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Acculturation and HPV Infection among Latinas in the United States

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Abstract

Objective—To describe the relationship between acculturation and human papillomavirus (HPV) infection among diverse US Latinas, a group at high risk for cervical cancer.

Method—Using survey and medical testing data from the 2003–2004 National Health and Nutrition Examination Survey (NHANES), we examined the relationship between acculturation level and HPV infection among diverse Latinas (n=503) and Mexican American women (n=442). Multivariable logistic regression was performed using infection with any type of HPV and with high-risk oncogenic genotypes as outcome variables.

Results—More acculturated Mexican American women were more likely to be infected with high-risk HPV than less acculturated women. In multivariate analyses, Mexican Americans with higher levels of self-rated English language ability (2.48 OR, 95% CI: 1.42–4.33); with birth in the US (2.07 OR, 95% CI: 1.03–4.16); and with US born parents (2.98 OR, 95% CI: 1.45–3.72) were more likely to be infected with high-risk HPV genotypes. Mexican American women with higher levels of acculturation were more likely to test positive for other sexually transmitted infections.

Conclusion—Higher acculturation levels related to more frequent infection with high-risk HPV genotypes and other STIs among US Mexican American women. This association may in part be due to engagement in sexual behaviors.

Introduction

In the United States (US), Latinas have a significantly higher incidence of cervical cancer than non-Hispanic white women. According to the National Cancer Institute, the average age-adjusted incidence of cervical cancer for white women was 7.1 per 100,000 per year in

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2002–2006. For Latinas, the rate was 12.7 per 100,000 (National Cancer Institute, 2009). This disparity is partially due to the underutilization of Papanicolaou (Pap) testing and follow-up. New opportunities for the prevention of cervical cancer have been developed in the form of two HPV vaccines. US Latinas are less aware of the vaccine and have lower vaccine uptake than white women (Jain et al. 2008).

Investigation of factors that relate to heightened risk for HPV infection among Latina women is needed to improve our understanding of cervical cancer risk factors among this high-risk group. One important factor that may influence HPV infection risk is level of acculturation. The most commonly used definition of acculturation defines it as the process by which immigrants adopt the beliefs, attitudes, values, customs, and behavioral practices of a new culture (Abraido-Lanza et al., 2005). With increased acculturation, Latinas are more likely to engage in specific sexual behaviors (Adam et al., 2005; Wingo et al., 2009), that may increase their risk for HPV infection. To our knowledge, this study is the first to examine the relationship between acculturation and genital HPV infection among a nationally representative sample of US Latinas.

Methods

The National Health and Nutrition Examination Survey (NHANES, 2003–2004) is the most recently available nationally representative dataset that measures vaginal HPV infection with a medical exam. The survey included questions related to acculturation. A subset of the survey population participated in physical examinations. These were carried out in a set of specially-equipped Mobile Examination Centers (MEC). HPV DNA was detected by the HPV L1 consensus polymerase chain reaction with biotinylated PGMY09/11 primer sets and B-globin as internal control for sample amplification using self-collected vaginal swabs as instructed by a testing center physician (Catch-All Sample Collection Swabs Epicenter, Madison, WI) (Dunne et al., 2007).

Women eligible for HPV laboratory assessment were ages 14–59. About 85% of eligible women participated. Of those, 95% of the tests were adequate for analysis. Positive samples were typed for 37 HPV types (Kahn et al., 2007). Of these, 15 high-risk types, are known to lead to cancer (Munoz et al., 2004).

NHANES measured acculturation using a series of questions that assessed primary language, country of birth, ethnic identity, country of father's birth, and country of mother's birth. A language proficiency score was developed using the Short Acculturation Scale (SAS) developed by Marin et al. (1987). This scale investigates level of language acculturation which has shown to also correlate highly with respondents' generation, length of residence in the US among foreign-born individuals, and age at arrival to the US. The SAS included five items, which relate to language that the participant reads and speaks, speaks at home, spoke as a child, uses to currently think, and uses to speak with friends. Higher scores represent higher levels of acculturation. Past studies determined that individuals with an average score above 2.99 on the SAS are highly acculturated and those scoring an average of 2.99 or less demonstrate a low level of acculturation (Marin & Posner, 1995).

