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Differences in Health-Related Quality of Life Between New Mexican Hispanic and Non-Hispanic White Smokers

Alejandro A. Diaz, MD, MPH; Hans Petersen, MS; Paula Meek, PhD, RN; Akshay Sood, MD, MPH, FCCP; Bartolome Celli, MD, FCCP; and Yohannes Tesfaigzi, PhD

BACKGROUND: Smoking is associated with impaired health-related quality of life (HRQL) across all populations. Because decline in lung function and risk for COPD are lower in New Mexican Hispanic smokers compared with their non-Hispanic white (NHW) counterparts, the goal of this study was to ascertain whether HRQL differs between these two racial/ethnic groups and determine the factors that contribute to this difference.

METHODS: We compared the score results of the Medical Outcomes Short-Form 36 Health Survey (SF-36) and St. George's Respiratory Questionnaire (SGRQ) in 378 Hispanic subjects and 1,597 NHW subjects enrolled in the Lovelace Smokers' Cohort (LSC) from New Mexico. The associations of race/ethnicity with SGRQ and SF-36 were assessed by using multivariable regression.

RESULTS: Physical functioning (difference, –4.5; $P = .0008$) but not mental health or role emotional domains of the SF-36 was worse in Hispanic smokers than in their NWH counterparts in multivariable analysis. SGRQ total score and its activity and impact subscores were worse in Hispanic (vs NHW) smokers after adjustment for education level, current smoking, pack-years smoked, BMI, number of comorbidities, and FEV_1 % predicted (difference range, 2.9-5.0; all comparisons, $P \leq .001$). Although the difference in the SGRQ activity domain was above the clinically important difference of four units, the total score was not.

CONCLUSIONS: New Mexican Hispanic smokers have clinically relevant, lower HRQL than their NHW counterparts. A perception of diminished physical functioning and impairment in daily life activities contribute to the poorer HRQL among Hispanic subjects.

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KEY WORDS: health-related quality of life; Hispanic; quality of life; racial disparities; smokers; smoking; SQRQ

ABBREVIATIONS: HRQL = health-related quality of life; NHW = non-Hispanic white; SF-36 = Medical Outcomes 36-item Short Form Health Survey; SGRQ = St. George's Respiratory Questionnaire

AFFILIATIONS: From Brigham and Women's Hospital and Harvard Medical School (Drs Diaz and Celli), Boston, MA; Lovelace Respiratory Research Institute (Mr Petersen and Dr Tesfaigzi), Albuquerque, NM; College of Nursing (Dr Meek), University of Colorado-Denver, Denver, CO; and the Department of Medicine (Dr Sood), University of New Mexico, Albuquerque, NM.

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CORRESPONDENCE TO: Alejandro A. Diaz, MD, MPH, Division of Pulmonary and Critical Care Medicine, Department of Medicine, Brigham and Women's Hospital, 75 Francis St, Boston, MA 02115; e-mail: adiaz6@partners.org

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Despite a major reduction in smoking rates over the past decade, an estimated 40 million adults were current smokers in the United States in 2014.[1] The effects of smoking on mortality, risk for chronic diseases, and impairment in health-related quality of life (HRQL) are well known.[2-5] However, health status perceptions of smokers from different races and ethnic groups are not well known.[6] Minority subjects with smoking-related lung diseases seem to experience a worse HRQL. For example, African-American subjects who smoke and have COPD report worse HRQL than their non-Hispanic white (NHW) counterparts. Although Hispanic ethnicity is the largest and fastest growing minority in the United States,[7] ethnic differences in health status among Hispanic and NHW smokers have not been studied. The lack of literature on HRQL in this minority group may be due to their infrequent inclusion in large studies.[8] Understanding health status perception in this population is of importance to better inform the burden of smoking on Hispanic subjects.

