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Menopausal symptoms within a Hispanic cohort: SWAN, the Study of Women's Health Across the Nation

R. Green^{*}, A. J. Polotsky^{*}, R. P. Wildman[†], A. P. McGinn[†], J. Lin[†], C. Derby[†], J. Johnston[‡], K. T. Ram^{*}, C. J. Crandall^{**}, R. Thurston[‡], E. Gold^{††}, G. Weiss^{‡‡}, and N. Santoro^{*}

^{*}Department of Obstetrics, Gynecology & Women's Health, Albert Einstein College of Medicine/Montefiore Medical Center

[†]Epidemiology and Population Health, Albert Einstein College of Medicine/Montefiore Medical Center

[‡]Department of Epidemiology, University of Pittsburgh

^{**}Department of Medicine, University of California at Los Angeles

^{††}Department of Public Health Sciences, University of California Davis

^{‡‡}Department of Obstetrics and Gynecology, UMDNJ-New Jersey Medical School, USA

Abstract

Introduction—Since the designation of people as Hispanic involves the amalgamation of a number of different cultures and languages, we sought to test the hypothesis that menopausal symptoms would differ among Hispanic women, based upon country of origin and degree of acculturation.

Methods—A total of 419 women, aged 42–52 years at baseline, were categorized as: Central American (CA, $n = 29$) or South American (SA, $n = 106$), Puerto Rican (PR, $n = 56$), Dominican (D, $n = 42$), Cuban (Cu, $n = 44$) and non-Hispanic Caucasian ($n = 142$). We assessed vasomotor symptoms, vaginal dryness and trouble in sleeping. Hispanics and non-Hispanic Caucasians were compared using the χ^2 test, t test or non-parametric alternatives; ANOVA or Kruskal–Wallis testing examined differences among the five Hispanic sub-groups. Multivariable regression models used PR women as the reference group.

Results—Hispanic women were overall less educated, less acculturated ($p < 0.001$ for both) than non-Hispanic Caucasians and more of them reported vasomotor symptoms (34.1–72.4% vs. 38.3% among non-Hispanic Caucasians; $p = 0.0293$) and vaginal dryness (17.9–58.6% vs. 21.1% among non-Hispanic Caucasians, $p = 0.0287$). Among Hispanics, more CA women reported vasomotor symptoms than D, Cu, SA, or PR women (72.4% vs. 45.2%, 34.1%, 50.9%, and 51.8%, respectively). More CA (58.6%) and D women (38.1%) reported vaginal dryness than PR (17.9%), Cu (25.0%) and SA (31.4%) women. More PR and D women reported trouble in sleeping (66.1 and 64.3%, respectively) compared to CA (51.7%), Cu (36.4%), and SA (45.3%) women.

Conclusion—Symptoms associated with menopause among Hispanic women differed by country of origin but not acculturation. Central American women appear to be at greatest risk for both vasomotor symptoms and vaginal dryness.

Keywords

MENOPAUSE; VASOMOTOR SYMPTOMS; HISPANIC; HOT FLUSHES; VAGINAL DRYNESS

INTRODUCTION

Hot flushes and night sweats are reported by the majority of women¹, but prevalence and severity of symptoms vary considerably based upon a number of different factors. These include race/ethnicity as well as other demographic and lifestyle factors^{2–5}. A relatively greater proportion of Hispanic women than non-Hispanic Caucasians report vasomotor symptoms and vaginal dryness^{2,6–10} and perhaps have greater symptom sensitivity¹⁰ than non-Hispanics. Hispanic women on average have a higher body mass index than Caucasian women and this may contribute to their increased risk of vasomotor symptoms relative to Caucasians^{7,8}, although, in studies adjusting for body mass index, associations between vasomotor symptoms and ethnicity remained statistically significant². Since many Hispanic samples of women that have been studied are located in relatively poor, immigrant communities, the effects of adverse socioeconomic status, which has also been associated with increased symptom reporting⁵, also need to be taken into consideration^{2,11}.

