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Nativity differences in behaviors associated with high-risk HPV infection among Hispanic women in Houston, Texas, USA

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Abstract

While Hispanics in the U.S. are a population with significant within-group heterogeneity, epidemiologic studies often aggregate Hispanics into one homogenous group without considering differences by nativity. The objective of this study is to evaluate nativity differences in the risk behavior profile associated with prevalent high risk human papillomavirus (HR-HPV) among U.S.- and foreign-born Hispanic women. Using a clinical trial dataset, we compare risk behavior and HR-HPV infection patterns among U.S.- and foreign-born participants and assess factors associated with infection in each group. While the prevalence of HR-HPV infection was similar among U.S.- and foreign-born participants, U.S.-born cases had a higher HR-HPV risk profile. The similar prevalence of HR-HPV despite foreign-born women's lower risk profile suggests a role for unmeasured risk factors among foreign-born Hispanics. More importantly, nativity differences in behavioral risk factors associated with HR-HPV suggest the need to further research cervical cancer risk factors among disaggregated Hispanic subgroups.

Keywords

Human Papillomavirus; risk behaviors; sexual behaviors; Hispanics; nativity

Introduction

Although cervical cancer incidence has declined markedly in the U.S. and other countries with widespread screening programs, it continues to be the second most common cancer among women worldwide [1]. In the U.S., the burden of cervical cancer is highest among ethnic minorities, including Hispanic women, among whom the incidence is twice that of non-Hispanic whites [2]. While Hispanics are a population with significant within-group heterogeneity, epidemiologic studies often aggregate them into one homogenous group without considering differences by nativity (i.e., place of birth). However, there is evidence that behaviors that affect the acquisition and persistence of high-risk human papillomavirus (HR-HPV) may vary among U.S.- and foreign-born Hispanics. For example, the prevalence

of early age of sexual initiation [3–5] and multiple sexual partnerships [5–7] is known to be higher among U.S.-born Hispanics compared to their foreign-born counterparts. Nativity differences may also exist for oral contraceptive use [3, 4] and parity [3]. Such variability may affect the risk profile for HR-HPV in different Hispanic subgroups. In this study we compare the risk behavior profile associated with prevalent HR-HPV infection among U.S.- and foreign-born Hispanics.

Methods

Data source

The cases in this analysis represent a subset of participants from a clinical trial to evaluate emerging technologies for the identification of cervical neoplasia [8]. Trial participants included women with abnormal Papanicolaou test screening presenting for colposcopy at one of three participating hospitals in the U.S. (Houston, Texas) and Canada (Vancouver, British Columbia) between 1999 and 2005, as well as community volunteers with no prior history of dysplasia. Behavioral risk factors were ascertained through an interviewer-administered questionnaire. Cytology and histology exams were performed on all participants and cervical samples were tested for HPV using Hybrid Capture-II (HC-II, Qiagen). HC-II tests for the presence of 13 high-risk (HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68) and six low-risk types (HPV 6, 11, 40, 42, 43, and 44) and results indicate whether an individual is infected with low-risk and/or high-risk types. Polymerase chain reaction (PCR) was used to detect vaccine-preventable HR-HPV types 16 and 18. The trial protocol was reviewed and approved by all institutions involved.

The present analyses are limited to participants of Hispanic origin in Houston, Texas (379 of the 1,858 cases). Of these, we excluded two cases who were non-sexually active, two with missing birthplace information, eight with missing HC-II results, and 16 without a cytology/histology diagnosis, resulting in a sample size of 351 cases.

Measures

The dependent variable, HR-HPV infection status, is based on HC-II results. Independent variables are based on self-reported answers to the behavioral risk factor questionnaire. We categorized nativity based on the reported country of birth. Foreign-born Hispanics were those born in Mexico, Central America, South America, or the Caribbean. Risk factors include age (18–35 vs. ≥36 years), history of cigarette smoking (never vs. ever smoked at least 100 cigarettes in lifetime), age at first sexual intercourse (<17 vs. ≥17 years), lifetime number of sex partners (<2 vs. ≥2), history of pregnancy (zero vs. ≥1 reported pregnancies), current oral contraceptive use, and current condom use.

