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Research Article

Knowledge and Awareness of Human Papilloma Virus (HPV) and HPV Vaccine among Pregnant Women in Puerto Rico: A Cross Sectional Study

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ABSTRACT

Background: The success of the HPV preventive measures requires the need for educational interventions as well as an understanding of groups at risks' concerns regarding HPV. Pregnant women are a key "teachable" population for the development of communication and information strategies to increase trust in HPV immunization during childhood. This study aims to evaluate and measure the level of knowledge of pregnant women in Puerto Rico about the Human Papilloma Virus (HPV) and willingness to vaccinate their children at the recommended age.

Methods: A cross-sectional self-administered questionnaire was addressed to pregnant women at two Obstetrician-Gynecologists (OB-GYN) private offices in San Juan and Caguas, Puerto Rico.

Results: A total of 102 questionnaires were completed and analyzed. Mean age of respondents was 27 years (range 21-38 years). Most participants reported they had heard about HPV (92%), knew that HPV is a sexually transmitted disease (88%) and that it can cause cervical cancer (73.5%). However, less than half (35%) knew that HPV is treatable. Seventy-eight percent of respondents were aware of the HPV vaccine, and 61.7% knew that the vaccine could prevent cervical cancer. Sixty percent of them were aware of the recommended age for the vaccine. Sixty-one percent of the responders that knew about HPV and the vaccine were willing to vaccinate their children at the recommended age.

Conclusion: This survey indicated that awareness of HPV among pregnant women in Puerto Rico is high. However, there are significant gaps in knowledge about HPV, the vaccine and its preventive attributes, which may contribute to the low willingness to vaccinate their children at the recommended age. Reinforcement of educational interventions at the obstetric clinics might help increase the patient population who is immunized against HPV.

Keywords: HPV; Knowledge; Awareness; Pregnant women; Puerto Rico

INTRODUCTION

Human Papilloma Virus (HPV) is the most common sexually transmitted infection in the United States with an estimated 79 million persons infected, and an estimated 14 million new infections occurring every year among persons age 15 through 59 years [1]. Approximately half of new infections occur among persons age 15 through 24 years. First HPV infection occurs within a few months to years of becoming sexually active. The oncogenic HPV variants 16, 18, 31, 33, 35 45, 51, 52, and 58 are strongly linked to cervical intraepithelial neoplasia, and cancers of the oropharynx, anus, vagina, vulva and penis [2]. Transmission of HPV variants is through close skin-to-skin contact or sexual contact [3].

Cervical cancer caused by HPV ranks among the fourth most common cancer in women worldwide, with an estimated 266,000 deaths and 528,000 new cases in 2012 [4]. A vast majority (around 85%) of the global burden occurs in the less developed regions, where it accounts for almost 12% of all female cancers (4). More than 13,000 cases of cervical cancer are diagnosed in the United States each year, and over 4,000 women die of cervical cancer [4]. In Puerto Rico, cervical cancer is the sixth most diagnosed cancer among females representing approximately 3.7% of all female cancers [5].

Vaccination, regular screening tests (called Pap tests) and follow-up care can help prevent the carcinogenic outcome of HPV. To date, there are three anti-carcinogenic HPV vaccines approved

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by the FDA: A quadrivalent (GARDASIL-4) vaccine against HPV serotypes 6,11,16 and 18 available for females and males 9 to 26 years old; a bivalent (CERVARIX) that protects against HPV serotypes 16 and 18 for females at age 9 to 25 years old; and GARDASIL-9 (HPV9) that protects against oncogenic HPV serotypes 6,11,16,18,31,33,45,52, and 58 for females and males aged 27 to 45 years [6-12]. None of these vaccines are yet approved to be administered in pregnant women [13].

Improving the delivery of HPV vaccine to the population at risk is a public health priority in the United States [14]. Even though HPV vaccination is increasing among adolescents, vaccination rates in United States and Puerto Rico remain below the target level of 80% established by Healthy People 2020 [14].

Disparities in belief, attitudes, knowledge and awareness about HPV and the HPV vaccine across gender/racial /ethnic groups have been documented and are related to low rates of HPV vaccination [15-17]. Lower knowledge levels related to HPV and HPV vaccine has been observed among Latina and Black women when compared with White women [17]. The observation is particularly worrisome on Latina women as this ethnic group suffer the highest incidence and one of the highest mortality rates of cervical cancer [18].

