Baseline Blood Pressure Control in Hispanics: Characteristics of Hispanics in the Systolic Blood Pressure Intervention Trial (SPRINT)

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Abstract

The Systolic Blood Pressure Intervention Trial tested whether a systolic blood pressure (SBP) < 120 mmHg reduces adverse clinical outcomes compared to the goal of < 140 mmHg. Here we describe the baseline characteristics of Hispanic participants in SPRINT. Non-diabetic hypertensive patients who are 50 years old with SBP 130-180 mmHg on 0-4 BP medications were enrolled in the mainland US and Puerto Rico (PR). Cross-sectional, bivariate analysis was employed comparing sociodemographic and clinical factors in Hispanics vs. non-Hispanics. Multivariable logistic regression models restricted to Hispanics were used to identify factors associated with achieved BP control (SBP < 140 mmHg and diastolic BP < 90 mmHg) at baseline. Eleven percent (n=984) of SPRINT participants were Hispanic; 56% (n=549) of Hispanics were living in PR, the remainder were living on the US mainland. Hispanics overall were younger, female, less likely to live alone, more likely to have lower education and be uninsured, although just as likely to be employed compared to non-Hispanics. BP control was not different between Hispanics vs. non-Hispanics at baseline. However, a significantly higher percentage of Hispanics on the US Mainland (compared to Hispanics in PR) were BP controlled. BP control was independently associated with cardiovascular disease history and functional status among Hispanics, specifically those living in PR. Whereas functional status was the only independent predictor of BP control s identified among mainland Hispanics. These findings highlight the diversity of the SPRINT population. It remains to be seen whether factors identified among Hispanics impact intervention goals and subsequent clinical outcomes.

Keywords

Blood Pressure; Clinical Trials and Hispanics

Hypertension (elevated blood pressure) is a global public health concern and affects billions worldwide. In the United States, the prevalence of hypertension in the adult population is 29.1% and is estimated to affect 71 million.[1] Although hypertension-related mortality rates have increased among Hispanics,[2, 3] there is a remarkable lack of consistent information regarding hypertension among US Hispanics. The prevalence of hypertension among Mexicans (28.7% in males, 31.4% in females) is not elevated compared to the general population;[2] however, longitudinal data show that it is on the rise. The age-adjusted prevalence of hypertension among Mexican Americans increased from 17.2% in 1988–1991 to 20.7% in 1999–2000 and to 27.8% in 2003–2004.[4, 5] This is a disturbing trend. Furthermore, Hispanics are more likely to have undiagnosed, untreated or uncontrolled hypertension than other ethnic groups.[6-8]

Differences by Hispanic subgroup are evident. Compared to Caucasians, adjusted odds of self-reported hypertension were 67% higher among Dominicans; 20-27% lower among Mexicans and Central/ South Americans.[9] Among Northern Manhattan Study participants (predominantly Hispanics of Dominican background), the prevalence of hypertension was similarly high among Hispanics (59%) compared to non-Hispanic blacks (64%).[10] Similar results have been found in the Hispanic Community Health Study/Study of Latinos (HCHS/ SOL) where the prevalence of hypertension among Hispanic men was the highest (32.6%) among Dominicans and lowest among South American men (19.9%).[11]

Over the past decade, numerous large-scale clinical trials have demonstrated that lowering blood pressure, using various antihypertensive agents, will reduce the risk of cardiovascular morbidity and mortality. However, such findings may not be entirely applicable to racial/ethnic groups, including Hispanics/Latinos, as they are underrepresented and understudied in such clinical trials, which may explain the continued disparities observed in hypertension and its related outcomes. It is warranted that clinical trials include diverse samples and examine the efficacy of antihypertensive therapies and their ability to achieve blood pressure control and lower risk of cardiovascular morbidity and mortality.

The Systolic Blood Pressure Intervention Trial (SPRINT) is a multicenter, randomized clinical trial designed to test whether treating systolic blood pressure (SBP) to a lower goal than currently recommended < 140 mmHg will reduce cardiovascular disease (CVD) risk among non-diabetic hypertensive patients over age 50 years. SPRINT was successful in recruiting an ethnically diverse population, including Hispanic/Latinos. The aim of this manuscript is to evaluate baseline characteristics and factors associated with baseline blood pressure control (SBP < 140 and DBP < 90) in Hispanics/Latinos in SPRINT.

METHODS

The design and rationale of SPRINT have been reported previously.[12] Briefly, SPRINT is a two-armed, multicenter, randomized, open label, clinical trial designed to test whether a strategy to treat SBP to <120 mmHg will reduce cardiovascular disease (CVD) outcomes among non-diabetic hypertensive participants compared to treating to the currently recommended SBP target of <140 mmHg. In addition, the SPRINT Memory and cognition IN Decreased hypertension (SPRINT MIND) sub-study will test whether the lower SBP goal influences the rate of incident dementia and mild cognitive impairment, global and domain-specific cognitive function, and cerebral small vessel ischemic disease.