Statistical Analysis

We used descriptive statistics to compare risk behavior and HR-HPV infection patterns among U.S.- and foreign-born participants. We built two independent multivariable logistic regression models to assess factors associated with HR-HPV in each group (at P value <0.05). Statistical analyses were performed using Stata version 10 (Stata Corp., College Station, Texas).

Results

The prevalence of any HPV infection, HR-HPV infection, and cervical dysplasia was similar among U.S.- and foreign-born participants (Table 1). However, there were significant differences in the prevalence of vaccine-preventable HR-HPV types 16 and 18, with a significantly higher prevalence of both types among U.S.-born participants. The distribution

of demographic and risk behavior characteristics varied between the two groups. Specifically, U.S.-born Hispanic participants were younger and significantly more likely to be non-married and employed. In regard to HR-HPV risk behaviors, U.S.-born participants were significantly more likely to have initiated sexual activity at age 17 years or younger, to have two or more lifetime sex partners, and to currently use contraceptives and condoms. There were no statistically significant differences by nativity in regard to history of pregnancy or the number of pregnancies.

Table 2 describes the univariable and multivariable associations between HR-HPV infection and demographic and risk behavior characteristics. Among U.S.-born Hispanic participants, HR-HPV infection was significantly associated with younger age, earlier age at first sex, not having a history of pregnancy, and currently using oral contraceptives. Among foreign-born women, prevalent HR-HPV infection was associated with not being married, history of cigarette smoking, currently use of condoms, and pregnancy. Interestingly, while history of pregnancy was a protective factor among U.S.-born women, it was a significant risk factor for those who were foreign-born.

Discussion

We found significant variation in the distribution of HR-HPV risk behaviors by nativity status. U.S.- born Hispanic participants were younger than foreign-born participants, and more likely to be nonmarried, to have initiated sexual activity at an early age, to have more than two lifetime sexual partners, and to use oral contraceptives and condoms. These findings support a growing body of literature documenting an increased prevalence of sexual risk behaviors among U.S.-born and more acculturated Hispanic women [3–7, 9]. Specifically, sexual initiation at an early age has been found to be more common among U.S.- versus foreign-born Hispanics [3–5] and more acculturated Hispanics versus their less acculturated counterparts [6, 9]. Similar trends have been found for multiple sexual partnerships [5–7, 9] and contraceptive use [5]. Linking acculturation and cervical cancer risk, Ward et al. found that more acculturated Hispanic women had a greater number of sexual risk behaviors and were more likely to have abnormal cervical cytology than less acculturated Hispanic women [9]. Unlike the findings of Ward et al., however, the higher prevalence of risk behaviors among U.S.-born participants in our study did not result in a higher prevalence of HR-HPV or cervical dysplasia.

The similar prevalence of HR-HPV among U.S.- and foreign-born Hispanic women despite the increased prevalence of risk behaviors among those born in the U.S. suggests a role for different HR-HPV risk factors by nativity. Such nativity differences were also suggested by our logistic regression analyses. Specifically, younger age, earlier age at first sex, and current use of oral contraceptives were significant risk factors for HR-HPV infection among U.S.-born but not foreign-born Hispanics, while not being married, cigarette smoking, and current use of condoms were risk factors among foreign-born but not U.S.-born Hispanics. Our results support those of Giuliano et al. who likewise found a lower risk profile for HPV infection among Mexican-born versus U.S.-born women of Mexican descent [10]. Collectively, these findings suggest a role for an unmeasured risk factor, specifically the sexual behavior patterns of the male partner, among foreign-born Hispanic women. Studies in Latin America have found an independent association between women's risk of cervical cancer and the sexual behaviors of their male partner (e.g., number of sex partners and sex with commercial sex workers). Recent research suggests that sexual concurrency (i.e., sexual relationships that overlap in time), a documented risk factor for HR-HPV infection, may be highly prevalent among Hispanic immigrant men [11]. Unfortunately, partner concurrency was not evaluated in this study, leaving unanswered questions regarding

differences in partnership-level characteristics between U.S.- and foreign-born Hispanic women.