In a New Mexico-based cohort, Hispanic female smokers had higher expiratory airflow and lower risk of airflow obstruction than NHW subjects.[9] Furthermore, Hispanic smokers had a reduced risk of rapid decline in lung function.[10] Despite this advantage, previous investigations in smoking-related diseases (eg, obstructive lung disease, coronary artery disease, stroke) have shown that Hispanic subjects seem to experience greater impairment in HRQL than NHW subjects.[11-13] A limitation of those studies is that they used a generic questionnaire or a single question from a generic instrument as a measure of HRQL. Using both a generic (eg, Medical Outcomes 36-item Short Form Health Survey [SF-36])[14] and a respiratory disease-specific instrument (eg, the St. George's Respiratory Questionnaire [SGRQ])[15] would improve the objective assessment of the health status in Hispanic subjects who smoke. Although the SGRQ has been used in smokers,[16] we are unaware of reports of SGRQ results restricted to US Hispanic subjects. Therefore, the goal of the present study was to compare SF-36 and SGRQ responses between Hispanic and NHW smokers. Although Hispanic smokers have better lung function, based on results of previous studies,[11,12] we hypothesized that Hispanic subjects would have a lower HRQL than NHW subjects. We also investigated the risk factors associated with HRQL in Hispanic smokers.

Patients and Methods

Data were used from the Lovelace Smokers' Cohort (LSC), which has been described elsewhere.[10] In brief, this is a cohort recruited based on smoking status (former and current smokers) including mainly NHW subjects and Hispanic subjects from the Albuquerque metropolitan area of New Mexico. Recruitment to this cohort was initiated in 2001 and is ongoing with follow-up visits of recruited subjects. Participants were aged 40 to 75 years, had smoked $\geq$ 20 pack-years, and were able to understand English. Approximately 96% of Hispanic participants were born in the United States, and they were therefore long-term residents in the country.[17] Subjects from other racial/ethnic groups were excluded from this analysis. From the 2,273 initial participants enrolled, exclusion of participants from other racial/ethnic groups and those with missing data on self-reported race/ethnicity (N = 298) resulted in 1,975 subjects eligible for analysis (New Mexican Hispanic subjects, n = 378; NHW subjects, n = 1,597).

All subjects gave their consent to participate in the study. The study protocol was approved by the Western Institutional Review Board (No. 20031684).

Lung Function Assessment

Spirometry was performed by adhering to the 1994 American Thoracic Society guidelines[18] as described previously.[19] Spirometric measures of lung function were obtained prior to and following the administration of albuterol. FEV_1 % predicted and FVC % predicted were calculated by using equations based on race/ethnicity. Mexican-American reference standards were used for the New Mexican Hispanic subjects.[20]

Outcome

The outcome was health status as measured by using the generic questionnaire SF-36 and the disease-specific, self-administered SGRQ. The SF-36 encompasses eight domains, and the following five domains were used: physical functioning, bodily pain, role emotional, mental health, and general health. The SF-36 scores range from 0 to 100, with higher scores indicating better HRQL.[14] The SGRQ total score and its activity, symptom, and impact domain subscores were used for analyses. The SGRQ total score and its domain subscores range from 0 to 100, with higher score indicating a worse HRQL.[21] A minimal clinically important difference in SGRQ total score and domain subscores is 4.[22]

Covariates

Clinical information was collected in a standardized manner, including demographic characteristics, education level (dichotomized as high school or beyond level or lower), smoking intensity (pack-years), current smoking status, and comorbidities. COPD was defined as a postbronchodilator ratio of FEV_1 to FVC < 0.7, according to criteria of the Global Initiative for Chronic Obstructive Lung Disease.[23] Asthma was defined as participants' self-report of physician diagnosis for this condition. Chronic bronchitis was based on self-reported cough productive of phlegm for $\geq$ 3 months per year for at least 2 consecutive years.[24] Information on other comorbidities (diabetes, hypertension, congestive heart failure, rheumatic disease, TB, cancer, peripheral vascular disease, renal disease, liver disease, and transient ischemic attack) was also collected based on self-reported data as described elsewhere.[19] The number of comorbidities was dichotomized as 0 to 2 and $\geq$ 3.[25]

Statistical Analyses

Main analyses for SGRQ total score and subscores, as well as SF-36 and its domains, were conducted by using multivariable regression models in which New Mexican Hispanic ethnicity was the main predictor, and NHW was the reference group. The models were adjusted for education level, BMI, pack-years smoked, current smoking status, FEV_1 % predicted, and the number of comorbidities. The main analysis was conducted in all smokers, but ethnic differences in subgroups with asthma, chronic bronchitis, or COPD were also explored. For the subgroup analyses, subjects with multiple diseases were excluded. To assess potential factors associated with SGRQ scores within the minority population, multivariable models in Hispanic subjects only were also assessed.