Participants are men and women aged 50 years with SBP between 130-180 mm Hg on 0-4 antihypertensive medications with at least one additional CVD risk factor. The SPRINT recruitment target was 9,250, including additional targets of enrolling 50% women and 40% minorities. Self-reported race and ethnicity was collected separately on all participants. Of those that classified themselves as Hispanic, they were asked if they considered their ancestry to be of Puerto Rican background, Cuban background, Mexican background, or Other Hispanic background. The protocol was designed to enroll three high risk subgroups: participants with chronic kidney disease (CKD; eGFR 20-59 ml/min/1.73m^2), those with clinical CVD (myocardial infarction, coronary revascularization, carotid endarterectomy/stenting, and/or peripheral artery disease with revascularization) or subclinical CVD (left ventricular hypertrophy; 50% stenosis of a coronary, carotid or lower extremity artery; abdominal aortic aneurysm >5 cm with or without repair; ankle brachial index 0.90; and/or coronary artery calcium score 400 Agatston units), and seniors who were at least 75 years of age. Patients with Framingham Risk Score >15, age 75 years, and/or CKD who met the BP eligibility criteria were automatically eligible for enrollment. Individuals with diabetes, proteinuria 1 g/day, history of stroke, eGFR <20 ml/min/1.73m^2, and heart failure were excluded. Participants were recruited from 102 clinical sites across the US and Puerto Rico (PR) between November 2010 and March 2013. The clinics were organized into five

regional Clinic Center Networks detailed on the SPRINT website with contact information and a map of all participating clinics.[13] All clinics obtained institutional review board approval and each participant provided written informed consent.

Baseline Visits and Procedures

BP measurements (sitting and standing) were collected using a standard automated blood pressure device (the OMRON HEM-907 XL Professional Digital Blood Pressure Monitor), the average of three seated blood pressures and pulse readings were measured after sitting quietly for 5 minutes, with back supported and feet flat on the floor. A single standing BP and pulse measurement was obtained, followed by questioning the participant for symptoms of orthostatic hypotension.

Anthropometric measures (height and weight), fasting blood and urine samples, and a 12-lead electrocardiogram (ECG) were obtained. All participants completed dementia screening (e.g., Montreal Cognitive Assessment [MoCA], Logical Memory - Immediate and Delayed Recall [LMI and LMII respectively] and Digit Symbol Coding [DSC]). The MoCA was designed as a rapid screening instrument of global cognitive function. The LM tests measure episodic verbal memory. Participants read a short story that consists of specific bits of information and recall is tested. The DSC assesses sustained attention, concentration, visuo-motor coordination and processing speed. A Spanish-translated version of the SPRINT cognitive battery was provided by the SPRINT coordinating center for Spanish-speaking participants (mainland as well as PR Hispanics) for use at the participant's request. In addition, participants completed several self-administered questionnaires assessing general Health-Related Quality of Life [HRQOL] measures and its three subscales a. general physical and mental health status (Veterans RAND 12 [VR-12]), the VR-12 is a shorter version of the SF-36, a reliable, established and valid HRQOL measure.[14] Scores on the VR-12 range from 0 to 100, with higher scores suggesting more favorable HRQL; b. health utility such as mobility, self-care, usual activities, pain/discomfort (EuroQol-5D [EQ-5D]); the EQ-5D[15] includes a single summary index with higher scores denoting self-perceived greater mobility, increased ability for self-care and lower pain; and c. depressive symptoms (Patient Health Questionnaire-9 [PHQ-9]); the PHQ-9[16] is a self-report measure of depressive symptoms over the previous two weeks. Possible scores range from 0 to 27, with higher scores suggesting more depressive symptoms. Functional Activities Questionnaire (FAQ) is a 10-item, validated questionnaire,[17] administered to assess daily functional status during the past four weeks. Items assess common daily functions like managing money and remembering names of familiar persons. Additional questionnaires queried participants about their sociodemographics, medical history, general health and quality of life, smoking/alcohol use, and concomitant medications. Antihypertensive medication adherence was assessed using the self-administered Morisky Medication Adherence Scale where lower numerical scores equate to lower adherence. Participation in physical activity was defined as engaging in vigorous activity two or more times per week or spending 30 minutes per day in a less vigorous activity ascertained using a previously validated set of questions.[18] Race and ethnicity was based upon a series of interview questions modeled on the 2000 U.S. Census. Ethnicity was subdivided as Hispanic or non-Hispanic based on the question: "Is the participant of Hispanic or Latino origin?" All participants who self-identified as Hispanic/

Latino were categorized as Hispanic. Clinical laboratory measurements were performed at the study's Central Laboratory to ensure uniformity of test methods and procedures for all samples. eGFRs were calculated using the Modification of Diet in Renal Disease equation.[19]

