (Freidman and Shepard, 2007; Gottval et al., 2010; Reiter et al., 2011; Uzunlar et al., 2013; Tonguc et al., 2013). In the present study it was evaluated for vaccinated rate among nurses' daughters and contrary to previous studies found only two of nurses had been vaccinated their daughters after three months of education. In the study, among nurses whose daughters have not received the vaccine yet, only 35.3% of nurses reported high probability for their daughter would get vaccinated within next year. It was probably willingness to receive their daughters was influenced by the nurses' own attitude about vaccine efficacy and safety. The attitude of the vaccine was the most important in our study findings. This may be considered as one of the reasons why the vaccination rate was very low among the nurses' daughters'. In Izmir, Turkey, among 129 female students only 5 of them had HPV vaccination (Ozsaran et al., 2011). Another study in Turkey determined only 2.1% of the nursing students were vaccinated and 66.3% of the the nursing students wanted to willingness to be vaccinated currently (Uzunlar et al., 2013). An achieving success in HPV vaccination programs may be more difficult than other vaccination programs. The cost of the HPV vaccine was reported a major obstacle to uptake HPV vaccine. Recommended three dose course costs were approximately US \$ 390.

The findings of the study have numerous important implications for practice. The study was the first evaluation of HPV educational intervention and in the date no similar intervention for nurses has been conducted in Izmir, Turkey. The education of the nurses about HPV infection, test and vaccination will play a crucial part in increasing public awareness about the HPV. The findings of the study indicated that HPV knowledge of nurses was found to be basis concerns and barriers to vaccination. In the current study, the education intervention effectively raised knowledge about HPV infection, HPV testing and HPV vaccine in nurses. This finding highlights the importance of increasing nurses' knowledge for the HPV infection, testing and prophylactic benefits of the HPV vaccine. However, although educational session was

given to nurses, a few nurses vaccinated their daughters. Cost, safety and efficacy of vaccine was found basis concerns and barriers to vaccination. Future research and educational program should focus on vaccine safety, effectiveness and barriers to vaccination. Health providers and researchers should focus on overcome all social and cultural barriers.

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