Most vaccine programs recommend HPV vaccination before sexual debut, at the age of 9-13 [1]. Earlier vaccination to newborns is possible even when they are not exposed yet to sexually transmitted infections. Recent research suggests that vaccine protection is long-lasting. Current studies have followed vaccinated individuals for ten years and show that there is no evidence of weakened protection over time [19].

The literature suggest pregnant women are crucial to the success of childhood vaccine uptake efforts because of their role as primary decision-makers in their children's medical care and their beliefs about infectious disease-related health behaviors and outcomes for their children [20]. Literature also indicates that pregnant women have been recognized as an ideal target population in which to develop interventions for the promotion of childhood immunizations. One study indicates that the antenatal period is the time when attitudes and beliefs about childhood vaccines first take shape [21]. Pregnancy has been recognized as a "teachable moment" for health promotion and behavior change [22].

To our knowledge, no research has examined the level of awareness and knowledge about HPV and HPV vaccine acceptability among Hispanic pregnant women as a geographically isolated ethnic group. A study done on different ethnic groups visiting OB-Gyn clinics in the US found a low willingness of US-living pregnant Hispanics to accept the HPV vaccine during pregnancy and to vaccinate their newborns [23]. Given the importance of vaccine-preventable diseases, prenatal immunization education, and the role of the ob-gyn, this study examines HPV awareness, knowledge, and willingness to vaccinate their children among Island PR pregnant women. Exploring pregnant women's' attitudes and perceptions about HPV and the vaccine could help develop strategies to improve risk communication and timely vaccination.

MATERIALS AND METHODS

Definition of study outcomes

The study consisted of a questionnaire-based cross-sectional study carried out in San Juan and Caguas, both representing the metropolitan capital and the main rural city in Puerto Rico, respectively. A questionnaire was developed (Supplementary Information 1) with information about demographic characteristics, awareness and knowledge of HPV and the HPV vaccine, and willingness to vaccinate her children.

Recruitment

The study was conducted at two (2) Obstetrician-Gynecologists (OB-GYN) private offices during October 2016. Pregnant women were recruited in this study if they: 1) were at least 21 years old, and 2) self-identified as Puerto Rican. The interview processes were carried out in an appropriate setting to ensure privacy. The investigators explained the study purpose to the patients. If the patient accepted to participate, she completed the consent form and the investigator conducted face-to-face structured interviews to complete the questionnaire. The study was approved by the San Juan Bautista School of Medicine Institutional Review Board (IRB # EMSJB-13-2016).

Data analysis

Sample data was analyzed using descriptive statistics such as frequency, percent, and means. Descriptive statistics were used to describe the study population and variables of interest. Statistical analysis was performed using a commercially available statistical software (e.g., Social Package for the Social Science, IBM; Stata, Excel).

RESULTS

Demographic characteristics

A total of 102 pregnant women participated in the study. The mean age of respondents was 27 years (range: 21-38). Nineteen (18.63%) were single while eighty-one (79.41%) were married or cohabitating and two (1.96%) were separated, widowed, or divorced. With regards to level of education, 4 (3.9%) of the respondents had less than high school education, 21 (20.6%) completed high school, 36 (35.3%) had some university education, 33 (32.4%) completed a bachelor degree and 8 (7.8%) had a post-graduate degree (Table 1).

Table 1: Demographics of participants based on age group, marital status and academic level.

Characteristics	Frequency	Percentage
Age		
21-25	36	35.29
26-30	46	45.1
30-38	20	19.61
Marital Status		
Never married/single	19	18.63
Married/cohabitating	81	79.41
Academic level		
Less than high school	4	3.92
High school degree	21	20.58
1-3 yrs. University	36	35.29
Bachelor's degree	33	32.35
Post-bachelor's degree	8	7.84

Awareness and knowledge about HPV, mode of transmission and risk of cervical cancer

Ninety-four (92.16%) of the responders answered they had heard about HPV while 75 (73.53%) knew that HPV could cause cervical cancer. Only 36 (35.29%) of the participants had knowledge that HPV is treatable (Table 2).