Statistical Analysis

Baseline measurements prior to randomization to the SBP treatment targets were analyzed in this report. Descriptive statistics were computed overall, by Hispanic ethnicity (Hispanics and non-Hispanics) and for Hispanics by geographic location (US mainland and PR). Means and standard errors were obtained for continuous measures, frequencies and percentages for categorical factors. Differences between groups were assessed using two-sample t-tests (with Satterthwaite's adjustment for unequal variances when necessary) for continuous factors, and chi-squared tests for categorical. Blood pressure treatment for all participants and for participants with SBP 160 was assessed using means and standard errors to determine the number of medications used in participants and frequencies; and percentages to assess the number of participants taking each class of antihypertensive medication. Differences between groups were assessed using two sample t-tests (with Satterthwaite's adjustment for unequal variances when necessary) for continuous factors, and chi-squared tests or Fisher's exact tests for categorical variables depending on the adequacy of the sample size. Univariable logistic regression analysis was used to examine sociodemographic, clinical and study measures to determine which variables were independently associated with BP control defined as <140/90 mmHg) in Hispanics at baseline. Variables with a p <0.10 in univariable logistic regression models were selected for our multivariable logistic regression models. Models were fit separately for all Hispanics, Hispanics living in PR, and Hispanics living in US mainland. Statistical significance was assessed at the two-sided 0.05 alpha level; no adjustments for multiple testing were completed. All analyses were performed using SAS® version 9.4 (SAS Institute Inc., Cary, NC).

RESULTS

Baseline and Clinical Characteristics

Of the 9,361 participants enrolled in SPRINT, 11% (n = 984) are Hispanics. Compared to non-Hispanics, Hispanics were younger, more likely to be female, less likely to live alone, more likely to have a lower than high school education but as likely to be employed. Hispanics were more likely to be uninsured or covered by Medicaid. Overall in SPRINT, 9.4% of participants were on no BP medications at baseline; with a significantly lower proportion of Hispanics being untreated compared to non-Hispanics. However, mean SBP was higher among Hispanics compared to non-Hispanics while the average number of prescribed antihypertensive medications was lower. Prevalence of clinical CVD history was similar among Hispanics and non-Hispanics; however, Hispanics had a lower average number of chronic diseases. Hispanics were less likely to engage in physical activity or be a current or past smoker. Among laboratory values, Hispanics had higher total cholesterol, higher LDL, lower HDL and higher triglycerides than non-Hispanics with a considerably higher eGFR and lower creatinine. **Table 1 & 2**

Baseline Study Measures

HRQOL measures and its three subscales VR-12, EQ-5D, and PHQ-9 are shown in **Table 3**. The mean score for the VR-12 was higher among Hispanics. Hispanics had a higher average score on health perception and a higher average score on depressive symptoms, meaning Hispanics had a more favorable perception of health, but experienced more depressive symptoms. Satisfaction with medical care did not differ significantly among Hispanics versus non-Hispanics. Hispanics had similar compliance to their prescribed treatment compared to non-Hispanics. Hispanics scored significantly lower on every cognitive measure assessment compared to non-Hispanics. The largest discrepancy was on the MoCA where Hispanics had a mean score almost 3-points lower than non-Hispanics. The pattern was similar for scores on the Logical Memory test (both immediate and delayed recall) as well as the forward and backward digit span. Across age and education strata, Hispanics scored worse on cognitive measures compared to non-Hispanics; however, the discrepancy in scores was largest among older (age 65+) and less educated (with less than High School educational attainment) Hispanics. *(Data not shown)*

Hispanics from US mainland versus Puerto Rico

Approximately 56% of SPRINT Hispanics were living in PR and enrolled from five clinic sites on the island. Of those classified as Hispanics from the US Mainland: 64 were Puerto Rican, 63 were Cuban, 111 were Mexican, 194 were of Other Hispanic background, and 3 identified as being of mixed Hispanic backgrounds. Of those classified as Hispanic from PR: 517 were Puerto Rican, 10 were Cuban, none were Mexican, and 22 were of Other Hispanic background. Hispanics on the US mainland (compared to those in PR) were more likely to be older; more likely to be male; more likely to have a HS degree or less; less likely to have any kind of a college degree; more likely to be uninsured although just as likely to be employed. Compared to mainland Hispanics, Hispanics in PR had higher SBPs and DBPs along with being less likely to have their BP controlled and having a lower average number of prescribed BP medications. Hispanics living in PR were less likely to have a history of clinical CVD despite higher total cholesterol, higher LDL levels, and higher HDL levels. Serum creatinine was lower and eGFR higher among Hispanics living in PR. Mainland Hispanics had a higher average score on overall better self-reported health status; a higher average score in regards to increased depressive symptoms; lower average cognitive scores on the MoCA and DSC assessments; and worse medication adherence according to the Morisky scale when compared to Hispanics living in PR. **Tables 1-3**

Aggressiveness of treatment patterns in Hispanics in the US mainland vs. Puerto Rico

According to the most recent JNC guidelines, those with Stage 2 Hypertension (SBP 160 mmHg) should be on at least two BP meds. Overall, in SPRINT 43.6% of the participants with an SBP 160 mmHg were on <2 BP medications. This was not statistically different for Hispanics vs. non-Hispanics (50.0% vs. 42.9%; p=0.18) or for those in PR vs. US mainland (47.1% vs. 57.7%; p=0.36). Overall, 82.6% of SPRINT participants were on a thiazide diuretic, ACEI or CCB. This was significantly more among Hispanics vs. non-Hispanics (85.1% vs. 82.3%; p=0.03) but was not different among Hispanics living in PR vs. the US mainland (84.7% vs. 85.5%; p=0.72). With regards to other classes of antihypertensive

agents among those not on a thiazide diuretic, ACEI or CCB as first line, only beta blockers were significantly used more among Hispanics living in PR vs. the US mainland (45.2% vs. 27.0%; p=0.02).