A P value $< .05$ was considered significant. All analyses were conducted by using SAS version 9.3 (SAS Institute, Inc).

Results

Participants' Characteristics

Hispanic subjects compared with NHW smokers were younger and more likely to be current smokers but had smoked fewer pack-years, had lower education levels, and higher BMI. In addition, Hispanic subjects who smoked had a higher incidence of diabetes and rheumatic disease but less hypertension, TB, and cancer than their NHW counterparts. As was previously reported,[9,10] Hispanic smokers had a higher FEV_1 % predicted and lower prevalence of COPD confirmed with spirometry, as well as a higher prevalence of chronic bronchitis, with no significant differences in asthma prevalence (Table 1).

Hispanic Smokers Have Worse HRQL

In univariate analysis, physical functioning, bodily pain, mental health, and general health domains of the SF-36 questionnaire were worse (lower) in Hispanic smokers than in NHW smokers ($P \leq .03$ for all comparisons) (Table 1). However, in adjusted models, physical functioning was the only domain in the SF-36 questionnaire that remained significantly lower (Table 2). Hispanic smokers also had worse (ie, higher) SGRQ total score (3.4 more points) and subscores (range, 3.4-5.6) than their NHW counterparts in univariate analysis. In adjusted analyses, the racial/ethnic differences in the SGRQ domain subscores (range, 2.9-5.0) were attenuated but remained significant ($P \leq .0003$), with the exception of the symptom subscale ($P = .09$). Although the difference in the activity subscore was above the minimal clinically important difference, the total score and impact subscores were not. We tested for an interaction between sex and ethnicity for SGRQ total score, which was not significant ($P = .48$).

Risk Factors for SGRQ Total Score in Hispanic Smokers

In analyses of Hispanic smokers only, current smoking status, greater pack-years smoked, greater BMI, and lower FEV_1 % predicted were independently associated with worse (ie, higher) SGRQ total score. Similar relationships with predictive factors were found for the domains of activity, impact, and symptoms (Table 3).

Analysis According to Disease Group

Compared with smokers who had no chronic pulmonary diseases (asthma, chronic bronchitis, COPD), participants with asthma (SGRQ difference range, –4.3 [impact] to –9.0 [symptom], chronic bronchitis (–8.1 [impact] to –23.5 [symptom]), or COPD (–3.6 [impact] to –7.7 [activity]) had a worse (ie, higher) SGRQ total score and subscores ($P < .0001$ for all comparisons). However, the multivariable analysis within disease showed no differences in most of the SF-36 and SGRQ scores and subscores (all comparisons, $P > .05$) between New Mexican Hispanic and NHW smokers: asthma (SF-36 difference range, –3.8 [bodily pain] to 3.7 [role emotional]; SGRQ difference range, –0.5 [impact] to 4.6 [activity]); chronic bronchitis (SF-36, –3.6 [role emotional] to 3.9 [general health]; SGRQ, 0.8 [symptom] to 3.4 [activity]); and COPD (SF-36, –0.4 [role emotional] to 4.4 [general health]; SGRQ, 0.1 [symptom] to –1.2 [impact]). One exception was observed in patients with asthma: New Mexican Hispanic subjects reported significantly worse SF-36 physical functioning (difference, –7.9; $P = .04$). None of the interactions between disease statuses and ethnicity for SGRQ total score and subscores were significant (P range, .10-.82).

Discussion

In the present study, we evaluated > 1,500 LSC participants and found that New Mexican Hispanic subjects compared with NHW subjects reported worse generic and disease-specific HRQL. In New Mexican Hispanic smokers, diminished physical functioning and impairment in daily life activities were the primary contributors to HRQL impairment. Current smoking status, greater pack-years smoked, higher BMI, and lower FEV_1 % predicted were identified as risk factors for a worse SGRQ score in this population.

