
Health Status and Practices of Urban Caribbean Latinos with Diabetes Mellitus

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Although Caribbean Latinos are more likely than non-Hispanic whites to develop diabetes, their health status has been poorly characterized. Information on diabetes management, metabolic control, dietary habits, and diabetes knowledge was gathered from a group of urban Caribbean Latinos with diabetes in order to characterize the nutritional behaviors, diabetes attitudes, health perceptions, and metabolic control of this high risk group. Interviews and medical record reviews were conducted among seventy low-income urban Caribbean Latinos with type 2 diabetes mellitus. Patients attending outpatient clinics were interviewed by bilingual interviewers. Medical records were reviewed to ascertain prevalence of diabetes-related complications, medications, and metabolic parameters. Participants were primarily Spanish-speaking and of Puerto Rican origin. Eighty-one percent were unemployed, and only 27% had completed high school or higher educational levels. Average hemoglobin A_{1c} was 10.6%. Among those with hypertension and hyperlipidemia, many were not receiving treatment. Participants' estimation of their own degree of metabolic control was poor, as was their understanding of desirable blood glucose and weight goals. A second evening meal was common. Diets were higher in fat and sugar content than currently recommended. More effective treatment strategies for both patients and providers are needed to improve glycemic control and cardiovascular risk factors among indigent urban Caribbean Latinos. Essential features of such strategies for patient programs include culturally appropriate dietary counseling and low literacy materials to better communicate glycemic and weight goals and dietary guidelines. Provider education is needed regarding established guidelines and cultural influences on diabetes-related practices. (*Ethnicity Dis.* 1998;8:158-166)

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People of Latino origin have a 3- to 5-fold higher prevalence of type 2 diabetes than non-Hispanic whites and develop the disease at an earlier age.¹ Factors that may contribute to increased type 2 diabetes

prevalence among Latinos include decreased rates of leisure time physical activity,² increased obesity prevalence,³ and more tolerant cultural attitudes toward obesity.⁴ Dietary factors may also be significant, as Latino diets have been found to be higher in saturated fat, cholesterol, and carbohydrate than those of non-Hispanic whites.⁵ Finally, genetic heritage may be a factor. Among Mexican Americans, a higher Native-American genetic admixture may contribute to increased rates of type 2 diabetes,⁶ while among those of Puerto Rican or Dominican origin, African ancestry may confer increased risk, as African Americans

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have an increased prevalence of type 2 diabetes as well.⁷

Despite these findings, few culturally sensitive programs for Latinos targeting type 2 diabetes risk reduction or treatment have been designed or evaluated. Latinos are currently the largest minority population in Massachusetts. The majority of these are Latinos of Caribbean descent (predominantly from Puerto Rico and the Dominican Republic). In a prior publication, we presented the findings of focus group interviews among urban Latinos with diabetes mellitus who were from Puerto Rico and the Dominican Republic.⁸ The focus groups were conducted to obtain information that would be useful in planning culturally sensitive interventions for members of this population group. Consistent themes described by participants were feelings of social isolation, little understanding of the long-term consequences of diabetes, fatalism regarding the course of the disease, multiple barriers to diet and exercise, skepticism regarding the value of preventive health behaviors, and prevalent use of traditional non-medical remedies. Based on these previous results we hypothesized that Caribbean Latinos with type 2 diabetes mellitus would have sub-optimal diabetes knowledge and diet behaviors.

Here, we present the results of survey interviews and medical record reviews among focus group participants and additional Caribbean Latinos with diabetes mellitus. Our goal was to characterize the nutritional behaviors, diabetes attitudes, and health perceptions and to obtain metabolic information on this high-risk group.