In addition to differences between Hispanics and non-Hispanic groups of women, it is important to take into consideration the implications of grouping women under the category of Hispanic ethnicity. As a broad census category, Hispanics consist of people from up to 13 different countries of origin over a geographic range that spans the globe. It is possible, and even likely, that differences in symptoms will be related to country of origin. While the effect of multiple countries of origin may be mitigated by studying women from one country, even within-country studies of Hispanic women demonstrate differences between women based upon ancestry. In one recent study of Colombian women, more vasomotor symptom reporting was observed in Afro-Colombians, compared to those without African ancestry⁴. Since Hispanics are the fastest growing population within the USA¹², it is important to better understand the relationships between country of origin and symptom reporting, to target identification of the most symptomatic women better and to direct strategies to facilitate their access to medical care.

To address the relative contribution of country of origin to symptom reporting within a Hispanic cohort, we examined the prevalence of specific menopausal symptoms associated with the menopausal transition¹ in women enrolled in SWAN, the Study of Women's Health Across the Nation¹³. SWAN recruited Hispanic women who self-identified their country of origin as Central American, South American, Puerto Rican, Cuban or Dominican. While SWAN represents a large proportion of the Hispanic population residing within the 'melting pot' of the USA, it is clear that the sample is extremely heterogeneous, and the numbers of women in each ethnic group within our sample are relatively small. However, the sample is a suitable one in which to ask questions about how symptom reporting may differ among Hispanics within the same sample recruited at the same site in a prospective cohort study. We hypothesized that the prevalence of reporting these symptoms at baseline would differ across these sub-ethnic countries of origin. We further hypothesized that acculturation would be related to symptom reporting, whereby greater acculturation would be associated with decreased symptom reporting.

METHODS

Study participants

The data reported herein are from the baseline cohort of women enrolled at the Newark, New Jersey (New Jersey Medical School) site of the SWAN. SWAN is a multicenter, multiethnic, longitudinal study designed to characterize the biological and psychosocial changes that occur during the menopausal transition in a community-based sample. Details of the study design and recruitment have been previously published¹³. Briefly, each of the seven field sites (Boston, MA; Chicago, IL; the Detroit area, MI; Los Angeles, CA; Newark, NJ; Pittsburgh, PA; and Oakland, CA) for SWAN recruited Caucasian women *and* women from one other race-ethnic group (African American, Chinese, Hispanic or Japanese). A total of 3302 women were enrolled into the longitudinal cohort study from 1996 to 1997. Women eligible for enrolment met the following criteria: (1) an intact uterus and at least one ovary; (2) not pregnant or breastfeeding; (3) between 42 and 52 years of age; and (4) at least one menstrual period within the past 3 months (women using oral contraceptives or menopausal hormone therapy within the previous 3 months were excluded). The Newark site is the only site that recruited and enrolled Hispanic women.

A total of 420 Hispanic and Caucasian women were recruited and enrolled from the Newark Site/Hudson County, NJ area using random digit dialing and supplemental 'snowball' sampling (women were asked to provide the names of up to five other women within the eligible age range and living in the target areas)¹³. Census tracts containing greater than average densities of Hispanic households were over sampled. Of the 420 women enrolled, 142 were non-Hispanic Caucasian and 278 were Hispanic. Women recruited into SWAN were asked to designate their primary race-ethnicity from among the following choices: (1) Black/African American, (2) Puerto Rican, (3) Mexican or Mexican American, (4) Dominican, (5) Central American, (6) Cuban or Cuban American, (7) South American, Spanish, or other Hispanic, (8) Chinese or Chinese American, (9) Japanese or Japanese American, (10) Caucasian/White non-Hispanic (European Descent), (11) Other (with a field for specification), or (12) no primary affiliation/mixed. Women at the Newark site who designated groups 2–7 or 10 were eligible for enrolment.

