Original Study

Human Papillomavirus Vaccination and Sexual Behavior in Young Women

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A B S T R A C T

Study Objective: To compare sexual attitudes and behaviors of young women who have received or declined the HPV vaccine.
Design: Cross-sectional survey.
Setting: Obstetrics and gynecology and pediatrics clinics at a large, Midwestern, academic health center.
Participants: 223 young women (ages 13-24): 153 who had received HPV vaccination and 70 with no prior HPV vaccination.
Main Outcome Measures: Sexual behaviors; attitudes toward sexual activity.
Results: Vaccinated young women were slightly but significantly younger than unvaccinated (mean age 19.2 vs 20.0). Both groups showed a large percentage of participants engaging in high-risk sexual behavior (75% vs 77%). The mean age at sexual debut was not significantly different between the groups (16.8 vs 17.0) nor was the average number of sexual partners (6.6 for both). Unvaccinated participants were more likely to have been pregnant (20% vs 8.6%, $P = .016$), although this difference was not significant in multivariate analysis CI [0.902-5.177]. Specific questions regarding high-risk sexual behaviors and attitudes revealed no significant differences between the groups.
Conclusion: We found that sexual behaviors, including high-risk behaviors, were similar between young women who had and had not received HPV vaccination. Our findings provide no support for suggestions that the vaccine is associated with increased sexual activity. Importantly, we found that young women in our population are sexually active at a young age and are engaged in high-risk behaviors, affirming the importance of early vaccination.
Key Words: HPV vaccine, Sexual behavior, Young women

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection worldwide and is well-known for its oncogenic properties.[1] Specifically, HPV subtypes 16 and 18 are known to cause nearly 70% of all invasive cervical cancers and 35% of oral cavity and oropharyngeal squamous cell carcinomas.[2,3] Although there is no known cure for persistent HPV infection, 2 vaccines have been developed which protect against the 16 and 18 subtypes: Cervarix (GlaxoSmithKline) and Gardasil (Merck). The Gardasil vaccine also protects against HPV subtypes 6 and 11, which are known to cause genital warts.[4] For the vaccines to be most effective, the complete series of 3 injections must be administered prior to sexual debut.[5]

Despite current recommendations for HPV vaccination of all young women at age 11 or 12, vaccine coverage among young women remained under 50% in the US in 2010.[6] One proposed reason for low coverage has been the persistence of negative attitudes toward the vaccine, including parental concerns related to the moral connotations of vaccinating adolescent women against a sexually transmitted disease.

Following the approval of the first HPV vaccine in 2006, debate ensued in both the scientific literature and the popular media over whether vaccination against a sexually transmitted infection would cause sexual "disinhibition," or an increase in sexual activity, in vaccinated youth.[7–9] Early studies showed that parental concern about the possibility of sexual disinhibition from the vaccine was a barrier to vaccine uptake.[10]

In the past few years, several studies have attempted to address linkages between the HPV vaccine and sexual behavior. Generally, we know that young women in the United States tend to become sexually active in their mid-teenage years.[11] An initial study of the idea that HPV vaccination could cause sexual disinhibition used other vaccines as a model to predict disinhibition behaviors after vaccination. This study found that vaccination could possibly cause a reduction in protective behaviors, but likely would not lead to increased risk-taking.[12] A 2012 study, one of the first to look at specific sexual behaviors in young women receiving the HPV vaccination, reported no association between having been vaccinated and an increase in risky sexual behavior.[13] Another recent study looked at use of healthcare for sexual health indicators and found that vaccinated young women were no more likely to be treated for a sexually transmitted infection (STI) or to become pregnant than if they had not received the vaccine.[14]

The purpose of our study was to compare the sexual behaviors and attitudes of young women who had received the HPV vaccine against those who had not. We

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hypothesized that vaccination status would not predict sexual behavior and differences in attitudes towards sex.

Materials and Methods

Young women aged 13-23 y were recruited at the University of Iowa Hospitals and Clinics during 2009-2011. A convenience sample of participants was recruited from the general pediatrics, general obstetrics and gynecology, and pediatric/adolescent gynecology clinics. Age-eligible women were approached in clinic by a research assistant and asked if they would be willing to fill out an online survey related to their sexual knowledge and behavior. If willing to participate, each young woman spoke privately with a research assistant who explained the survey and obtained informed consent. For minor participants, assent was obtained from the participant and informed consent was obtained from an accompanying parent. Young women under age 17 who were not accompanied by a parent or guardian could not sign an informed consent and were excluded from participation. All other women within the age range were eligible to participate. Although we do not have data on patients who declined to participate, recruiters reported that a large majority of those approached agreed to participate. When private insurance does not cover the cost of the vaccine, the HPV vaccine is provided free of charge to all young women in Iowa via a statewide vaccination program.