Predictors of Blood Pressure Control at Baseline

Overall, approximately half of all SPRINT participants had controlled BP (<140/90 mmHg) at baseline; this proportion did not vary significantly among Hispanics vs. non-Hispanics but was significantly lower among Hispanics in PR vs. mainland Hispanics. **(Table 2)** As detailed in **Table 4**, in logistic regression models that included only Hispanics, several univariate associations with baseline BP control are identified. In multivariable logistic regression models, better BP control was more likely among those with a history of clinical CVD but less likely among Hispanic participants with higher functional abilities scores. A history of clinical CVD and functional status remained associated with better BP control among Hispanics in PR; however, for Mainland Hispanics, where functional status was the only independent significant predictor of BP control identified. Interestingly, neither medication adherence nor insurance status was associated with BP control among any Hispanics.

DISCUSSION

The purpose of this study was to describe the baseline characteristics of Hispanics in SPRINT, compare the clinical and study measures with those in non-Hispanics, and explore factors associated with poor blood pressure control at study entry. Because of the impact of hypertension, the goal of SPRINT was to enroll a significant percentage of minorities, including Hispanics, as well as women and those 75 years and older. SPRINT successfully enrolled a diverse sample, including 11% ($n = 984$) Hispanics. Although SPRINT did not *a priori* propose a baseline analysis by Hispanic ethnicity, given that Hispanics have been underrepresented in clinical trials in general and in BP trials in particular, it was important to report these results.

SPRINT eligibility criteria were designed to facilitate the inclusion of high risk populations. Our findings suggest that Hispanics did differ substantially in several baseline risk factors compared to non-Hispanics. Hispanics enrolled in SPRINT were younger, more likely to be female, more likely to be living with others, and more likely to be of lower socioeconomic status compared to non-Hispanics. We found that Hispanics recruited into SPRINT were more likely to be uninsured and were on lower numbers of antihypertensive medications at baseline despite having higher SBPs than non-Hispanic participants. Hispanics had a worse lipid profile than non-Hispanics and more likely to be sedentary; despite this, clinical CVD prevalence was similar among Hispanics and non-Hispanics. CKD appears to be less prevalent among Hispanics as they had higher eGFRs and lower serum creatinine compared to non-Hispanics in SPRINT. However, less prevalent CKD was driven by the PR Hispanics, as eGFR was higher in PR vs. mainland Hispanics. Clinic selection issues in PR probably accounted for some of these differences. Characteristics of non-Hispanic blacks in SPRINT have been previously reported.[20] Compared to non-Hispanic blacks, Hispanics in SPRINT

were on less BP medications at enrollment, less likely to be smokers but were as likely to have less than a high school education or be uninsured.

Hispanics are underrepresented in biomedical research, community-based cohorts and clinical trials; however, it appears that Hispanics enrolled in SPRINT, despite being younger, may be a particularly high risk group with higher SBPs, worse lipid profiles and less likely to be BP treated or controlled than non-Hispanics. Hispanics in ALLHAT were also younger, more likely to be female, and of lower SES than non-Hispanics.[21] Given the paucity of hypertension clinical trials which included Hispanics, we turn our attention to prior population based studies. In the Multi-Ethnic Study of Atherosclerosis (MESA), blood pressure was higher among Hispanics when compared to their non-Hispanic white counterparts with Hispanic adults, along with non-Hispanic blacks, having significantly higher prevalence of treated but uncontrolled hypertension compared to non-Hispanic white adults.[22] In the HCHS/SOL, of those with hypertension, 50% were receiving treatment, and only 32% of those treated had their hypertension under control.[11] Results from SPRINT seem consistent with these prior studies. In addition, at baseline in SPRINT, Hispanics (compared to non-Hispanics) were as likely to be satisfied with their medical care and as likely to adhere to prescribed medication; thus these factors were not associated with uncontrolled blood pressures in this group at study entry.

Some data point to a health advantage among Hispanics over non-Hispanic populations.[23] Hispanics, despite an increased burden of heart disease risk factors and greater socioeconomic disadvantage, are less likely to have coronary heart disease and less likely to die from heart disease compared to non-Hispanic whites.[24] This discordance comprises the so-called "Hispanic Paradox".[25, 26] Among SPRINT participants this 'paradox' was not evident as clinical CVD prevalence was similar among Hispanics compared to non-Hispanics. Hence, the notion of the Hispanic paradox may be flawed, perpetuating an inaccurate view of Hispanics as low risk, and not likely to impact on study power in this subgroup. Thus, SPRINT should provide important data on the effects of aggressive blood pressure control on the differences in CVD outcomes by racial and ethnic subgroups.