The study was approved by the institutional review board of the New Jersey Medical School and all women signed informed consent prior to participation.

Baseline assessments

Physical measures—Blood pressure, height and weight were directly measured using standardized procedures previously reported in detail¹³. Body mass index was calculated as weight in kilograms divided by height in meters².

Menopausal status was based on responses to questions regarding menstrual irregularity and amenorrhea at each visit. *Premenopause* was defined as the presence of menses within the past 3 months, with no decrease in cycle predictability. *Early perimenopause* was defined as the presence of menses within the past 3 months that had become less predictable, and *late perimenopause* was defined as 3–11 months of amenorrhea.

Survey data collection—Demographic data were obtained by self-report using standard questionnaires. All SWAN-developed questionnaires were translated and back-translated by a certified Spanish translator. The level of acculturation for Hispanic women was ascertained from four questions regarding the language in which women usually think, read and speak, talk with their friends, and listen to the radio or watch television¹⁴. Responses to each of the four questions were coded as 1 = only Spanish, 2 = Spanish more often than

English, 3 = English more often than Spanish, or 4 = only English. The mean of these four responses to the questions was then calculated and used to create a categorical variable (0 = low acculturation (exclusively Spanish), 1 = mid-acculturation (some English), 2 = high acculturation (mostly/exclusively English)). Annual household income was ascertained by asking participants to indicate which of eight income categories best described their household. However, this variable was frequently unanswered or missing. Therefore, as an indicator of economic status, we utilized a three-level variable that described a perception of economic (financial) strain, 'how hard is it to pay for basics', including food, shelter and heat (very hard, somewhat hard, not very hard).

Sexual activity was assessed based upon the answer to a specific question about whether or not a participant had engaged in any one of a variety of sexual activities with a partner within the past 6 months.

Serum hormones—Follicle stimulating hormone (FSH), estradiol, testosterone, dehydroepiandrosterone sulfate (DHEAS) and sex hormone binding globulin (SHBG) were measured using paramagnetic particle assays adapted for high-throughput assay¹⁵.

Menopausal symptom reporting

Vasomotor symptoms—The number of days in the past 2 weeks (1–5, 6–8, 9–13 and every day) that the participant experienced vasomotor symptoms (hot flushes, cold sweats, night sweats) was reported. As previously analyzed in SWAN, these symptoms were reduced to a binary variable (any versus none)¹⁶. Cold sweats and night sweats were also examined separately in this analysis, as was dizziness.

Vaginal dryness—The number of days in the past 2 weeks (1–5, 6–8, 9–13 and every day) that the participant experienced vaginal dryness was reported. A dichotomous variable was created by categorizing the responses as any vaginal dryness vs. none.

Trouble in sleeping—Sleep problems were assessed at the baseline visit with four questions assessing the following aspects of sleep: initiation, maintenance, early awakening, and overall quality. Participants were asked how often in the past 2 weeks they experienced each of the first three on a scale of 1–5 (not at all to 5 or more times per week). Overall quality of sleep included five response categories, from very sound/restful to very restless. Responses to all four questions were summed to create a sleep scale, with higher values indicating more problems associated with sleep¹⁷.

Statistical methods

Of the 420 women enrolled at the Newark SWAN site, 278 self-reported Hispanic ethnicity. One woman identifying herself as Mexican American was excluded from the current analyses, leaving 419 women for the current analyses: 277 Hispanic and 142 non-Hispanic Caucasians. All symptom variables that were not normally distributed were log transformed. Levels or distributions of demographic and symptom variables were compared between non-Hispanic Caucasians and Hispanics (Puerto Ricans, Cubans, Dominicans, and Central Americans and South Americans combined) using the χ^2 test for categorical variables and t tests for continuous variables.