Pregnancy status was the only variable associated with HR-HPV infection in both groups. However, while pregnancy had a protective effect against HR-HPV infection among U.S.-born Hispanics, it was a significant risk factor among those born outside the U.S., despite a similar number of pregnancies across groups. Parity is known to affect HR-HPV clearance, with reduced viral clearance among parous and multiparous versus nulliparous women [12, 13]. While reduced viral clearance may explain the higher prevalence of HR-HPV among foreign-born women with a history of pregnancy, it contradicts the observed protective effect of pregnancy among U.S.-born women. However, a similar (albeit non-statistically significant) effect was observed by Scheurer et al. [14] in their analysis of the same dataset, in which they included women of all race/ethnicities. It may be that pregnancy among U.S.-born Hispanics is indicative of more stable sexual relationships. However, we were unable to evaluate this hypothesis in our dataset given the lack of data on partner type and the male partners' sexual behaviors.

The strengths of our analysis include the extensive biological data available for trial participants (including cytology, HC-II, and PCR results), paired with detailed behavioral risk factor data. Nonetheless, we recognize several limitations to our analysis. Because of the cross-sectional design, it was not possible to differentiate between incident and prevalent HR-HPV infection. Thus, we were unable to ascertain whether certain risk behaviors are related to the acquisition of HR-HPV or to the persistence of the infection. Due to the small sample size for foreign-born Hispanics, we were unable to examine differences by country of origin and duration of residence in the U.S. within this group. We were also unable to derive population prevalence estimates or directly compare U.S.- and foreign-born women due to the non-probability sample. Finally, we were unable to evaluate the role of the sexual behaviors of male partners and therefore describe an incomplete picture of the HR-HPV risk behavior profile of U.S.- and foreign-born Hispanic women. Future studies will benefit from assessing partnership-level characteristics in addition to individual-level risk behaviors.

In conclusion, we found evidence for a role of different risk behaviors for prevalent HR-HPV infection by nativity. The similar prevalence of HR-HPV among U.S.- and foreign-born Hispanic women despite foreign-born women's lower HR-HPV risk profile suggests the need to evaluate partnership-level characteristics, especially in studies involving Hispanic immigrants. More importantly, our exploratory analysis suggests the need to further research HR-HPV and cervical cancer risk factors among disaggregated Hispanic subgroups, as Hispanics are a heterogeneous group with significant intragroup variation in regard to culture, social norms, health seeking, and health risk behaviors.

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Human papillomavirus (HPV), cervical dysplasia, sociodemographic, sexual behavior, and reproductive characteristics of Hispanic participants, comparing U.S.-born and foreign-born women

Table 1

	Total (n=351), % or median (IQ range)	Nativity		U.S.-born vs. foreign- born z or χ^2 P- value
		U.S.-born (n=130), % or median (IQ range)	Foreign-born (n=221), % or median (IQ range)	
HPV and cervical dysplasia characteristics				
Any HPV infection	18.2	21.5	16.3	0.219
High-risk HPV infection	16.5	18.5	15.4	0.454
HPV 16 infection				0.005
Yes	16.8	23.1	13.1	
No	78.4	69.2	83.7	
Missing	4.8	7.7	3.2	
HPV 18 infection				0.005
Yes	11.4	16.9	8.1	
No	83.8	75.4	88.7	
Missing	4.8	7.7	3.2	
Cervical dysplasia				0.636
Negative for dysplasia	88.9	88.7	89.2	
Low-grade dysplasia	7.4	8.1	6.2	
High-grade dysplasia	3.7	3.2	4.6	
Sociodemographic characteristics				
Age (years)				<0.001
18–35	21.4	31.5	15.4	
36	78.6	68.5	84.6	
Marital status				0.001
Married or living as married	67.2	55.4	74.2	
Never married	16.8	23.1	13.1	
Separated, divorced, or widowed	16.0	21.5	12.7	