In this study, acculturation was examined using the following three elements from the NHANES acculturation supplement:

1. SAS language proficiency score (high or low language acculturation)
2. Country of birth (US or elsewhere)

3. Parents' country of birth (Both born in the US, one born in the US, both born elsewhere)

These three elements have been found to account for a large portion of the variance in acculturation measures (Coronado et al., 2005). We also investigated the relationship between HPV infection and a number of other sociodemographic variables, including family income (less than and equal or greater than $20,000), age, and marital status using chi-square tests. Characteristics that had a statistically significant relationship ($p<0.05$) with HPV infection and a possible association to level of acculturation were included in the multivariable models. Next, multivariable logistic regression analysis assessed the association of acculturation and HPV infection risk for US Latinas. Sensitivity analyses were conducted to explore the association between level of acculturation and high-risk oncogenic HPV infection (HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 73). Mediation by reported sexual behaviors was also explored using the Sobel-Goodman mediation test which quantifies the proportion of the total effect explained by the mediating variable.

Lastly, all multivariable analyses accounted for the stratification and clustering of data within the complex survey design of NHANES using multiple stage survey functions. STATA 10.0 was used to conduct all statistical analyses (College Station, Texas). The research was considered exempt by the University of Washington Institutional Review Board (IRB).

Results

Of the 529 Latinas who participated in the medical exam, 503 (95%) had adequate HPV test results. Of these, 493 provided responses in the acculturation survey and 467 had a measure of household income. Age ($p<0.01$) and income ($p<0.01$) were inversely associated with HPV infection. About one third of individuals with household incomes less than $20,000 tested positive for HPV infection compared to 21% of those earning $20,000 or more ($p<.01$). Other Latinas were more likely than Mexican American women (US Mexicanas) to be infected with HPV ($p<.01$). Lastly, Latinas whose parents were born in the US had higher odds of testing positive for any type of HPV ($p<.01$) (data not shown).

US Latinas (includes US Mexicanas) with higher levels of language acculturation had nearly twice the odds of being infected with HPV (OR=2.07, 95% CI: 1.18 – 3.64), with less acculturated US Mexicanas at greatest risk (OR=2.48, 95% CI: 1.42 – 4.33) (Table 1). Among US Mexicanas with higher levels of language acculturation, 16.5% demonstrated high-risk HPV infection and by contrast, among US Mexicanas with lower levels of language acculturation, 6% demonstrated high-risk HPV infection (data not shown). US-born Mexicanas had a 2.07 increased odds of high-risk HPV infection (95% OR CI: 1.03 – 4.16) compared to foreign-born US Mexicanas. Latinas with both parents born in the 50 US states had a 2.54 increased odds of high-risk HPV infection (95% OR CI: 1.07 – 6.06). Lastly, US Mexicanas with both parents born in the 50 US states demonstrated a 2.24 increased odds for any type of HPV infection (95% OR CI: 1.14 – 4.39) and a 2.98 increased odds for high-risk HPV infection (95% OR CI: 1.45 – 3.72). In general, income did not relate to HPV infection in these models. The Sobel-Goodman mediation test demonstrated that income accounted for less than 1.2% of the impact of the acculturation measures on HPV infection (data not shown).

When we examined the relationship between the three measures of acculturation and testing positive for at least one other sexually transmitted infection (STI) (Chlamydia, Gonorrhea, and/or Herpes II) among Latinas and US Mexicanas (Table 2), the findings suggested higher infection with increasing acculturation level among US Mexicanas alone. Lastly, the

mediation analyses using the subset of Latinas who answered questions about their sexual risk behavior indicate that higher risk sexual behavior partially explains the relationship between acculturation and high-risk HPV infection. The number of lifetime sexual partners (1 or less vs. 2 or more) reported by respondents explains 21–33% of the total effect of higher acculturation on HPV infection using Sobel- Goodman mediation tests (Table 1).

Discussion

More acculturated US Mexicanas were more likely to be infected with oncogenic genotypes of HPV compared to less acculturated Mexicanas. Kahn et al. (2007) investigated rates of high-risk HPV infection among US women by race and ethnicity using NHANES (2003–2004). In this study, non-Hispanic whites had a 14.5% infection rate with at least 1 of 15 high-risk HPV types, US Mexicanas had a 13.2% high-risk HPV infection rate, and other Latinas had a 16.1% high-risk HPV infection rate (Kahn et al., 2007). Our study revealed substantial difference in rates of high-risk HPV infection among US Mexicanas across level of acculturation. Highly acculturated US Mexicanas appear to be at greater risk of high-risk HPV infection (16.5%) compared to non-Hispanic whites (14.5%).