Methods

A questionnaire was adapted from the Hispanic Health and Nutrition Education Survey (HHANES)¹ and the previously described Diabetes Knowledge Scale.⁹ Our instrument was modified extensively during pilot testing to better address the specific cultural characteristics of Caribbean Lat-

nos.¹⁰ For example, Caribbean Latino foods were incorporated into questions on the knowledge scale that targeted the individuals' understanding of diabetic dietary exchanges. Knowledge was assessed by asking participants to either agree or disagree with a series of 16 statements regarding basic concepts pertaining to diabetes, diabetes care, and guidelines for the diabetic diet. Knowledge scores were reported as percent of questions correctly answered. To characterize the frequency of consumption of selected foods with particular reference to Caribbean Latino food items, we developed our own brief, qualitative dietary questionnaire. As there is no validated food frequency instrument for assessing dietary intake of Hispanics, the development of this instrument was guided by our prior focus group research.⁸ Published information on food selection and dietary practices characteristic of Latino populations was also used.¹¹⁻¹³

Participants were recruited from among patients receiving care at Boston City Hospital, the South End Community Health Center in Boston, or the Windsor St. Neighborhood Health Center in Cambridge. Adults with diabetes mellitus who were >20 years of age and whose origins were either first or second generation Puerto Rican or Dominican were invited to participate. Providers and nutritionists at the health centers encouraged participation.

The questionnaire was pre-tested in English among bilingual Latinos with diabetes, also translated into Spanish and then back-translated. The questionnaire was administered in an interview format in either Spanish or English (based on patient preference) in order to eliminate potential language or literacy barriers. To reduce bias, non-medical personnel with fluency in Spanish administered the questionnaires. On average, interviews were completed in 25-30 minutes, while patients were waiting for clinic visits.

Medical records were reviewed to collect

information on the prevalence of diabetes-related complications, current use of medications, documented contact with a dietitian or an ophthalmologist, and the most recent metabolic and physiologic parameters recorded, such as weight, blood pressure, glucose level, lipid profile, hemoglobin A_{1c}, and creatinine. Past history of diabetes-associated illness, such as coronary, peripheral, or cerebrovascular disease, hypertension, retinopathy, neuropathy, amputation, nephropathy, or hyperlipidemia was also noted. Medical records were located for 64 of the 70 participants interviewed. The protocol was approved by the Human Studies Committees of the Trustees of Health and Hospitals for the City of Boston and of The Cambridge Hospital.

Results

Demographic description

The demographic characteristics of the 70 survey interview respondents are outlined in Table 1. Participants were predominantly female (62%), middle-aged (median 55 years), and Spanish-speaking (92%). Most (81%) were of Puerto Rican origin. Educational and income levels were low in this group of urban Caribbean Latinos. While 20% lived alone, most (80%) lived in a household of 2 or more persons, with 56% living with at least two other persons. Only 7% of participants had worked at a paying job within the last two weeks; the majority (69%) considered themselves disabled.

Current diabetes management

Fifty-nine percent of participants were currently taking insulin; most (63%) were taking 35 units per day or less. Forty-six percent were currently taking oral hypoglycemic agents. Among these, 5% of participants were using both insulin and oral agents simultaneously. While 89% reported performing self-monitoring of blood glucose levels, only 13% were monitoring on a daily basis.

Table 1.—Demographics of Caribbean latinos with diabetes mellitus

	n = 70
Number interviewed	
Males	38%
Females	62%
Median age (range)	55
Language spoken most often at home	
is Spanish	92%
Puerto Rican origin	81%
Completed high school or higher	27%
Currently living with spouse	46%
Worked for pay within past 2 weeks	7%
Currently looking for work	12%
Unemployed because they consider themselves disabled	69%
Currently taking oral hypoglycemic agents	46%
Currently taking insulin (percent of all subjects)	59%
Taking ≤ 35 units per day (percent of those taking insulin)	63%
Taking 36-74 units per day (percent of those taking insulin)	23%
Taking ≥ 75 units per day (percent of those taking insulin)	14%
Performing any self blood glucose monitoring	89%
Performed self blood glucose monitoring daily	13%

Diabetes complications and metabolic status

The metabolic and physiologic data obtained from medical record reviews are summarized in Table 2. Among participants for whom heights were recorded (N=35), mean body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) was 24.4 kg/m² for males, and 26.5 kg/m² for females. Group mean BMI values were not in the overweight or moderate obesity range in either gender (defined in HHANES as 27.8–31.1 for men and 27.3–32.2 for women).¹⁴ However, 40% of the women were overweight, as compared to reported HHANES prevalence for U.S. women.¹¹ Sixteen percent of the women had a BMI in the severe overweight range of 32.2 or higher. Among men, 13% were overweight, as compared to previous HHANES estimates of 25% for U.S. Puerto Rican men.