In order to further examine differences in menopausal symptoms among Hispanic participants in SWAN, the remainder of the analyses focused only on the Hispanic women. χ^2 tests were used to compare differences in categorical variables by Hispanic sub-ethnicity, using exact tests when necessary, and analysis of variance (ANOVA) was used to compare differences of continuous variables by Hispanic sub-ethnicity. When significant differences

were observed between Hispanic sub-ethnicity groups, *post-hoc* tests were conducted using Tukey adjustments for multiple comparisons¹⁸. Multivariable logistic regression analyses were used to adjust Hispanic ethnicity differences in vasomotor symptoms, vaginal dryness and trouble in sleeping for factors that have previously been shown in SWAN to co-vary with symptoms: age, menopausal status, education and acculturation (Model 1) and a more fully adjusted model that added smoking, financial strain, depressive symptoms (CES-D score ≤ 16 or > 16), hormones (FSH, estradiol, testosterone and SHBG), body mass index, cycle day of specimen collection of blood, and sexual activity (Model 2). Odds ratios and 95% confidence limits were estimated from multiple logistic regression analyses with Puerto Ricans as the reference group.

RESULTS

Baseline sample and demographics

The final sample contained Central ($n = 29$), South American ($n = 106$), Puerto Rican ($n = 56$), Cuban ($n = 44$) and Dominican ($n = 42$) women, with 142 non-Hispanic Caucasians (Table 1). The number of the Central Americans is small; however, we conducted our analysis with the data we had available. We chose not to collapse the Central and South Americans into one group because they represent two distinct sub-ethnic entities.

Mean age did not differ significantly between Hispanics and non-Hispanic Caucasians nor among Hispanic sub-groups. More non-Hispanic Caucasians reported education beyond high school compared with Hispanics, but ethnic subgroups of Hispanics received similar education. Body mass index was overall higher in Hispanics compared to non-Hispanic Caucasians, but did not differ among Hispanics. Financial strain was significantly more prevalent among Hispanics compared to non-Hispanic Caucasians ($p < 0.01$) but did not differ significantly among the Hispanic sub-groups (18.2–37.9% vs. 8.5% in Caucasians). Menopausal status and self-reported sexual activity did not differ between Hispanics and non-Hispanic Caucasians, or among Hispanic subgroups. Puerto Rican and Cuban women were more likely to smoke compared to the other Hispanic women, especially compared to Central Americans, none of whom smoked (*post-hoc* comparisons yielded significant differences between Central American women and PR, Cu and SA women). Among the Hispanic women, high acculturation (most or exclusive use of English) was reported most often by Puerto Ricans compared to other Hispanics (21% vs. 4.8% or lower for all other countries of origin, $p < 0.001$).

Vasomotor symptoms and vaginal dryness

With respect to vasomotor symptoms, Hispanics had a higher prevalence of vasomotor symptoms than non-Hispanic Caucasians ($p = 0.029$) (Table 2). *Post-hoc* testing (with adjustment for multiple comparisons) indicated that CA women more often reported having vasomotor symptoms than D or Cu women (72.4% vs. 45.2 and 34.1%, respectively). Multivariable-adjusted logistic regression among the Hispanic women indicated differences in the odds ratios for vasomotor symptoms even after adjustment for acculturation (Model 1) (Table 3), although this was attenuated after further adjustment for covariates (Model 2). Point estimates for both models were in good agreement, however, and indicated that CA women had the greatest likelihood of vasomotor symptoms compared to PR women (odds ratio (OR) 2.9 (95% confidence interval (CI) 1.0–8.6) for Model 1, and OR 3.2 (95% CI 0.7–14.2) for Model 2). Significantly more reporting of hot flush-associated emotional upset and embarrassment ($p < 0.0001$ for both) occurred among Hispanic women compared to non-Hispanic Caucasians, but no differences were observed among Hispanic subgroups (see Table 2).