The Hispanic/Latino population, a growing heterogeneous subgroup, is currently the largest US minority.[27] Although Hispanics have been reported to have rates not significantly different from non-Hispanic whites, most data have been extrapolated from Mexican Americans. The HCHS/SOL recently report that the overall age-adjusted hypertension prevalence rates higher in Dominican, Puerto Rican, and Cuban adults. Mexican Americans had significantly lower prevalence of HTN compared to all other Hispanic subgroups except South Americans.[11] On the US mainland, Puerto Ricans are the second largest Hispanic group following Mexicans. Compared with other US Hispanics, Puerto Ricans overall have lower median household incomes, lower homeownership rates and are more likely to live in poverty.[27] Substantial differences have been reported in the demographic profiles of those born on the mainland versus those born on the island. Mainland-born Puerto Ricans are younger, have higher household incomes, and are more likely to have attended college than their island-born counterparts.[28] In SPRINT we found opposite trends. Hispanics on the US mainland (compared to those in PR) were more likely to be older and male; more likely to have a HS degree or less; less likely to have any kind of a college degree; more likely to be

uninsured. Compared to mainland Hispanics, Hispanics living in PR were less likely to have a history of clinical CVD despite having higher SBPs and DBPs along with being less likely to have their BP controlled and having a lower number of prescribed BP medications than mainland Hispanics. It remains to be seen if SPRINT outcomes will differ between Hispanics residing in the island of PR versus Hispanics on the US Mainland.

Historically, blood pressure control in Hispanics has been considerably less than that of non-Hispanic whites and blacks.[27] In HCHS/SOL only 20% of Hispanics treated, had their blood pressure under control.[29] In SPRINT, SBP was higher in Hispanics when compared to the overall cohort. Other epidemiological data suggest that more than 50% of Hispanics in the US had uncontrolled blood pressure.[1] This finding parallels baseline Hispanics results in SPRINT, with 49% of Hispanics having poor blood pressure control (BP >140/90 mmHg) at study entry. However, Hispanics were no more likely to have uncontrolled BP at study entry than non-Hispanics and the Morisky medication adherence score was similar among Hispanics and non-Hispanics in SPRINT. More likely, the disparity in higher SBPs appears to be related to Hispanics being prescribed less anti-hypertensive medications at baseline compared to non-Hispanics (e.g., provider clinical inertia) possibly due to the lower SES of Hispanics and lack of health insurance. However, the data do show that once properly treated, rates of BP control among Hispanics are among the best. Findings from ALLHAT demonstrate that Hispanic participants had equivalent or superior BP control compared with non-Hispanics in the setting of a clinical trial in which patients with hypertension had equal access to medical care and medication provided at no cost.[21] Thus, we expect that future studies of achieved BP control in SPRINT to be similar among Hispanics but possibly requiring more BP medications in Hispanics living in PR vs. the US mainland. Although not statistically significant, the trend was for more BP aggressive treatment in Hispanics in Puerto Rico signaling that possibly it is not that BP treatment patterns are less aggressive in Puerto Rico vs. the US but that hypertension may be more severe among Hispanics of Puerto Rican/Caribbean descent vs. other Hispanics.

Hispanics enrolled in SPRINT consistently had lower performance on cognitive tests than non-Hispanics. The epidemiology of neurocognitive health among Hispanics is not well known.[30] Age and socioeconomic factors, particularly education, could play a role in explaining some of the neurocognitive differences between Hispanics and non-Hispanics. However, we found that these differences were largely maintained after statistical adjustment for sociodemographic covariates. Differential neurovascular disease burden may be another cause for our observed results (though prevalence of comorbidities, CKD and CVD were actually lower or similar for Hispanics than non-Hispanics). It is commonly believed that Hispanics are at increased risk for dementia compared with non-Hispanic Whites.[31, 32] Although all of the cognitive testing instruments were translated, the translations may be a factor in the differences in scores. Language proficiency may also come into play where English-language tests may be more cognitively demanding for primary-Spanish participants. The relationship between cognitive function and blood pressure is an area of active research, and longitudinal observational studies to date have yielded mixed results.[33] An important objective of SPRINT is to assess the impact of more intensive SBP reduction on the incidence of probable dementia and cognitive function changes; analysis of these data by race should provide important information in Hispanics.

Several potential limitations must be pointed out. The sole purpose of our study is to describe the makeup of the SPRINT subcohort of Hispanics; however our data should be interpreted with caution. SPRINT enrollment was highly selective to meet explicit recruitment goals and not designed as a population-based epidemiology survey. The SPRINT study population is not by any means a random sample of adults with hypertension. Race and ethnicity were determined by self-report. The majority of the Hispanic participants in SPRINT were recruited from clinics located in PR and it is also possible that clinic selection issues and regional variations in physician practice accounted for our results. Furthermore, the SPRINT sample of Hispanics in PR is not meant to be representative of all Hispanics in PR. Finally, Given the SPRINT inclusion criteria, participants at baseline included prehypertensives, untreated hypertensives and treated hypertensives, a diverse group with respect to their BP status which cannot be accounted for in this analysis. Similarly, the eligibility criteria (exclusion of people with untreated BP 180/110 mm Hg or treated BP 160/100 mm Hg) may have affected our results.