We found a relatively small proportion of less acculturated US Mexicanas were infected with a high-risk HPV genotype as is consistent with data from Mexico. Lazcano-Ponce et al. randomly selected households in Morelos, Mexico for HPV testing. HPV testing was carried out with 1,248 women with past sexual activity. Testing positive for one of 17 oncogenic HPV types was present in 2.6% – 5.8% of women up to age 64 (Lazcano-Ponce et al., 2001), similar to the rate of testing positive for high-risk HPV among low-acculturated US Mexicanas (6%) found in our study.

The association between high-risk HPV infection and level of acculturation among US Mexicanas may be partially due to engagement in higher risk sexual behaviors. Consistent with this hypothesis, we found that more acculturated US Mexicanas have a greater risk of other STI infections than less acculturated Mexicanas (based on all three acculturation domains). However, sexual behaviors appear to only partially explain the acculturation-infection relationship. Other related factors may include sexual sorting and networks, exposure to specific genotypes of HPV, and persistence of HPV infection by genotype.

Conclusion

US Latinas have higher rates of cervical cancer than non-Hispanic white women. When limited resources are available, it may be necessary to target those most at risk for oncogenic HPV infection to decrease health disparities related to cervical cancer (Flores & Bencomo, 2009). Interventions that aim to increase HPV vaccine uptake, promote healthier sexual behavior, and increase Pap screening rates among US Mexicanas with higher levels of acculturation may more effectively lower cervical cancer incidence and mortality among one of the ethnic groups most at risk for cervical cancer.

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TABLE 1

Three separate models using adjusted logistic regression analyses of acculturation measures and HPV infection risk among US Latinas and US Mexican American Women*

	Latinas (n=457)			Mexican American Women (n=407)			
	Any HPV+ OR (95% CI)	**High Risk HPV+ OR (95% CI)**	**Sobel- Goodman Mediation <1 sex. partner vs. > 1**	**Any HPV + OR (95% CI)**	**Sobel- Goodman Mediation <1 sex. partner vs. > 1**	**High Risk HPV + OR (95% CI)**	**Sobel- Goodman Mediation <1 sex. partner vs. > 1**
Short Acculturation Scale (SAS)							
Low Language Acculturation (referent)	1.0	1.0		1.0		1.0	
High Language Acculturation	1.28 (.76, 2.15)	**2.07 (1.18, 3.64)**	28.0% (n=239)	1.34 (.75, 2.39)	†	**2.48 (1.42 – 4.33)**	32.3% (n=219)
Country of Birth							
Not born in US states (referent)	1.0	1.0		1.0		1.0	
Born in 50 US states or DC	1.40 (.74, 2.63)	2.05 (.76, 5.55)	†	1.49 (.85, 2.62)	†	**2.07 (1.03, 4.16)**	21.6% (n=209)
Parents Country of Birth							
Both Parents Born Outside of US states (Referent)	1.0	1.0		1.0		1.0	
1 Parent Born in US 50 states	2.11 (.91, 4.90)	2.2 (.48, 10.0)		1.72 (.97, 3.05)		1.42 (.54, 3.72)	
Both Parents Born in US 50 states	1.54 (.70, 3.39)	**2.54 (1.07, 6.06)**	21.3% (n=204)	**2.24 (1.14, 4.39)**	22.1% (n=176)	**2.98 (1.45, 3.72)**	21.4% (n=176)

*Note: Family income (< or > $20,000) and age (under 18, 18–25, 26–35, 36–45, 46–59) were included as covariates in the logistic regression models. Statistically significant p-values are in bold.

†The Sobel-Goodman test is only applicable to statistically significant findings.

Table 2

Three separate models using adjusted logistic regression analyses of acculturation measures and other STI infection risk for US Latinas and US Mexican American Women*†

	Latinas (n=277) OR (95% CI)	Mexican American Women (n=243) OR (95% CI)
Short Acculturation Scale (SAS)		
Low Language Acculturation (referent)	1.0	1.0
High Language Acculturation	1.16 (.46, 2.92)	**2.86 (1.06, 7.76)**
Country of Birth		
Not born in US states (referent)	1.0	1.0
Born in 50 US states or DC	2.17 (.82, 5.80)	**3.29 (1.13, 9.61)**
Parents Country of Birth		
Both Parents Born Outside of US states (Referent)	1.0	1.0
1 Parent Born in US states	2.62 (.85, 8.14)	**4.09 (1.24, 13.46)**

*Note: Family income (< or > $20,000) and age (under 18, 18–25, 26–35, 36–45, 46–59) were included as covariates in the logistic regression models. Statistically significant p-values are in bold.

†Other STIs: Chlamydia, Gonorrhea, &/or Herpes II infection