Mean systolic blood pressure was 134 ± 23 mm Hg, with a range of 98–210, and

Table 2.—Metabolic status of urban Caribbean latinos with diabetes mellitus

Measurement	N	Mean + SD	Range	Comment
Body mass index [BMI] (kg/m ²)	35	Men 24.4 ± 3.0	20.0-31.7	<ul style="list-style-type: none"> • 13% of men had BMI ≥ 27.8 (overweight) • 40% of women had BMI ≥ 27.3 (overweight) • 16% of women had BMI ≥ 32.2 (severe overweight)
		Women 26.5 ± 4.6	19.7-35.9	
Systolic blood pressure [BP] (mm Hg)	64	134 ± 23	98-210	<ul style="list-style-type: none"> • 44% had systolic BP > 130
Diastolic BP (mmHg)	64	82 ± 11	60-110	<ul style="list-style-type: none"> • 64% met criteria for hypertension but only 33% were taking anti-hypertensive drugs. • 33% had diastolic BP > 85
Laboratory Test	N	Mean ± SD	Range	Comment
Serum glucose (mmol/L)	64	12.5 ± 6.3	2.5-45.3	<ul style="list-style-type: none"> • See Figure 1 for distribution
Hemoglobin A _{1c} (%)	31	10.6 ± 3.3	5.1-20.8	<ul style="list-style-type: none"> • Only 48% of subjects had HgbA_{1c} in chart • 55% had value > 10%, indicating poor control (see Figure 2 for distribution)
Total cholesterol (mmol/L)	62	5.5 ± 1.2	3.0-9.1	<ul style="list-style-type: none"> • 58% had cholesterol value > 5.2 mmol/L • 36% recorded diagnosis of hyperlipidemia while 5% currently on lipid-lowering drug
HDL cholesterol (mmol/L)	15	1.2 ± 0.3	0.5-2.3	<ul style="list-style-type: none"> • Only 23% of subjects had value in chart
Triglycerides (mmol/L)	47	2.3 ± 1.2	0.5-7.2	<ul style="list-style-type: none"> • 45% had triglyceride value > 2.3
BUN (mmol/L)	63	10.1 ± 2.9	3.6-19.3	
Creatinine (μmol/L)	63	86.6 ± 22.7	35.4-68.0	

mean diastolic blood pressure was 82 ± 11 mm Hg. Systolic BP exceeded the current American Diabetes Association recommendation of 130 mm Hg in 44% of participants, and diastolic was higher than the recommended value of 85 in 33% of participants. Although 64% of participants had a diagnosis of hypertension recorded, current use of antihypertensive drugs was noted in only 33% of participants.

The frequency distribution of the most recent serum glucose values was wide, as is shown in Figure 1. Mean glucose was 12.5 ± 6.3 mmol/L, with a range of 2.5–45.3 mmol/L. Fifty six percent of glucoses were over 11.1 mmol/L. Hemoglobin A_{1c} levels were recorded in only 31 of 64 participants (48%). The mean level was $10.6 \pm 3.3\%$, with a range of 5.1–20.8%. The

frequency distribution of hemoglobin A_{1c} levels is shown in Figure 2. Fifty-five percent of hemoglobin A_{1c} values were greater than 10%, a level generally defined as indicating poor glycemic control.

Cholesterol was above 5.2 mmol/L in 58% of participants, and the mean value for the entire group was 5.5 ± 1.2 mmol/L. The mean triglyceride level was 2.3 ± 1.2 mmol/L, and 45% of the values were above 2.3 mmol/L. HDL levels were recorded in only 15 participants, with a mean value of 1.2 ± 0.5 mmol/L. Despite evidence of substantial levels of hyperlipidemia among participants, only 36% had a recorded diagnosis of hyperlipidemia, and only 5% were noted to be currently receiving lipid-lowering agents. However, 77% of participants had been seen by a registered dietitian for