Conclusion

Hispanic/Latinos are underrepresented in clinical trials of BP control. SPRINT is one of the largest BP control clinical trials to date inclusive of US Hispanic/Latino adults. Our findings describe significant differences between Hispanic and Non-Hispanic participants in SPRINT that affect baseline BP control. In conclusion, the SPRINT trial has the potential to provide a better understanding of predictors that influence poor BP control as well as understand the effects of lower SBP targets on clinical outcomes in this understudied population.

Acknowledgments

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Table 1

Sociodemographics of SPRINT Participants Stratified by Race-Ethnicity and Region

	Overall (n = 9361)	Hispanics (n = 984)	Non-Hispanics (n = 8377)	P-Value	Hispanics Living in Puerto Rico (n = 549)	Hispanics Living in US Mainland (n = 435)	P-Value
Age	.	.	.	<0.0001	.	.	0.00021
<65	3805 (40.65)	508 (51.63)	3297 (39.36)		294 (53.55)	214 (49.2)	
65-74	2904 (31.02)	298 (30.28)	2606 (31.11)		180 (32.79)	118 (27.13)	
>75	2652 (28.33)	178 (18.09)	2474 (29.53)		75 (13.66)	103 (23.68)	
Gender	.	.	.	<0.0001	.	.	<0.0001
Male	6029 (64.41)	530 (53.86)	5499 (65.64)		251 (45.72)	279 (64.14)	
Female	3332 (35.59)	454 (46.14)	2878 (34.36)		298 (54.28)	156 (35.86)	
Living Status	.	.	.	0.00025	.	.	0.07853
Lives with other(s)	6627 (70.95)	746 (75.97)	5881 (70.36)		428 (78.1)	318 (73.27)	
Lives alone	2714 (29.05)	236 (24.03)	2478 (29.64)		120 (21.9)	116 (26.73)	
Marital Status	.	.	.	0.72208	.	.	0.32639
Married	1613 (54.05)	146 (55.09)	1467 (53.95)		80 (57.97)	66 (51.97)	
Not Married	1371 (45.95)	119 (44.91)	1252 (46.05)		58 (42.03)	61 (48.03)	
Education	.	.	.	<0.0001	.	.	<0.0001
<High School	876 (9.38)	231 (23.52)	645 (7.71)		106 (19.34)	125 (28.8)	
High School	4214 (45.1)	350 (35.64)	3864 (46.21)		170 (31.02)	180 (41.47)	
Associates Degree	619 (6.62)	65 (6.62)	554 (6.63)		45 (8.21)	20 (4.61)	
College Degree	2089 (22.36)	208 (21.18)	1881 (22.49)		136 (24.82)	72 (16.59)	
Graduate Degree	1033 (11.06)	97 (9.88)	936 (11.19)		71 (12.96)	26 (5.99)	
Post-Grad	513 (5.49)	31 (3.16)	482 (5.76)		20 (3.65)	11 (2.53)	
Employment	.	.	.	0.55748	.	.	0.07842
Employed	3213 (34.39)	346 (35.23)	2867 (34.29)		180 (32.85)	166 (38.25)	
Unemployed(includes retirees)	6129 (65.61)	636 (64.77)	5493 (65.71)		368 (67.15)	268 (61.75)	
Health Insurance	.	.	.	0.01698	.	.	<0.0001
Insured	8360 (89.57)	858 (87.37)	7502 (89.83)		514 (93.8)	344 (79.26)	
Uninsured	973 (10.43)	124 (12.63)	849 (10.17)		34 (6.2)	90 (20.74)	
Primary Care Provider	8965 (96.11)	935 (95.21)	8030 (96.21)	0.12538	520 (94.89)	415 (95.62)	0.59379

US mainlaind refers to the 50 states (including Alaska and Hawaii) and the District of Columbia

Table 2

Baseline Clinical Characteristics of SPRINT Participants Stratified by Race-Ethnicity and Region