More Hispanic women reported vaginal dryness, ranging from 17.9% for PR women to 58.6% for CA women, than did non-Hispanic Caucasians, 21.1% of whom reported this symptom ($p = 0.029$; Table 2). Statistically significant differences in vaginal dryness were found among Hispanics ($p = 0.003$); *post-hoc* tests with adjustment for multiple comparisons indicated that CA women had a significantly higher prevalence of vaginal dryness than PR, Cu and SA women, and more D women reported vaginal dryness (38.1%) than did PR women (17.9%). Both D (OR 3.0; 95% CI 1.1–8.3) and CA women (OR 8.5; 95% CI 2.7–26.6) were more likely than were PR women to report vaginal dryness in the minimally adjusted model which included adjustment for acculturation (Model 1). After full adjustment, the overall point estimates were preserved (3.9 for D women) but decreased in the CA women (3.8) and the 95% CIs included 1.0.

Trouble in sleeping

Hispanic women overall and non-Hispanic Caucasians reported similar trouble in sleeping, but, among Hispanic subgroups, significant differences were observed. *Post-hoc* testing (with adjustment for multiple comparisons) indicated that PR and D women had a higher prevalence of trouble in sleeping (66.1% and 64.3%, respectively), and this differed significantly between Cu and SA women (36.4% and 45.3%, respectively).

Reproductive hormones

Reproductive hormones did not differ between Hispanics and non-Hispanic Caucasians, except for testosterone, which was higher in Cu than in SA women. In *post-hoc* testing, Hispanic subgroups did not differ significantly in their hormone levels.

DISCUSSION

Herein we have reported significant differences in common menopausal symptoms sometimes associated with the menopausal transition within the ethnic subgroups of Hispanic women in SWAN. These data have indicated that hot flushes, vaginal dryness, and possibly associated symptoms such as cold sweats and dizziness are reported more commonly by Hispanic women compared to non-Hispanic Caucasians, and were more likely to be reported by Central American women. Vaginal dryness was reported by more Hispanic than non-Hispanic Caucasian women, and was more prevalent in Central American and Dominican women within our cohort. These latter findings persisted after adjustment for many additional potential covariates.

The finding that trouble in sleeping, another common symptom sometimes associated with menopause and believed to be caused in part by the menopausal transition¹, was not reported more by Hispanic compared to non-Hispanic Caucasian women argues against a general tendency for more Hispanic women to report symptoms or more severe symptoms than non-Hispanics. Hispanic women also reported more embarrassment and emotional upset with their vasomotor symptoms, but not more discomfort. These data suggest that, despite a lower overall educational attainment, the Hispanic women in the SWAN sample were able to understand and process these questions about symptoms appropriately. As all women who were Spanish-speaking were given the option of a fully translated survey, and bilingual research study personnel were available to administer the questionnaires in Spanish, our findings suggest that the quality of the administration of the surveys was adequate and, indeed, allowed us to detect differences among the Hispanic subgroups in SWAN. A limitation of this study was that our data do not fully address the issue of differential comprehension and observed differences between Hispanics and Caucasians. This is a subject for future studies and we plan to address this in a qualitative manner in the next phase of our research.

Among Hispanic women, the Central American subgroup was the smallest in size, yet represented the most symptomatic women in our study. More of them reported both vasomotor symptoms and vaginal symptoms. This increased reporting persisted after adjustment for age, menopausal status, education and acculturation. Although the greater odds ratio for Central Americans to report vasomotor symptoms was not statistically significant after adjustment in Model 2 (which included five additional variables), due to the small group size ($n = 29$), the wider confidence intervals in this multivariate model were expected. However, the agreement of the point estimate of the OR in both Model 1 and Model 2 suggests that there is, in fact, a tendency for more Central American women to report vasomotor symptoms, the most common symptom of the menopausal transition, and this observation suggests the need for further comparisons in other, larger samples.