Table 2: Awareness and knowledge of HPV among pregnant women.

	Yes (%)	No (%)
Heard about HPV	94 (92.16)	8 (7.84)
HPV is treatable	36 (35.29)	66 (64.7)
Cause of CC[b]	75 (73.53)	27 (25.47)
a: Human Papilloma Virus; b: Cervical Cancer		

Ninety (88.24%) of the participants knew that HPV is a Sexually Transmitted Disease, while 9 (8.82%) admitted to not knowing how the virus is transmitted. Only one participant thought the virus is transmitted by casual contact and another thought it was transmitted by IV drug use (Table 3).

Table 3: Distribution of frequency and percentage of participants' knowledge of Human Papilloma Virus mode of transmission.

Characteristics	Frequency	Percentage
Food borne	0	0
Sexual contact	90	88.24
Casual contact (hug, handshake)	1	0.98
IV drug use	1	0.98
Don't know	9	8.82

The main sources of information of HPV included health care providers 45 (44.12%), television 22 (21.57%) and Internet 14 (13.73%). Other sources included newspapers/magazines 1 (0.98%), and friends/families 9 (8.82%). Two participants did not specify how they heard about HPV (Table 4).

Table 4: Distribution of frequency and percentage of participants about how they have heard about Human Papilloma Virus (HPV).

Characteristics	Frequency	Percentage
Heard about HPV through		
Never heard	7	6.86
Healthcare provider	45	44.12
Friends/family	9	8.82
Newspaper/magazines	1	0.98
Television	22	21.57
Internet	14	13.73
Radio	0	0
Other	2	1.96

Awareness and knowledge about HPV vaccine and willingness to vaccinate their children at the recommended age

Eighty (78.43%) of the participants were aware of the HPV vaccine, and 63 (61.76%) knew that the vaccine can prevent cervical cancer. Sixty-one (59.80%) were aware of the recommended age for the vaccine. Sixty-three (63.73%) did not know that the vaccine is recommended for both males and females (Table 5).

Table 5: Knowledge of HPV vaccine among pregnant women.

	Yes (%)	No (%)
Heard of the vaccine	80 (78.43)	22 (21.57)
Prevent cervical cancer	63 (61.76)	39 (38.24)
Recommended for boys and girls	37 (36.27)	65 (63.73)
Recommended for ages 12-26	61 (59.80)	41 (40.20)

Fifty-seven (60.8%) of the 94 responders with knowledge of HPV were willing to administer the HPV vaccine to their children, 15 (16.2%) were unwilling, while 22 (22.9%) were not sure if to administer the vaccine of the 80 responders that had knowledge of the HPV vaccine, 49 (61.6%) were willing to administer the vaccine to their children, 15 (18.3%) were unwilling, while 16 (20.0%) were not sure if to administer the vaccine (Table 6).

Table 6: Willingness to vaccinate their children.

	Yes (%)	No (%)	Not sure (%)
HPV knowledge	57 (60.81)	15 (16.22)	22 (22.97)
Vaccine knowledge	49 (61.67)	15 (18.33)	16 (20.0)

DISCUSSION

Several studies have consistently found the need for educational programs and the understanding of patients' perceptions and concerns to increase vaccination rates [24-26]. Our results support the importance of educational programs to increase the mothers' willingness to vaccinate their children as early as possible or before they reach ages of sexual risk. We showed that the level of awareness of HPV and knowledge of HPV as a Sexually Transmitted Disease among pregnant women visiting OB/GYN clinics in Puerto Rico is high (92.16% and 88.24% respectively). This high level of awareness of HPV is consistent with that reported for metropolitan-island PR women [16,27] and contrasts with a previous study on pregnant women in the U.S, which found lower knowledge of HPV (79%, 23). One factor that may contribute to the increasing knowledge is education level, as 92% of the responders in our study had at least a high school education experience. Despite this higher reported knowledge, there are still significant gaps as more than half of the responders did not know that HPV is a treatable disease. Also, one-fourth of the pregnant women surveyed did not know that HPV can cause cervical cancer.