	Nativity			U.S.-born vs. foreign-born z or χ^2 P- value
	Total (n=351), % or median (IQ range)	U.S.-born (n=130), % or median (IQ range)	Foreign-born (n=221), % or median (IQ range)	
Education				0.298
High School or less	49.0	45.4	51.1	
More than High School	51.0	54.6	48.9	
Employment status				<0.001
Employed	60.4	77.7	50.2	
Unemployed or homemaker	39.6	22.3	49.8	
Risk behavior characteristics				
Ever smoker	24.2	29.2	21.3	0.093
Age at first sex 17 years	44.2	64.6	32.1	<0.001
Median number of partners, lifetime	2 (1–4)	4 (2–6)	2 (1–3)	<0.001
Number of partners, lifetime				<0.001
2	50.4	30.0	62.4	
>2	47.0	65.4	36.2	
Missing	2.6	4.6	1.4	
Ever pregnant	86.3	87.3	84.6	0.475
Median number of pregnancies	2 (1–4)	2 (1–4)	2 (1–4)	0.593
Current oral contraceptive use	8.6	13.9	5.4	0.006
Current condom use	17.1	25.4	12.2	0.002

Abbreviations: IQ = interquartile

Univariable and multivariable association between risk behaviors and high-risk human papillomavirus (HR-HPV) infection among U.S.- and foreign-born Hispanic participants

Table 2

Risk behaviors	Nativity					
	U.S.-born(n=130)			Foreign-born (n=221)		
	% HR-HPV +	OR (95% CI)	AOR (95% CI)	% HR-HPV +	OR (95% CI)	AOR (95% CI)
Age, years						
18–35	39.0	1.00	1.00	26.5	1.00	1.00
36	9.0	0.15(0.06–0.40) ^a	0.14(0.04–0.45) ^a	13.4	0.43 (0.18–1.02)	0.48(0.17–1.33)
Marital status						
Married or living as married	18.1	1.00	1.00	11.0	1.00	1.00
Single, divorced, separated, or widowed	19.0	1.06 (0.44–2.59)	0.89 (0.27–2.92)	28.1	3.17 (1.48–6.75) ^a	3.38 (1.42–8.08) ^a
Ever smoker						
No	17.4	1.00	1.00	17.8	1.00	1.00
Yes	21.1	0.79	1.00 (0.29–3.37)	6.4	3.18 ^c	4.30 (1.12–16.59) ^b
Age of sexual debut, years						
17	23.8	1.00	1.00	22.5	1.00	1.00
>17	8.7	0.30(0.10–0.95) ^b	0.15(0.03–0.84) ^b	12.0	0.47 (0.22–0.99) ^b	0.57 (0.24–1.35)
Ever pregnant						
No	35.0	1.00	1.00	7.1	1.00	1.00
Yes	15.5	0.34(0.12–0.97) ^b	0.19(0.04–0.82) ^b	16.6	2.58 (0.58–11.44)	7.24 (1.22–43.06) ^b
Current oral contraceptive use						
No	14.3	1.00	1.00	14.8	1.00	1.00
Yes	44.4	4.80(1.65–13.99) ^a	4.22(1.17–15.30) ^b	25.0	1.91 (0.49–7.47)	3.15 (0.64–15.54)
Current condom use						
No	16.5	1.00	1.00	13.4	1.00	1.00
Yes	24.2	1.62 (0.62–4.23)	0.58 (0.16–2.15)	29.6	2.72 (1.08–6.85) ^b	3.55(1.24–10.18) ^b
Number of partners, lifetime						
2	10.3	1.00	1.00	12.3	1.00	1.00
>2	22.0	2.46 (0.78–7.76)	_____*	20.5	1.83 (0.87–3.83)	_____*

Abbreviations: OR = odds ratio, AOR = adjusted odds ratio, CI = confidence interval

Key:

^a p<0.01,

^b p<0.05,

^c p<0.10

* Lifetime number of partners was excluded from the multivariable analyses because it was not statistically significant in either model and its removal did not meaningfully change the other ORs