With respect to vaginal dryness, the data were clearer. In both minimally and fully adjusted models, Central American women were far more likely to report this symptom. More Dominican women also reported vaginal dryness than the other Hispanic women, but the increased OR for Dominican women was no longer significant after full adjustment. As the baseline group of Dominican women was also not large ($n = 42$) and the point estimates were similar across both models, the results suggest that Dominican women were more likely to report vaginal dryness than other Hispanic women.

Few studies have examined the prevalence of and extent to which vaginal symptoms are bothersome in a multiethnic sample of women. In the Women's Health Initiative (WHI) cohort ($n = 98\,705$), women were asked questions about vaginal symptoms and more Hispanic women overall reported vaginal complaints than did non-Hispanic women⁶. Similar to our findings, no relationship was observed between sexual activity and self-reported vaginal symptoms. However, in the WHI study⁶, the Hispanic women were more likely to be Mexican, unlike the Hispanic women of SWAN. It is interesting that both groups of Hispanic women, despite their different backgrounds, were more likely to report symptoms than non-Hispanic Caucasians. In the WHI cohort, women had to be at least 50 years old and postmenopausal to be included. Thus, they were both older than the women in SWAN and all had completed their transition to postmenopause. It is therefore somewhat surprising that only 27% of this group of women reported vaginal dryness compared to up to 58.6% of the pre- or early perimenopausal, Central American women in SWAN. This high prevalence of vaginal dryness in women who were at most only experiencing minimal menstrual cycle disturbances has not been previously reported and calls into question the nature of the relationship of endogenous estrogen to this commonly reported symptom. Moreover, the Central American women in SWAN had the lowest proportion of women who had already entered the menopausal transition (only 32.1% reported being early perimenopausal compared to 53% of non-Hispanic Caucasians). It is possible that the Hispanic women at SWAN baseline had a less clear understanding of the subtle distinctions in menstrual cyclicity that were being used to assign menopausal status, and that they were in fact closer to their final menstrual periods than the data suggested. However, the lack of between-group differences in FSH and estradiol among the Hispanic subgroups and the non-Hispanic Caucasians suggests that hormone levels were not related to this symptom. Further, the results of the logistic models indicate that adjustment for hormones did not explain the difference in this symptom. Nonetheless, longitudinal studies can clarify whether the Hispanic women have an earlier final menstrual period.

It is interesting that we did not observe the typical covariates associated with increased vasomotor symptoms or vaginal dryness, such as increased body mass index, lower educational attainment, or more depressive or anxiety symptoms (data not shown for depression and anxiety) among the Central American or Dominican women¹⁶. Because the sample size was so small, we cannot rule out a weak or moderate association. Of note, fewer

Central American women reported depressive symptoms than the Puerto Rican women, but more than the other Hispanic subgroups, even though these differences were not statistically significant.

Somewhat surprisingly, and against our initial hypotheses, acculturation did not appear to explain the differences in symptoms we observed among the Hispanic subgroups. Although Puerto Rican women were the most acculturated in our sample, more of them reported depressive symptoms and fewer reported vaginal dryness. The relationship between acculturation and symptoms can be complex. In some Hispanic populations, new immigrants have better health outcomes than those who have been in their adopted country for a generation or more^{19,20}. This may be because of unhealthy social or health habits – such as cigarette smoking²¹, drug use⁵, breakdown of the family structure – that offset gains in financial well-being. This phenomenon has been called ‘acculturation stress’ and may apply to the finding of increased depressive symptoms in the Puerto Rican women in SWAN²². On the other hand, the low reporting of vaginal dryness in the Puerto Rican women cannot be explained by this reasoning, and other factors are likely at play. We used a simplified three-category acculturation variable based upon language. The limitation of measuring acculturation by this scale is that it is a language-based measure that does not take into account other dimensions of acculturation such as values placed on preserving cultural origin, attitudes towards traditional family structure and sex-role organization and adult interaction with members of the mainstream society²³. It is also possible that this variable is not sufficiently sensitive to elucidate subtle differences that might exist between Hispanic subgroups of women. A longitudinal assessment of the pattern of menopausal symptoms over the entire transition should help to clarify the relationship of symptoms to each transition stage and may help to provide a better evaluation of the role of acculturation, if any, in menopausal symptoms.

