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Tés, Licuados, and Cápsulas: Herbal Self-Care Remedies of Latino/Hispanic Immigrants for Type 2 Diabetes

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Abstract

Purpose—The purpose of this cross-sectional, descriptive study was to explore the characteristics of herbal remedy use for diabetes among Latinos/Hispanics with type 2 diabetes.

Methods—A convenience sample of 75 Latino/Hispanic adults with type 2 diabetes was recruited from community-based settings in North Carolina. Data were collected through face-to-face bilingual interviews. Measures included a demographic questionnaire, the Traditional, Complementary, and Alternative Practices Questionnaire, and biophysical indicators of A1C and body mass index.

Results—Sixty-nine percent of the sample reported using herbal remedies for diabetes self-care. Forty-nine herbal products were identified. The most commonly reported products were prickly pear cactus, aloe vera, celery, and chayote. The perceived effectiveness of products varied; some said they helped “a lot” while others noted the development of side effects. Over three quarters (77%) of persons using herbal remedies reported concurrent use with prescribed medications. Also, some participants reported skipping or altering the dose of diabetes medications when using herbal remedies. Most (77%) reported not disclosing herbal remedy use to healthcare providers.

Conclusions—Diabetes educators and other healthcare providers need to ask Latino/Hispanic clients about their use of herbal remedies and become knowledgeable about herbal products to provide advice about safety.

Keywords

herbal remedies; diabetes; Latinos; Hispanics; CAM; self-care

The use of herbal remedies by Latinos/Hispanics for diabetes self-care has been identified in several studies.^{1–6} In fact, Latinos/Hispanics have been reported to consume more herbs than other ethnic groups^{1,7} and to use herbal products that are unfamiliar to most American healthcare providers.^{1,8,9} Herbal remedies are considered to be botanical, natural products that are nonvitamin or nonmineral in content and may consist of a single herb/plant or a mixture of multiple herbs/plants.¹⁰ Latinos/Hispanics report using herbal remedies because they are “natural,” culturally congruent, familiar, accessible, and affordable.^{4,7,11,12} Some qualitative studies suggest that many Latinos/Hispanics believe that herbal remedies are an

effective diabetes treatment and can even cure diabetes.^{4,5} At the same time, a lack of awareness of possible synergistic or negative interactions between herbs and between herbs and medications, or between herbs and underlying health conditions has been documented among Latinos/Hispanics.^{13–15} This lack of knowledge places individuals at risk for herb-herb interactions, drug-herb interactions, overmedication, exposure to contaminants, allergic reactions, toxicities, and exacerbation of underlying health conditions.^{16–18}

Literature on the use of herbal remedies by Latinos/Hispanics indicates that they consume many different types of herbs/plants for health concerns and these natural products are ingested in multiple forms, including tablets, capsules, teas, *licuados* (smoothie-like mixture of natural products), *aguas frescas* (cold drinks usually made with one herb), and herbs/plants eaten raw or cooked as food.^{2,4} The use of several culturally-based, premixed commercial teas for the treatment of diabetes has been reported by Latinos/Hispanics, including Te Diabetil, Diabe Cure, Diabetina, Te Malabar, and Starbien.^{8,11,15} Little is known, however, about the dose or frequency of herbal remedies, or whether Latinos/Hispanics alter the dose of prescribed diabetes medications to accommodate herbal treatments. Poss et al.⁴ found that Mexican Americans with type 2 diabetes relied on their own judgment to titrate doses of herbs as part of their diabetes self-care, even when they did not understand the pharmacokinetics and pharmacodynamics of the herbs they ingested.