	Hispanics (n=984)	Non-Hispanics (n=8377)	P-Value for Hispanic Difference Overall	Hispanics Living in Puerto Rico (n=549)	Hispanics Living in US Mainland (n=435)	P-Value for Island vs Mainland Difference Overall
Baseline Blood Pressure	.	.				
SBP, mmHg	140.68± 0.47	139.55± 0.17	0.02397	142.97± 0.6	137.78± 0.72	<0.0001
DBP, mmHg	77.46± 0.36	78.21± 0.13	0.0487	78.31± 0.47	76.38± 0.54	0.00737
BP Controlled	485 (49.39%)	4212 (50.38%)	0.55812	241 (43.98%)	244 (56.22%)	0.00014
Pulse	65.77± 0.34	66.31± 0.13	0.13142	65.72± 0.41	65.84± 0.56	0.8654
# of BP Medications	1.75± 0.03	1.84± 0.01	0.00341	1.69± 0.04	1.83± 0.05	0.02136
Not on Antihypertensive Agents	75 (7.62%)	807 (9.63%)	0.04102	37 (6.74%)	38 (8.74%)	0.24123
Weight, lbs	177.89± 1.14	192.04± 0.46	<0.0001	177.95± 1.55	177.83± 1.69	0.95806
BMI, Kg/m^2	29.54± 0.17	29.89± 0.06	0.04994	29.75± 0.23	29.27± 0.23	0.1483
Physical Activity	397 (40.47%)	3879 (46.56%)	0.0003	219 (39.96%)	178 (41.11%)	0.71674
CVD History	184 (18.7%)	1693 (20.21%)	0.2628	84 (15.3%)	100 (22.99%)	0.00213
Smoking Status	.	.	<0.0001			<0.0001
Current	113 (11.52%)	1127 (13.49%)		60 (10.95%)	53 (12.24%)	
Past	303 (30.89%)	3670 (43.93%)		135 (24.64%)	168 (38.8%)	
# of Chronic Diseases	2.2± 0.05	2.73± 0.02	<0.0001	2.03± 0.06	2.43± 0.08	<0.0001
Baseline Labs	.	.				
Fasting Glucose (mg/dL)	98.42± 0.38	98.86± 0.15	0.27988	98.3± 0.46	98.57± 0.63	0.7282
Cholesterol, total (mg/dL)	193.85± 1.29	189.68± 0.45	0.00269	198.2± 1.7	188.33± 1.94	0.00014
Cholesterol, LDL (mg/dL)	114.55± 1.11	112.14± 0.39	0.04266	118.24± 1.48	109.88± 1.66	0.00019
Cholesterol, HDL (mg/dL)	50.63± 0.42	53.13± 0.16	<0.0001	51.66± 0.58	49.33± 0.61	0.00596
T riglycerides (mg/dL)	145.1± 2.69	123.69± 1	<0.0001	141.77± 3.12	149.33± 4.66	0.17718
Potassium (mmol/L)	4.2± 0.01	4.21± 0	0.40844	4.17± 0.02	4.23± 0.02	0.01933
Sodium(mmol/L)	140.29± 0.07	140.12± 0.03	0.02758	140.51± 0.09	140± 0.11	0.00049
eGFR (ml/min/1.73^2)	77.59± 0.71	71.07± 0.22	<0.0001	81.59± 0.86	72.47± 1.15	<0.0001
Creatinine (mg/dL)	0.96± 0.01	1.09± 0	<0.0001	0.88± 0.01	1.06± 0.02	<0.0001

N(%) or Mean ± SE

**Physical Active is defined as participants with 2 or more times of vigorous activity per week or 30 or more minutes of less vigorous activity per week

*** Controlled Blood Pressure is defined as SBP<140 and DBP<90

Table 3

Means and Standard Deviations of Study Baseline Measures

	Hispanics (n = 984)	Non-Hispanics (n = 8377)	P-Value for Hispanic Difference Overall	Hispanics in Puerto Rico (n = 549)	US Mainland Hispanics (n = 435)	P-Value for Island vs Mainland Difference Overall
Health Related Quality of Life	.	.		.	.	
General Health Status	2.81±0.89	2.63±0.84	<0.0001	2.68±0.84	2.97±0.92	<0.0001
EQ-5D (Health Utility)	0.82±0.15	0.84±0.15	<0.0001	0.82±0.14	0.81±0.17	0.07981
Patient Health Questionnaire-9	3.6±4.42	3.01±4.13	<0.0001	3.21±3.86	4.08±4.99	0.00287
Depressive Symptoms	0.09±0.29	0.08±0.27	0.09402	0.06±0.23	0.14±0.34	<0.0001
Patient Satisfaction	1.64±0.82	1.67±0.82	0.19073	1.64±0.84	1.63±0.81	0.85651
Dementia Screening	.	.		.	.	
Logical Memory I (0-28)	16.71±5.3	19.42±4.79	<0.0001	16.95±5.3	16.39±5.3	0.10838
Logical Memory II (0-14)	7.29±3.52	8.26±3.33	<0.0001	7.46±3.5	7.05±3.54	0.07353
Montreal Cognitive Assessment	20.93±4.89	23.12±3.94	<0.0001	21.25±4.84	20.51±4.92	0.02049
Digital Symbol Coding: Forward	7.91±2.39	9.68±2.41	<0.0001	8.07±2.39	7.78±2.39	0.36598
Digital Symbol Coding: Backward	6.53±2.32	7.41±2.24	<0.0001	6.94±2.58	6.22±2.05	0.0229
Functional Assessment (FAQ)	2.65±4.14	1.39±3.09	<0.0001	2.88±4.06	2.35±4.23	0.18834
Morisky Medication Adherence	6.91±1.35	6.96±1.27	0.24306	7±1.32	6.79±1.37	0.02094

Table 4

Logistic Regression of Factors Associated with Achieved Blood Pressure Control (<140/90 mmHg) at Baseline Among Hispanic SPRINT Participants

