GENERAL GYNECOLOGY

Passive smoke exposure and abnormal cervical cytology in a predominantly Hispanic population

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OBJECTIVE: We sought to evaluate the association between passive cigarette smoke exposure and cervical cytological abnormalities in a predominantly Hispanic sample.

STUDY DESIGN: Data were collected as part of a larger, ongoing randomized clinical trial. Inclusion criteria were met by 4403 Hispanic (73%) and non-Hispanic (27%) women between 18-55 years of age (mean = 30.14 ± 8.7). Analysis of variance and multivariate logistic regression determined the association between passive smoke exposure and Pap abnormality.

RESULTS: Passive smoke exposure was positively associated with having an abnormal Pap smear (odds ratio, 1.70; 95% confidence interval, 1.14–2.52) as was current active smoking (odds ratio 1.45; 95% confidence interval, 1.03–2.04). Neither effect was modified by ethnicity. Increasing hours per week of passive smoke exposure was associated with low-grade squamous intraepithelial lesion ($P < .05$).

CONCLUSION: Passive smoke exposure is an important independent risk factor for cytological abnormalities in Hispanic and non-Hispanic women. This study adds to the growing body of evidence of the dangers of passive smoke exposure.

Key words: cervical cytology, Hispanic, Pap test, passive cigarette smoke, secondhand smoke

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A causal association between cigarette smoking and squamous cell carcinoma of the cervix is well established.[1-4] Cigarette smoking is also associated with cervical dysplasia, and many studies have identified an increased risk of high-grade lesions of the cervix among smokers.[5-9] However, the relation between passive exposure to cigarette smoke and cervical neoplasia is less clear.[1]

Studies evaluating passive smoke exposure and cervical neoplasia have not been consistent in their findings. Investigations by Slattery et al[10] and Trimble et al[11] have demonstrated an increased cervical cancer risk among women exposed to passive smoke. Among women exposed to cigarette smoke in the home, Scholes et al[12] found an association with exposure and low-grade cervical abnormalities. Similarly, studies by Tay and Tay[13] and by Coker et al[14] reported an increased risk of high-grade squamous intraepithelial lesions (HSIL) among women exposed to passive smoke. Earlier work by Coker et al,[15] however, failed to show a consistent association between cervical intraepithelial neoplasia II/III and passive smoke exposure. Furthermore, survey results of husbands of women with cervical dysplasia did not support an association between the husbands' smoking habits and their wives' cervical cytology.[16]

The lack of a clear understanding of the relationship between passive exposure to cigarette smoke and changes in cervical cytology is especially noticeable when considering Hispanic women. This is an important gap in the literature as Hispanic women have a disproportionately higher rate of cervical cancer than non-Hispanic women.[17] Hispanic women were not included in 5 of the 7 studies addressing passive smoke exposure and cervical cancer noted above,[10,11,13-15] and the remaining 2 did not specify ethnicity.[12,16] Two studies that included the same sample of Hispanic women examined active smoking but not passive exposure to cigarette smoke; neither study found an association between active smoking and cervical dysplasia among Hispanics.[18,19]

In the present study, we examine the relationship between passive exposure to cigarette smoke and Pap test results in a large, predominately Hispanic sample of women undergoing routine screening. We hypothesized that passive smoke ex-

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posure would be an independent risk factor for abnormal cervical cytology among Hispanic and non-Hispanic women.

MATERIALS AND METHODS

Data for the present study were collected from June 1, 2006, through May 29, 2009, as part of a larger, ongoing randomized clinical trial addressing cervical cancer prevention (NCT00575510). Hispanic, non-Hispanic black, and non-Hispanic white women between 18-55 years of age who were patients in 1 of 5 University of Texas Medical Branch (UTMB) clinics in southeast Texas were screened for eligibility for the main study. Pregnant women, women diagnosed with cervical cancer, women who were aged <18 or >55 years, or women who were unable to understand English or Spanish were excluded from participation from the main study. During the recruitment period captured in the present study, approximately 80% of those meeting eligibility criteria agreed to participate and provided written informed consent. Available refusal data suggest that women who refused to participate did not significantly differ from women who agreed to participate with regard to age ($P = .35$) or ethnicity ($P = .80$). Women were reimbursed $5 for their time. The research was approved by the UTMB Institutional Review Board.