Distribution of Serum Glucoses

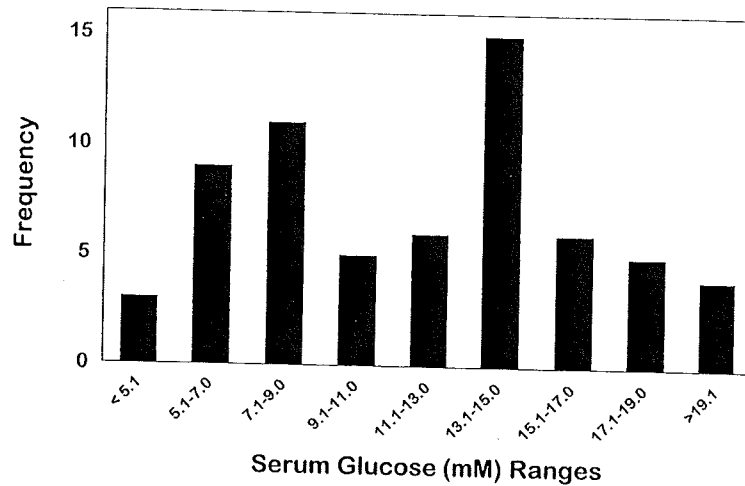


Fig 1.—Distribution of serum glucose values. The most recent glucose concentrations were abstracted from medical records of Caribbean Latinos with diabetes mellitus.

nutrition education. The mean creatinine value was in the normal range at $86.6 \pm 22.7 \mu\text{mol/L}$.

In terms of diabetes complications, 17% had a recorded diagnosis of diabetic retinopathy. There was an ophthalmology visit recorded in 77% of subject records. Fourteen percent of participants had a recorded diagnosis of diabetic neuropathy, and 3% of participants had a recorded diagnosis of diabetic nephropathy.

Diabetes knowledge

Selected results for the 70 participants interviewed are summarized in Table 3. Participants' perceptions regarding their own glycemic control were found to compare poorly with blood glucose levels found in their medical records. Blood glucose levels were described as "about right" in 17% of participants; yet this group had a mean recorded glucose level of 11.6 mmol/L. Lev-

Distribution of Hemoglobin A1C

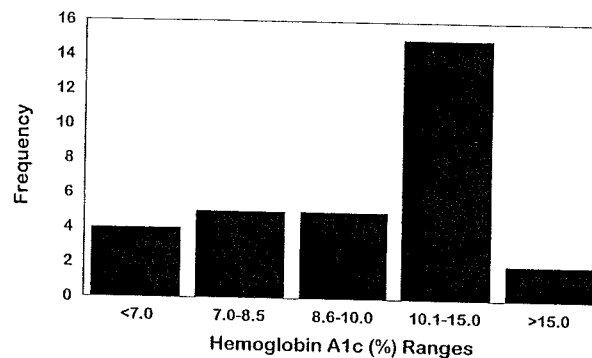


Fig 2.—Distribution of hemoglobin A_{1c} values. The most recent hemoglobin A_{1c} concentrations were abstracted from the 31 medical records of Caribbean Latinos with diabetes mellitus.

Table 3.—Comparison between respondents' perception of their diabetes control and their mean glucose and Hgb_{A1c}

Self Perceived Degree of Control	Percent (n = 70)	Mean Glucose in Medical Record (mmol/L) (n = 60)	Mean Hgb _{A1c} (%) (n = 31)
Up and down	43%	14.2	11.6
Don't know	6%	12.3	14.4
About right	17%	11.6	9.1
High	24%	11.2	10.8
Low	5%	4.5	6.4

els were described as "high" by 24% of participants, for whom the mean recorded level was 11.2 mmol/L. Most participants (43%) thought their blood glucoses were "up and down"; the mean recorded glucose value for this group was 14.2 mmol/L. As well, participants' self-described glycemic control compared poorly to glycemic control as assessed by the most recently recorded hemoglobin A_{1c} level.