The present study was limited by its cross-sectional design and small sample size among the Hispanic subgroups. Thus, statistical power to detect group differences was limited. The confidence intervals are wide and the odds ratios may be considered unstable. These findings are preliminary and future research needs to be done. However, a strength of the study was that the community-based sample provided the opportunity to describe a heterogeneity within a group Hispanic women of relatively low socioeconomic status who have been rarely studied and who were all drawn from the same geographical area. Because the group of Hispanic women was heterogeneous with respect to country of origin, we were able to explore variability in the prevalence of symptoms across ethnic subgroups. Although the samples are small, given the lack of data on these group differences, they provide useful information for clinicians to take into consideration when assessing self-reported symptoms in menopausal women of Hispanic ethnicity.

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Table 1

Mean (standard deviation) or percent prevalence (n) of demographic and behavioral characteristics by Hispanic ethnicity. Values are geometric mean (geometric standard deviation) for continuous variables or percent (n) for categorical variables

Variable	p Values for differences across groups						
	Puerto Ricans (PR) (n = 56)	Cubans (Cu) (n = 44)	Dominicans (D) (n = 42)	Central Americans (CA) (n = 29)	South Americans (SA) (n = 106)	Caucasians (n = 142)	Non-Hispanic White vs. Hispanic
Age (years)	46.3 (1.1)	46.6 (1.1)	45.3 (1.1)	47.3 (1.1)	46.2 (1.1)	46.1 (1.1)	0.71
Education *	21.2 (11)	39.5 (17)	23.1 (9)	23.1 (6)	29.7 (30)	74.8 (98)	<0.0001
Acculturation †							<0.0001
% low	50.0 (28)	65.9 (29)	81.0 (34)	93.1 (27)	76.0 (79)	0	PR vs. Cu, p = 0.0263
% medium	28.6 (16)	31.8 (14)	14.3 (6)	6.9 (2)	19.2 (20)	2.9 (4)	PR vs. D, p = 0.0008
% high	21.4 (12)	2.3 (1)	4.8 (2)	0	4.8 (5)	97.1 (136)	PR vs. CA, p < 0.0001
BMI (kg/m ²)	29.8 (1.2)	29.6 (1.3)	27.6 (1.2)	29.0 (1.2)	28.6 (1.2)	27.0 (1.3)	PR vs. SA, p = 0.0002
SES	25.0 (14)	18.2 (8)	35.7 (15)	37.9 (11)	23.8 (25)	8.5 (12)	0.21
% current smokers	26.8 (15)	25.0 (11)	12.8 (5)	0	14.4 (15)	22.7 (32)	0.013
Serum FSH	14.2 (2.0)	19.4 (2.3)	16.0 (2.3)	22.4 (2.2)	18.7 (2.5)	16.8 (2.6)	0.11
Serum estradiol	64.1 (2.1)	53.6 (2.4)	65.0 (2.5)	44.3 (3.0)	51.9 (2.4)	56.9 (2.4)	0.26
Serum T	36.3 (1.6)	41.6 (1.7)	38.8 (1.7)	32.6 (1.9)	31.9 (1.7)	39.1 (1.5)	0.05
Serum SHBG	41.1 (1.6)	37.5 (1.5)	39.1 (1.9)	42.8 (1.7)	35.8 (1.7)	37.3 (1.9)	0.64
Menopausal status % premenopausal	48.2 (26)	65.9 (27)	52.6 (20)	67.9 (19)	58.7 (61)	47.0 (62)	0.31
Sexual activity (any)	90.6 (29)	97.1 (34)	90.3 (28)	94.7 (18)	96.3 (79)	96.0 (95)	0.56