Although a large percentage of the responders (92%) in this study had heard of HPV, the level of awareness of the HPV vaccine and knowledge of its potential benefits to prevent cervical cancer were found to be low (78.43% and 61.76%; respectively). These results are consistent with that reported on U.S pregnant women and metropolitan-Island PR women (72.3% and 64.8%, respectively 23,27). Other studies comparing differences in HPV and HPV vaccine awareness and knowledge between U.S Hispanic and island-wide PR women had reported significantly lower levels of HPV vaccine awareness (61.0% and 66.9% respectively,16). Our study also found that the level of awareness about the recommended age and gender for the vaccine is low (59.80% and 63.73%; respectively). The results are consistent with that reported for metropolitan-island PR women [27]. Holman DM, in a systematic review, identified low HPV vaccine awareness and

knowledge to several factors that include: lack of perceived risk for cervical cancer, cost, lack of parental support, inconvenience of getting the vaccination, stigma associated with connection with sexual activity, and concern regarding safety [15].

Gaps in knowledge about HPV and vaccine may also reflect limited access to reliable sources of information. Our study revealed that less than half of the responders heard about HPV from a health care provider. The remainder considers TV, the Internet, and friends/families as their primary sources of information. Information sources other than provided by healthcare professionals are concerning, as the accuracy and reliability are not known.

A substantial proportion of pregnant women and mothers of newborns are more likely to consider their OB-GYN as their primary health care provider [28]. Our results showing poor HPV education obtained from healthcare providers is comparable with findings from other studies, who reported the need for educational programs at the routine obstetric prenatal care [29-31]. These findings confirm the importance of the obstetrician-gynecologists as a valuable source of infant immunization education. Prenatal visits are an opportunity to reinforce information on HPV and other infant immunizations into routine obstetric, prenatal care. This addition to clinical practice may increase maternal knowledge of infant vaccines and reduce delayed vaccinations.

Our study found that only 60% of pregnant women expressed willingness to vaccinate their children against HPV at the recommended age. The findings are consistent with prior meta-analysis research that demonstrated parents' overall modest levels of HPV vaccine for their children [24]. Heyman et al. [23] found that only 33% of pregnant women would vaccinate their newborn female infant while 27.7% stated willingness to vaccinate their male infants, suggesting that reluctance to vaccinate their children against HPV is even greater within this population. The literature refers this global trend as "vaccine hesitancy", which is defined as "a delay in acceptance or refusal of vaccination despite availability of vaccination services" (31). Gaps in knowledge about the vaccine found in our study could be the reason for the generally unfavorable attitude toward a willingness to vaccinate their children at the recommended age. The discrepancy between knowledge of HPV and vaccination in our study may reflect misconceptions about HPV vaccination or failure of the healthcare provider to endorse the HPV vaccine strongly. This observation makes evident the reinforcement of effective programs to accelerate uptake.

This study has two limitations. First, the samples size was small. Although the study includes women living in both urban and rural areas whose knowledge and education may not be the same throughout the Island, the results may not give a complete representation of the Puerto Rican population. Second, the exclusion of pregnant patients under the age of 21 may result in a bias in the data since education, beliefs and attitudes about HPV and the vaccine may be more influenced by parents/tutors' beliefs as compared with older groups.

CONCLUSION

Despite the high level of knowledge of HPV among pregnant women in Puerto Rico, the awareness and attitudes regarding HPV vaccine and willingness to vaccinate their children remain relatively low. Interventions by health provider, such as education for pregnant women should be reinforced at the obstetric clinics to promote and improve the decision-making process about HPV vaccination. This practice would increase the acceptability of the vaccine and hence contribute to the increasing HPV vaccination coverage in Puerto Rico.

DECLARATION

Ethics approval and consent to participate

The study was approved by the San Juan Bautista School of Medicine Institutional Review Board (IRB # EMSJB-13-2016) and participants provided fully informed consent to participate by reading a participant information sheet and signing a consent form.

Consent for publication

Not applicable

Availability of data and materials

The databases generated and/or analyzed during the current study are not publicly available but are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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AUTHORS' CONTRIBUTIONS

GMD, HC, RG, SP, LR, GR, DR, EW: participated in study design, coordination during field work and acquisition of data. GMD, RSV: participated in data analysis and helped to draft the manuscript. GMD performed the statistical analysis. All authors read and approved the final draft of this manuscript.

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