TABLE 1] Baseline Characteristics of the Participants According to Disease and Racial/Ethnic Group

Characteristic	All Participants (N = 1,975)	Hispanic (n = 378)	Non-Hispanic White (n = 1,597)	*P* Value
Female sex	1,518 (77)	281 (74)	1,237 (78)	.20
Age, y	56 ± 10	53 ± 9	56 ± 10	< .0001
High school or higher education level	1,373 (70)	172 (46)	1,201 (75)	< .0001
Pack-years smoked	39.9 ± 20.7	33.7 ± 15.5	41.3 ± 21.5	< .0001
Current smoking status	1149 (58)	288 (76)	861 (54)	< .0001
BMI, kg/m^2	28.1 ± 6.2	28.7 ± 6.0	28.0 ± 6.2	.04
FEV_1, L	2.5 ± 0.8	2.6 ± 0.7	2.5 ± 0.8	.19
FEV_1/FVC, %	73.1 ± 10.4	76.6 ± 9.0	72.3 ± 10.6	< .0001
FVC, L	3.5 ± 0.9	3.4 ± 0.9	3.5 ± 0.9	.03
FEV_1 % predicted	88 ± 18	92 ± 17	87 ± 18	< .0001
FVC % predicted	94 ± 15	95 ± 15	93 ± 15	.01
Chronic pulmonary diseases				
Asthma only	172 (9)	34 (9)	138 (9)	.83
Chronic bronchitis only	294 (15)	78 (21)	216 (14)	< .0001
COPD only	194 (10)	19 (5)	175 (11)	.001
Comorbidities				
≥ 3 Comorbidities	165 (8)	22 (6)	143 (9)	< .0001
Hypertension	654 (33)	100 (27)	554 (35)	.002
Chronic heart failure	15 (1)	2 (1)	13 (1)	.56
Peripheral vascular disease	164 (8)	24 (6)	140 (9)	.13
Liver disease	164 (8)	38 (10)	126 (8)	.17
Transient ischemic attack	82 (4)	15 (4)	67 (4)	.84
Renal disease	107 (5)	21 (6)	86 (5)	.90
Rheumatic disease	106 (5)	31 (8)	75 (5)	.007
Diabetes	145 (7)	45 (12)	100 (6)	.0002
TB	197 (10)	16 (4)	181 (11)	< .0001
Cancer	330 (17)	33 (9)	297 (19)	< .0001
Health status: SF-36				
Physical functioning	76.4 ± 24.9	72.9 ± 26.5	77.2 ± 24.5	.002
Bodily pain	67.1 ± 25.0	64.6 ± 27.5	67.7 ± 24.4	.03
Role emotional	75.2 ± 39.6	71.7 ± 41.6	76.0 ± 39.1	.06
Mental health	73.4 ± 19.7	69.8 ± 21.5	74.3 ± 19.1	< .0001
General health	66.6 ± 21.6	64.0 ± 22.6	67.3 ± 21.3	.009
Health status: SGRQ				
Total score	21.9 ± 17.9	25.3 ± 19.2	21.1 ± 17.5	< .0001
Activity domain	31.7 ± 24.9	36.2 ± 26.3	30.6 ± 24.4	< .0001
Symptom domain	31.2 ± 23.5	34.8 ± 24.7	30.4 ± 23.1	.001
Impact domain	11.9 ± 14.3	14.7 ± 16.2	11.2 ± 13.7	< .0001

Data are presented as no. (%) or mean ± SD. SF-36 = Medical Outcomes 36-item Short Form Health Survey; SGRQ = St. George's Respiratory Questionnaire.