Despite participants' inaccurate assessments of their own glycemic control, they appeared to have fairly high levels of knowledge of general diabetes principles. Most respondents (87%) agreed that a high blood sugar would be associated with feeling tired and thirsty, and the same percentage agreed that a low blood sugar would be associated with feeling shaky and sweaty. Most (67%) also agreed that too much insulin could cause a low blood sugar reaction, and 87% agreed that one should eat something sweet in the event of such a reaction. Vision changes were successfully associated with diabetes by 94% of participants. Most participants were also aware that complications would develop if one did not take care of diabetes (93%), and that complications from diabetes are preventable (91%). Over 80% of participants answered at least 9 of 16 (56%) diabetes knowledge questions correctly, as compared to reported average score among persons with diabetes of 51%.⁹

Deficiencies in knowledge were apparent when participants were asked to interpret various blood glucose levels. While these questions were presented to subjects using mg/dl units, they are reported in this text as the corresponding international units. While 61% disagreed that a "normal" sugar range was 14.9–17.2 mmol/L, 39% either agreed or did not know whether this was normal. About one-third thought it was better to have a stable but high blood sugar (32%) rather than a blood sugar that was variable but near normal (37%), while 30% did not know which was better. Also, most participants were unclear about what to do if sick and unable to eat, with 30% agreeing to take the usual dose of insulin, 27% disagreeing, and 43% not knowing what to do.

Body image

A series of questions was asked about body weight and self-perception of body size. Respondents were asked to rate their own weights as either "too much," "just right," or "too little." Among men, 44% thought they weighed "too much"; this group had a mean weight of 86.4 kg. Those 48% who thought they weighed "just right" had a mean body weight of 78.1 kg, and those that thought they weighed "too little" had a mean body weight of 72.5 kg. Among women, 54% thought they weighed "too much", with a mean body weight of 86.1 kg. Forty-four percent thought they weighed "just right" with a mean weight of 71.2 kg, and those who thought they weighed "too little" had a mean weight of 64.1 kg.

Nutrition knowledge and dietary behaviors

While most participants (93%) knew that they should be on a modified diet, the type of diet was less understood and the level of compliance was low. For example, only 84% reported that they were told to adopt a diabetic diet. Slightly more than one-third (37%) reported usual compliance with their prescribed diet, whereas, almost two-thirds

(62%) reported following their diet only sometimes or less often. Friends and peers were the most commonly reported sources of nutrition information for 97% of participants. Other sources included nutritionists (71%), physicians (49%), books (20%), and family members (17%).

The frequency and composition of meals appeared to be unique to the Latino culture. It was common for participants to have a second evening meal; almost half (46.5%) reported eating four meals per day. Most did not eat out or take-out commercially prepared foods often, with 81% stating that they rarely or never ate food that was not cooked in the home. Traditional Latino foods were most frequently consumed at lunch and dinner meals by 49% and 81% of the population, respectively.

The food frequency data provided a qualitative description of important food sources of key nutrients in the diets of Latinos. In general, respondents consumed more daily servings of foods with high fat and/or high carbohydrate content than is currently recommended by American Diabetes Association guidelines. No appreciable gender differences were noted in frequency of consumption of high fat foods, red meat, sweets, or alcohol.

Commonly reported dietary sources of protein were chicken, eggs, beef, pork, deli meats and sausages, cheese and milk. These foods are also potentially important sources of fat and saturated fat, depending on how they are prepared and whether they are full-fat or low-fat varieties. Oil was used extensively in food preparation. More than 80% of respondents reported using oils more than twice daily. Other commonly added fats were mayonnaise, salad dressing, and butter or margarine. Rice and beans were dietary staples for Caribbean Latinos. Nearly 80% of respondents ate beans and more than 90% ate rice at least once each day. Other major contributors of complex carbohydrates were peas, platanos, viandas, verduras, canned vegetables, vegetable sal-

ads, and fruits. Commonly consumed sources of concentrated sweets were fruit juice and soda. Desserts, other sweets and alcoholic beverages were rarely consumed by respondents on a daily basis.

Discussion

This group of Latinos with type 2 diabetes was characterized by low income and educational levels, Caribbean origin, and urban location; most were unemployed. Thus, findings cannot be extrapolated to all Latinos living in the United States, but may be useful for providers working with similarly characterized groups. Features of the group elucidated by the current study include a similar prevalence of overweight among women (40% vs 37%) and a lower prevalence among men (13% vs 25%) than previously reported HHANES estimates for Puerto Ricans living in the mainland United States.¹¹ However, in the current study, BMI data was available on only a limited number of participants and may not reflect the true group average. Attitudes regarding body weight also appeared to be similar to those found among other Hispanic groups, with many who appeared to be overweight perceiving themselves as normal weight or too thin.