There is little knowledge of the diabetes-related symptoms Latinos/Hispanics treat with herbs or the perceived effectiveness of these traditional modalities. Data on the development of adverse events due to herb ingestion by Latinos/Hispanics are also lacking. Further, prior research suggests that Latinos/Hispanics do not disclose the use of these traditional modalities to their healthcare providers, nor do healthcare providers routinely ask about or monitor the use of herbal remedies.^{2,8,12} Many authors have raised concerns that healthcare professionals do not have sufficient knowledge to provide advice about safe use of herbal remedies.^{8,9,19}

Given the high prevalence of type 2 diabetes among Latinos/Hispanics²⁰ and their high rates of diabetes-related complications²¹ and hospitalization for uncontrolled diabetes,²² research is clearly needed to obtain a better understanding of how Latinos/Hispanics use herbal remedies for the management of type 2 diabetes. Therefore the purpose of this cross-sectional, descriptive study was to explore the use of herbal remedies for diabetes self-care among a sample of Latinos/Hispanics with type 2 diabetes living in the southeastern United States. Specifically, the study assessed: (1) the characteristics of herbal remedy use for diabetes self-care; (2) the perceived effectiveness of herbal remedies and the development of side effects; and (3) Latinos/Hispanics' attitudes towards herbal remedies for diabetes self-care.

Methods

Design, Sample, and Setting

The data reported here were collected as part of a larger study of self-care practices of Latinos/Hispanics for the management of type 2 diabetes. Convenience sampling was used to recruit Latino/Hispanic men and women (N = 75) in rural and urban areas of central and

western North Carolina. Inclusion criteria were (1) self-identification as either Latino or Hispanic, (2) self-reported history of type 2 diabetes for at least 12 months, (3) age 18 years or older, and (4) ability to speak either Spanish or English. Participants were recruited by the first author, who speaks Spanish as a second language, and by two trained, native Spanish speaking, bicultural and bilingual lay research assistants.

Participants were recruited from community clinics, Latino/Hispanic churches of various denominations, an English-as-a-Second Language class, a migrant farmworker neighborhood, Latino/Hispanic markets, and a Latino/Hispanic health fair. The community clinics provided healthcare to uninsured, low-income individuals and use a sliding scale for payment. These settings were chosen as recruitment sites because the majority of Latinos/Hispanics in North Carolina (61.1%) lack health insurance²³ and more than 25% of Latinos/Hispanics in the state live in poverty.²⁴ Multiple methods of recruitment were used, including posting culturally and linguistically appropriate flyers in these community-based settings, making bilingual announcements in churches, and speaking with Latino/Hispanic adults in community clinic waiting rooms and at cultural community events. The study was approved by appropriate administrators in the community based settings and the Institutional Review Board of the University.

Study Measures

A 32-item author-developed demographic questionnaire was used to capture information on age, gender, medical history pertaining to type 2 diabetes, Latino/Hispanic subgroup status, nativity, length of residence in the United States, spoken language, education, income, marital status, and health insurance. Response options included multiple choice sets or short answers. Participants also completed the Traditional, Complementary, and Alternative Practices Questionnaire developed by the first author. This 31-item measure assesses the use of herbal remedies, faith-based interventions, traditional healers, and self-medication/self-prescription for diabetes self-care. The measure was developed based on the scientific literature, clinical knowledge, and the 2007 National Health Interview Survey Adult Alternative Health/Complementary and Alternative Medicine Questionnaire.²⁵ This questionnaire includes both open-ended and multiple choice questions inquiring about herbal remedy practices for diabetes self-care, use of prescribed diabetes medications when consuming herbal remedies, and disclosure of herbal remedy use to healthcare providers. To assess Latinos/Hispanics' attitudes towards herbal remedies for diabetes, respondents were asked whether they trust herbs/plants, prescription diabetes medications, or a combination of the two most for the treatment of diabetes and which type they believe is safer to use. The demographic questionnaire and the Traditional, Complementary, and Alternative Practices Questionnaire were translated into Spanish and back translated into English by two bicultural native Spanish speakers and the back translations were then compared to the original English versions to ensure semantic accuracy. All study documents and measures were available in both Spanish and English.