Patients attending one of the study clinics for a routine appointment in which it was anticipated that a Pap test would be performed were asked to complete a comprehensive survey as part of study participation. The survey contained demographic questions including age, ethnicity, marital status, education level, number of pregnancies, and number of children. Sexual history questions included age at first sexual intercourse, number of sexual partners in the past year and in her lifetime, and history of sexually transmitted infections (STI) including genital warts, gonorrhea, trichomonas, chlamydia, syphilis, and herpes.

The survey also included questions on history of cigarette smoking and passive exposure to smoke (secondhand smoke exposure). Subjects answered if they were never, past, or current smokers. For a qualitative measure of passive smoke exposure, subjects were asked if they were exposed to none, a little, some, or a lot of secondhand smoke in the past 5 years. They were also asked to quantify the amount of time they were exposed as number of hours per day, week, or month in the past 5 years. The median hours of passive smoke exposure for each qualitative category were as follows: none = 0 h/wk, a little = 1.25 h/wk, some = 5.0 h/wk, and a lot = 35.0 h/wk.

A total of 4582 subjects completed the survey; of those, 4500 (98%) underwent Pap screening. The most common reasons for not performing a Pap test were proximity of the visit to the previous Pap test and current heavy vaginal bleeding. For this investigation, 7 women were excluded secondary to a history of human immunodeficiency virus infection and 89 were excluded secondary to a history of cervical cancer. One additional subject was excluded due to inconsistent responses on the survey that suggested she was selecting answers without considering the question. The final sample for analysis included 4403 subjects.

All subjects underwent liquid-based Pap screening (SurePath; BD, Franklin Lakes, NJ) and pelvic examination by a practitioner at one of the study clinics. Cytology was reviewed per routine by the UTMB pathology department, with the exception of 1 clinic, which used LabCorp (San Antonio, TX). Patients were clinically managed per UTMB guidelines. Pap test results are analyzed as a dichotomous outcome (normal vs abnormal) as well as by specific type of result (normal, atypical squamous cells of undetermined significance [ASC-US]/atypical glandular cells of undetermined significance [AGC-US], low-grade squamous intraepithelial lesion [LSIL], or HSIL).

Hours of passive exposure to smoke per week were calculated for women who answered the question regarding hours per day, week, or month of exposure. All responses were converted to reflect hours per week as a common metric. If the participant indicated "0," "no," "none," this was coded as 0 h/wk.

Statistical analyses were performed using software (SPSS 15.0 for Windows; SPSS Inc, Chicago, IL). Descriptive data are reported as frequencies, percentages, and means ± SD. In general, missing data were between 1-5% with the exception of household income, where 15% of the data were missing. When asked if exposed to passive smoke, 96% of participants gave a valid answer. However, the follow-up question asking subjects to quantify their smoke exposure into hours was only answered fully by 39% of respondents. Associations between categorical variables were analyzed using the Fisher's exact or χ^2 test. Independent sample *t* tests were performed to evaluate the relationship between Pap test results (normal vs abnormal) and passive exposure to smoke (h/wk). Univariate analyses of variance were performed to evaluate the relationship between more specific Pap test results (normal, ASC-US/AGC-US, LSIL, HSIL) and hours per week exposed to passive smoke. Multivariate analysis was performed using logistic regression in which Pap test result (normal vs abnormal) was regressed onto active smoking and passive exposure to smoke, with ethnicity, age, number of sexual partners in the past year, and history of an abnormal Pap included in the model. A final logistic model was estimated to predict an abnormal (vs normal) Pap test result. Odds ratios (OR), Bonferroni-adjusted 95% confidence intervals (CI), and levels of significance are reported. A 2-sided significance level of .05 was used to indicate statistical significance.

RESULTS

The majority of the sample was Hispanic (72.6%), which reflects the patient population of the UTMB clinics. The mean age of the sample was 30.14 (±8.7) years with a range of 18-55 years. Overall, 15.7% of the sample currently smoked and 64.4% reported exposure to passive smoke. With regard to the sexual risk factors for an abnormal Pap test, on average, women were 17.5 years old at first sexual intercourse, and reported 1.2 sex partners in the past year and 4.2 lifetime sex partners. Furthermore, 20.1% had a