The so-called "Hispanic paradox" states that despite socioeconomic disadvantages, Hispanic subjects vs NHW subjects have comparable or more favorable health outcomes (eg, lower general mortality rates, better birth outcomes).[26,27] However, whether this paradox includes HRQL in smokers is unknown. Our results found that the Hispanic paradox is not applicable to health status because smokers of this ethnicity

TABLE 2] Racial/Ethnic Differences in Health-Related Quality of Life in All Smokers

SF-36 Domains									
Physical Functioning		Bodily Pain		Role emotional		Mental Health		General Health	
Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value
−4.5 (−5.8 to −3.2)	.0008	−1.4 (−2.9 to 0.1)	.35	−1.1 (−3.5 to 1.3)	.63	−1.8 (−3.0 to −0.6)	.11	−1.2 (−2.4 to 0.0)	.31
SGRQ Domains									
SGRQ Total Score		Activity		Symptom		Impact			
Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value	Hispanic-NHW Diff (95% CI)	*P* Value		
3.4 (4.3 to 2.5)	.0003	5.0 (3.7 to 6.3)	.0002	2.1 (0.8 to 3.4)	.09	2.9 (2.1 to 3.7)	.0002		

The values for the differences in scores between Hispanic subjects and non-Hispanic white (NHW) subjects represent the parameter estimates (95% CI) from multivariable regression models, with NHW as the reference group and adjusted for education level (high school or beyond vs less than high school), pack-years smoked, current smoking status, BMI, the number of comorbidities (≥ 3 vs < 3), and FEV_1 % predicted. Diff = difference. See Table 1 legend for expansion of other abbreviation.

TABLE 3] Multivariable Models for SGRQ Total Score and Subscores in All New Mexican Hispanic Smokers Only

	Total Score		Activity Subscore		Symptom Subscore		Impact Subscore	
Variable	β (95% CI)	*P* Value	β (95% CI)	*P* Value	β (95% CI)	*P* Value	β (95% CI)	*P* Value
High school or higher education level	−3.2 (−3.3 to −3.1)	.09	−3.9 (−6.5 to −1.3)	.13	−0.9 (−3.3 to 1.5)	.70	−3.4 (−5.0 to −1.8)	.04
BMI	0.5 (0.3 to 0.7)	.004	0.8 (0.6 to 1.0)	.0002	0.3 (0.1 to 0.5)	.19	0.3 (0.2 to 0.4)	.04
Pack-years smoked	0.1 (0.04 to 0.16)	.02	0.1 (0.0 to 0.2)	.12	0.1 (0.0 to 0.2)	.15	0.2 (0.1 to 0.3)	.003
Smoking status	8.5 (6.3 to 10.7)	.0001	9.9 (6.8 to 13)	.001	17.5 (14.6 to 20.4)	<.0001	4.2 (2.3 to 6.1)	.02
≥3 Comorbidities	4.7 (0.3 to 9.1)	.24	7.1 (1.4 to 12.8)	0.21	0.9 (−4.3 to 6.1)	<.0001	4.6 (1.2 to 8.0)	.18
FEV_1 % predicted	−0.2 (−0.3 to −0.1)	<.0001	−0.2 (−0.3 to −0.1)	<.0001	−0.3 (−0.4 to −0.2)	<.0001	−0.2 (−0.24 to −0.16)	<.0001

β = beta value. See Table 1 legend for expansion of abbreviation.

experienced worse HRQL than their NHW counterparts. The racial/ethnic differences in SGRQ activity subscore are particularly relevant because they exceed the minimum clinically important difference for this instrument and are higher than those reported between women and men with COPD.[28] Although our cohort is female predominant, and women tend to report worse HRQL and more respiratory symptoms (eg, dyspnea) than men,[29] the proportion of women was similar in both populations, and an interaction term between sex and ethnicity was not significant, suggesting that the observed differences were independent of sex. In addition, because Hispanic subjects from the LSC were long-term residents in New Mexico and are fluent in English, the "healthy migrant effect" and language barrier are likely not to be relevant explanations for the observed ethnic differences in HRQL.[17,30] Together, our novel findings suggest that although New Mexican Hispanic smokers have less airway obstruction and fewer pack-years of smoking exposure than their NHW counterparts, they perceive their health status to be on average poorer based on their reports of diminished ability to perform activities of daily living and of experiencing more severe disease impact. The results of both SF-36 and SGRQ are consistent in revealing that the discrepancy between desired and real well-being among New Mexican Hispanic smokers seems to be related to a reduced ability to perform activities of daily living or being less physically functional. The absence of ethnic differences in the SF-36 mental, role emotional, and general health domain scores emphasizes that physical limitations seem more relevant to health status in New Mexican Hispanic smokers. These findings suggest that culturally sensitive interventions targeted to improve physical functioning may be most appropriate for the well-being of Hispanic subjects.