	Hispanics		Hispanics in Puerto Rico		US Mainland Hispanics	
	Univariate Analysis	Multivariate Analysis (n = 432)	Univariate Analysis	Multivariate Analysis (n = 248)	Univariate Analysis	Multivariate Analysis (n = 185)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Social Demographics	.		.		.	
Age: 65-74 (vs. <65)	0.87 (0.65, 1.16)	0.84 (0.51, 1.38)	0.83 (0.57, 1.21)		0.96 (0.61, 1.52)	1.13 (0.52, 2.43)
Age: >75 (vs. <65)	0.59 (0.42, 0.84)	0.75 (0.43, 1.31)	0.57 (0.33, 0.97)		0.52 (0.32, 0.84)	0.74 (0.35, 1.54)
Male (vs. Female)	1.47 (1.14, 1.89)	1.39 (0.91, 2.13)	1.46 (1.04, 2.05)	1.03 (0.55, 1.9)	1.23 (0.83, 1.83)	
Lives with others (vs. lives alone)	1.24 (0.92, 1.66)		1.23 (0.82, 1.86)		1.34 (0.88, 2.06)	
<High School (vs. High School Graduate or Higher)	0.78 (0.58, 1.05)	1.09 (0.66, 1.79)	0.69 (0.45, 1.07)	1.07 (0.57, 1.98)	0.75 (0.5, 1.14)	
Employed (vs. Not Employed)	1.43 (1.1, 1.86)	1.17 (0.69, 1.97)	1.49 (1.04, 2.13)	1.79 (0.89, 3.61)	1.3 (0.88, 1.93)	
Has Health Insuranceed (vs. No Health Insurance)	0.81 (0.55, 1.18)		0.99 (0.49, 2)		0.92 (0.58, 1.48)	
Primary Care Provider (vs. No Primary Care Provider)	1.11 (0.62, 2)		1.7 (0.76, 3.83)		0.58 (0.22, 1.55)	
CVD History (vs. No CVD History)	1.48 (1.07, 2.05)	1.81 (1.11, 2.97)	1.72 (1.08, 2.76)	3.81 (1.9, 7.9)	1.16 (0.74, 1.82)	
Smoker (vs. Non-Smoker)	1.12 (0.87, 1.44)		0.98 (0.69, 1.39)		1.12 (0.76, 1.63)	
Participate in Physical Activity (vs. No Physical Activity)	1.21 (0.94, 1.56)		1.19 (0.84, 1.68)		1.22 (0.83, 1.8)	
Clinical Measures	.		.		.	
# of Chronic Diseases (unit increase)	1.01 (0.93, 1.1)		1.05 (0.94, 1.18)		0.93 (0.83, 1.05)	
# of BP Medications<3 (vs. >=3)	0.77 (0.57, 1.04)	0.66 (0.42, 1.05)	0.74 (0.48, 1.13)		0.87 (0.57, 1.35)	
Weight: BMI<25 (vs. BMI>=25)	0.66 (0.47, 0.94)	0.62 (0.36, 1.06)	0.63 (0.39, 1.02)	0.56 (0.26, 1.14)	0.69 (0.41, 1.16)	
eGFR (20mL/min/1.73m^2[1SD])	1 (0.99, 1)	1 (0.99, 1)	1 (0.99, 1.01)		1 (0.99, 1.01)	
Study Measures	.		.		.	
General Health Status	0.92 (0.8, 1.06)		0.83 (0.67, 1.01)	1.06 (0.77, 1.48)	0.93 (0.75, 1.14)	
EQ-5D (Health Utility)	0.78 (0.34, 1.79)		0.94 (0.28, 3.18)		0.79 (0.25, 2.49)	
Patient Health Questionnaire-9	1.01 (0.98, 1.04)		1.01 (0.97, 1.05)		1 (0.96, 1.04)	
Patient Satisfaction	0.86 (0.74, 1.01)	0.97 (0.74, 1.26)	0.88 (0.72, 1.08)		0.85 (0.67, 1.07)	
Dementia Screening	.		.		.	

	Hispanics		Hispanics in Puerto Rico		US Mainland Hispanics	
	Univariate Analysis	Multivariate Analysis (n = 432)	Univariate Analysis	Multivariate Analysis (n = 248)	Univariate Analysis	Multivariate Analysis (n = 185)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Logical Memory I (0-28)	1.02 (1, 1.05)	0.99 (0.94, 1.04)	1.01 (0.98, 1.04)		1.05 (1.01, 1.09)	1.01 (0.92, 1.1)
Logical Memory II (0-14)	1.02 (0.99, 1.06)		1 (0.96, 1.05)		1.06 (1, 1.12)	1.03 (0.91, 1.17)
Montreal Cognitive Assessment	1.02 (1, 1.05)	1 (0.93, 1.08)	1.02 (0.98, 1.05)		1.04 (1, 1.08)	1 (0.9, 1.11)
Digital Symbol Coding	1 (0.99, 1)		1 (0.99, 1)		1.01 (1, 1.02)	
Functional Assessment (FAQ)	0.9 (0.86, 0.95)	0.9 (0.84, 0.95)	0.91 (0.85, 0.98)	0.92 (0.84, 0.99)	0.9 (0.83, 0.98)	0.91 (0.83, 0.98)
Morisky Medication Adherence	1.02 (0.93, 1.12)		1.06 (0.93, 1.22)		1.01 (0.87, 1.17)	