A survey instrument was partially modeled after surveys published by Mathematica Policy Research, Inc, which were designed to evaluate abstinence education programs and their impact on sexual attitudes and behavior in teens.[15] Some questions were also modeled after surveys published by the National Study of Adolescent Health (Add Health).[16] Our resultant survey queried basic demographic information and participants' prior education and current sexual and HPV-related knowledge. The second section of the survey, which is the focus of this paper, addressed participants' attitudes toward sex and their sexual behaviors (including oral, vaginal, and anal intercourse). More specifically, if a participant endorsed a sexual behavior, she was asked the age at which this was first done as well as total number of partners for this behavior. Young women who had previously received the HPV vaccine answered 3 additional questions regarding their attitudes and behavior related to having been vaccinated. All study participants were told that if a question did not apply to them, they could leave the answer space blank. Study patients were compensated for their participation.

The survey instrument and study protocols were approved by the University of Iowa Institutional Review Board and Human Subjects Office.

Following completion of the survey, question responses were compiled using Microsoft Access 2007 (Microsoft Corp., Redmond, WA) and data analysis was performed using SAS 9.3 (SAS Institute Inc, Cary, NC). Analyses were performed to examine associations between HPV vaccination status and demographic data, sexual attitudes and sexual behaviors.

In order to evaluate high-risk behaviors, a composite high-risk behavior score was first assessed using as a measure any behavior that could expose the participant to HPV (ie, anal, vaginal or oral intercourse). Johnson et al reported increased risk for HPV infection in women who had sex before age 16 and had greater than 2 sexual partners[17] so we further analyzed our groups looking at each potentially risky sexual behavior based on age at first participation and number of partners. We also separately examined condom usage, pregnancy, and sexually transmitted disease diagnosis as indicators of high-risk sexual behavior.

Univariate analyses were performed on demographic, sexual behavior, and sexual attitude variables using Pearson chi-square or Fisher exact test for the categorical variables and the 2-sample t-test for continuous variables; *P*-values are reported. Additionally, multivariate logistic regression was performed to examine the effects on sexual attitudes and behaviors of differences in the baseline demographics of our study groups. The analysis presented here is part of a larger study in which power analysis was based on the ability to detect a change in attitudes and behavior over time between the 2 study groups using follow-up surveys.

Results

A total of 223 young women were enrolled in the study between 2009 and 2011 (Table 1). The average age was slightly but significantly higher in the unvaccinated group (20.1 vs 19.2, $P = .044$), and the average number of participants still in school was lower in the unvaccinated group (64.7% vs 79.3%, $P = .021$). There was a tendency for the vaccinated group to include more white women than the unvaccinated group, though this was not statistically significant ($P = .052$). Religious differences between the 2 groups were not significant.

In comparing sexual behaviors between vaccinated and unvaccinated participants, a high percentage of both groups was found to engage in high-risk sexual behaviors, with

Table 1
Demographics of Participants Who Received or Did Not Receive the HPV Vaccine

Variable	Vaccinated Group (n = 153)	Unvaccinated Group (n = 70)	*P*
Age (y)	19.2 ± 2.8	20.1 ± 2.9	.044
Race/Ethnicity			.052
Asian	1 (1)	2 (3)	
Black	5 (3)	2 (3)	
Hispanic	3 (2)	7 (10)	
White	139 (91)	56 (82)	
Other	5 (3)	2 (3)	
Religion			.405
Catholic	57 (38)	20 (29)	
Protestant	55 (36)	25 (37)	
Other	40 (26)	23 (34)	
Student	119 (79)	44 (65)	.021
Grade in School			.593
7th-8th	5 (4)	3 (5)	
9th-12th	47 (34)	16 (27)	
13th-16th	88 (63)	41 (68)	

HPV, human papillomavirus vaccine
Multivariate logistic regression that controlled for age, student-status, and race did not reveal any significant differences in behaviors or attitudes between the two groups.
Data are mean ± SD or count and frequency: n (%).