The factors contributing to the racial/ethnic differences in HRQL are multifactorial and include disparities in access to health care and adequate health literacy, and health behavior. A recent report indicated that compared with NHW subjects, US Hispanic subjects are three times less likely to have health insurance,[31] a key factor to health care access. Martinez et al[11] demonstrated that access to health care was one of the main contributors to differences in health status between Mexican-American subjects and NHW subjects. Prior investigation has documented that education level is directly related to health literacy.[32] The 2003 National Assessment of Adult Literacy showed that Hispanic subjects have the lowest health literacy level of all ethnic groups in the United States.[33] Because the majority of the Hispanic smokers in the present study had only a high school education, it is also likely that they have inadequate health literacy. Low health literacy is reportedly associated with worse HRQL in Hispanic subjects with asthma.[34,35] Furthermore, leisure-time physical activity is a behavior associated with improved HRQL likely because it involves improvement in mobility, reduced pain, and higher emotional well-being.[36,37] Hispanic subjects report less leisure-time physical activity compared with NHW subjects,[38] which might explain the differences in observed HRQL.

When we examined the factors associated with HRQL in New Mexican Hispanic smokers only, we consistently identified modifiable risk factors such as current smoking status, pack-years smoked, and BMI. The current smoking status in this study was higher in New Mexican Hispanic subjects than in NHW subjects, and current smoking remains higher in national surveys.[31] Our findings thus support the need of culturally sensitive smoking cessation interventions in this population. Consistent with national data,[39] a higher BMI was also observed in New Mexican Hispanic subjects than in NHW subjects, and BMI was associated with worse health status. A previous study reported a modest decrease in HRQL in obese (vs nonobese) Hispanic subjects.[40] A high BMI may affect HRQL by further limiting daily activities or causing sleep disturbances.[24]

In the analysis according to disease group, we found no racial/ethnic differences in most of the SF-36 scales and for all SGRQ domains. The exception was in participants with asthma only, in whom SF-36 physical functioning was, again, worse in New Mexican Hispanic subjects. This finding suggests that the burden of asthma is worse for this minority group. As for COPD, initial New Mexican Hispanic/NHW differences in SGRQ scores and subscores disappeared after adjustment for lung function. FEV_1 % predicted was inversely associated with SGRQ in this population, suggesting that this factor partly explains the lack of HRQL difference based on race/ethnicity in COPD.

The present study has several limitations. First, all LSC participants are heavy smokers, the majority are female, and the enrolled Hispanic subjects are predominantly long-term residents of New Mexico. Thus, the cohort is not representative of the diverse Hispanic subgroups in the United States, limiting the generalizability of our

results. The term Hispanic in this study applies solely to Hispanic subjects living in the New Mexico area. Ancestry studies by our group have shown that this population has an average 33% Native American ancestry,[10] which may not be present in other ancestry groups that are also identified as Hispanic subjects in the United States. A further limitation is that some potential confounders such as access to health care, physical activity, depression, and dyspnea in the health status/ethnicity relationships were not accounted for.[6] When we examined dyspnea frequency by using the SGRQ individual item, no ethnic differences were evident (33% vs 30% for New Mexican Hispanic subjects and NHW subjects, respectively; $P = .20$); this finding is consistent with a previous study.[41] Finally, we used the SGRQ with the assumption that it is an appropriate instrument to capture the true health status of a minority population. However, although the instrument was originally validated in a nonminority population from six countries,[42,43] several subsequent studies[44,45] have used the SGRQ in Hispanic subjects outside of the United States, supporting its use in this population.

Conclusions

The present study found that, compared with NHW smokers, New Mexican Hispanic smokers had clinically relevant decreases in HRQL, which seemed to be driven by less physical functioning and limitations in performing daily life activities.

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