Information obtained on glycemic control indicated suboptimal parameters, with recorded glucoses well above recommended levels and hemoglobin A_{1c} values in a range suggestive of poor control. Since hemoglobin A_{1c} levels were found in only 48% of charts reviewed, the average for the entire group may differ. However, glucose levels showed a similar extent of poor control. Low use of home blood glucose monitoring may be one factor that contributed to poor glycemic control. Factors that could explain the low prevalence of home monitoring might include lack of provider initiation of the practice, lack of economic access to monitoring supplies, or lack of patient compliance with home monitoring once instituted. Whether these explanations

apply to this group cannot be ascertained from these data. Another possible contribution to poor glycemic control may be lack of emphasis by health care providers. Incomplete testing of hemoglobin A_{1c} levels indicates lack of concordance with current American Diabetes Association (ADA) guidelines for quarterly measurement. Whether the observed poor glycemic control was a result of suboptimal medical management or lack of patient compliance with treatment or follow-up could not be ascertained from these data.

In terms of status of diabetes-related conditions, a substantial proportion of participants had blood pressures above the recommended goals for type 2 diabetes patients. This may have been in part due to lack of appropriate medical follow-up in those with recorded diagnoses of hypertension, as only one-third with such a diagnosis were currently taking antihypertensive medication. Similarly, only 14% of those with a recorded diagnosis of hyperlipidemia were receiving pharmacologic therapy for hyperlipidemia. The prevalence of diabetic retinopathy and neuropathy appeared to be similar in this group to previously reported prevalence rates among persons with type 2 diabetes,¹⁵⁻¹⁷ although under-recording of such diseases may have been an issue in our sample. Compliance with ADA guidelines for yearly ophthalmologic evaluation was 77%, which appeared to be similar to previous surveys of community physician compliance with yearly Ophthalmology referral.¹⁸

Diabetes knowledge levels compared favorably to surveys among other patient groups. One major deficiency in knowledge, however, was the low levels of understanding regarding what would constitute a normal blood glucose; this may have been due partly to the infrequent usage of home blood glucose monitoring.

Some of the dietary behaviors reported by Caribbean Latinos in this study were in accordance with the Dietary Guidelines^{19,20}

whereas others warrant further attention. While daily inclusion of fruits and vegetables was widespread, the overall dietary pattern appeared to be built upon a base of carbohydrate rich foods. In addition, fats and oils were used multiple times daily in contrast to recommendations for less frequent use.²⁰ Insights into culturally specific dietary behaviors will be useful in guiding target behaviors in need of modification and encourage and support those that are desired.

In conclusion, this group of urban Caribbean Latinos was characterized by reduced surveillance for diabetes control and complications, suboptimal treatment of hypertension and lipid disorders, overweight status, poor compliance with dietary recommendations, and limited usage of home blood glucose monitoring. These findings strongly suggest the need for both patient and provider education.

New programming is needed for patients that includes culturally appropriate treatment strategies that address educational and literacy levels, language barriers, and economic barriers, and incorporate an understanding of culturally specific dietary behaviors and health beliefs. The importance of and rationale for weight control, diabetes surveillance, and compliance with medical follow-up also need to be emphasized in this population.

Health care professionals may need to modify their practice behaviors with this population. Education of health care providers regarding health beliefs and behaviors of urban Caribbean Latinos, as well as the economic, environmental, and cultural barriers to care, found in this group, may be one effective strategy to facilitate change. In addition, primary care providers may need educational reinforcement concerning basic information on ADA guidelines for the management of type 2 diabetes. In particular, the use of hemoglobin A_{1c} and home blood glucose monitoring, the need for regular surveillance for diabetes

complications, aggressive management of hypertension and hyperlipidemia, and ongoing nutrition intervention to achieve weight reduction appear to be areas that need further focus and review in order to maximize secondary prevention of diabetes-related complications.

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