BMI, body mass index; SES, indicator of economic status: very hard to pay for basics; FSH, follicle stimulating hormone; T, testosterone; SHBG, sex hormone binding globulin

* , % greater than High School;

† low, exclusively Spanish; medium, some English; high, mostly/exclusively English

Table 2

Proportion of women reporting each symptom by Hispanic ethnicity. Values are mean (standard deviation) for continuous variables or percent (*n*) for categorical variables, *p* values for χ^2

Variable	Puerto Ricans (PR) (n = 56)	Cubans (Cu) (n = 44)	Dominicans (D) (n = 42)	Central Americans (CA) (n = 29)	South Americans (SA) (n = 106)	Caucasians (n = 142)	p Values for differences across groups		
							Non-Hispanic White vs. Hispanic	Hispanic comparisons	Post-hoc comparisons
Vaginal dryness	17.9 (10)	25.0 (11)	38.1 (16)	58.6 (17)	31.4 (33)	21.1 (30)	0.029	0.003	PR vs. CA, <i>p</i> = 0.001 Cu vs. CA, <i>p</i> = 0.019 SA vs. CA, <i>p</i> = 0.025
Hot flushes	35.7 (20)	20.5 (9)	21.4 (9)	48.3 (14)	27.4 (29)	24.7 (35)	0.36	0.05	
uncomfortable	89.5 (17)	77.8 (7)	77.8 (7)	100.0 (14)	89.7 (26)	77.1 (27)	0.15	0.41	
emotionally upset	72.2 (13)	66.7 (6)	88.9 (8)	92.9 (13)	75.0 (21)	35.3 (12)	<0.0001	0.46	
embarrassed	68.4 (13)	66.7 (6)	66.7 (6)	85.7 (12)	75.0 (21)	35.3 (12)	<0.0001	0.78	PR vs. Cu, <i>p</i> = 0.031 PR vs. SA, <i>p</i> = 0.039 D vs. Cu, <i>p</i> = 0.039
Trouble in sleeping	66.1 (37)	36.4 (16)	64.3 (27)	51.7 (15)	45.3 (48)	50.7 (72)	0.92	0.010	
VMS, any vs. none	51.8 (29)	34.1 (15)	45.2 (19)	72.4 (21)	50.9 (54)	38.3 (54)	0.029	0.029	CA vs. Cu, <i>p</i> = 0.014

VMS, vasomotor symptoms

Multivariable-adjusted logistic regression odds ratios (95% confidence interval) for menopausal symptom differences between Hispanic ethnic groups

Table 3

Variable	Puerto Ricans	Cubans	Dominicans	Central Americans	South Americans
<i>Vasomotor symptoms, any vs. none</i>					
Model 1 reference		0.5 (0.2–1.3)	0.9 (0.4–2.1)	2.9 (1.0–8.6)	1.1 (0.6–2.3)
Model 2 reference		0.4 (0.1–1.3)	0.7 (0.2–2.4)	3.2 (0.7–14.2)	1.6 (0.6–4.1)
<i>Vaginal dryness</i>					
Model 1 reference		1.7 (0.6–4.8)	3.0 (1.1–8.3)	8.5 (2.7–26.6)	2.3 (1.0–5.5)
Model 2 reference		1.5 (0.4–5.6)	3.9 (1.0–15.1)	3.8 (0.8–17.8)	2.2 (0.7–6.9)

Model 1, minimally adjusted model adjusted for age, menopausal status, education, and level of acculturation (low vs. medium/high)

Model 2, fully adjusted model adjusted for age, education, level of acculturation (low vs. medium/high), menopausal status, smoking, SES (very hard to pay for basics), serum hormones (follicle stimulating hormone, estradiol, testosterone, sex hormone binding globulin), body mass index, cycle day, and sexual activity