Height was measured without shoes in centimeters with a portable stadiometer, and weight was measured in kilograms using a Tanita BWB-800A Class III Digital Professional Body Weight Scale. Body mass index (BMI) was calculated using the standard formula of weight

in kilograms divided by height in meters squared.²⁶ Weight was then characterized based upon the standard BMI categories of normal weight (BMI 18.5 to 24.9 kg/m²), overweight (25 to 29.9 kg/m²), and obese (≥ 30 kg/m²).²⁶ The Bayer A1CNow+® point of care machine was used to determine A1C level from a finger stick blood sample. The accuracy of the Bayer A1CNow+® point of care machine is reported to be comparable to that of clinical diagnostic laboratories, and it has received National Glycohemoglobin Standardization Program certification.^{27,28} The maximum A1C result with the Bayer A1CNow+® point of care machine is 13.0%. In this study, all A1C results greater than 13.0% were truncated in the statistical database as 13.10%.

Data Collection and Analysis

All data were collected in face-to-face interviews with the first author or a lay research assistant. The interviews were conducted in Spanish or English in a private area of a community-based site or in the participant's home, based upon the preferences of participants. Since many Latino/Hispanic immigrants in North Carolina have reported low educational levels, consent forms and all measures were read to participants to increase data validity and to prevent embarrassment about low literacy.²⁹ A list of hypoglycemic agents and insulin names was available for participants to review to promote accuracy of medication recall. All interviews were completed within one hour. At the end of the interview, participants were given a copy of their biophysical indicator results, diabetes educational materials in either Spanish or English from the National Diabetes Education Program,^{30,31} and a \$20 gift card to a local store in appreciation of their time. Data were entered into SPSS version 18.0 (SPSS Inc., an IBM® Company, Chicago, IL). Descriptive statistics were used to describe categorical variables. Responses to open-ended questions were evaluated using basic content analysis and counts.³²

Results

Characteristics of Participants

Of the 75 participants recruited for the study, most (66.7%) were female and the mean age was 47 years ($SD = 11.34$). The majority (69.3%) were married or lived with a committed partner and identified as Catholic (64%) or other Christian (28%). All participants were immigrants; the great majority was born in Mexico (85.3%), while others originated from various Central American or Caribbean countries. They had lived on average nearly 16 years ($SD = 7.22$) in the United States and 12 years ($SD = 4.35$) in North Carolina. Spanish (72%) was the predominant language spoken at home; however, some participants reported speaking a mixture of English and Spanish (21.3%; $n = 16$), while others reported speaking a mixture of Mixtec or Tarasco at home and Spanish (6.7%; $n = 5$). Most (64%) persons rated their ability to speak English as "very poor," and one out of three persons rated their ability to write in Spanish as "poor" or "very poor." Most of the participants were uninsured (86.7%) and 48% reported a family household annual income less than \$20,000. The mean number of years of education of participants was 6.08 ($SD = 3.82$).

Fifty-two percent ($n = 39$) of the sample had been diagnosed with type 2 diabetes between ages 18 and 39 years, and nearly 23% ($n = 17$) had been diagnosed between ages 40 and 50

years. The average number of years participants reported having diabetes was 7.59 ($SD = 5.40$). A majority of participants (68%) reported taking oral hypoglycemic agents for diabetes, and 26.7% reported taking insulin. One-fifth of the sample described taking a combination of oral hypoglycemic agents and insulin. Other prescribed medications taken by participants included statins (52%), angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers (40%), other antihypertensive medications (22.7%), aspirin (17.3%), omega-3 fish oil (8%), antidepressants (5.3%), and fibrates (4%).

Nearly 70% of participants ($n = 51$) had A1C results greater than 7% (see Table 1). An overwhelming majority (90%) of the sample were classified as either overweight or obese by calculated BMI.

Use of Herbal Remedies

Fifty-two participants (69.3%) reported currently using herbal remedies for the management of diabetes (see Table 2). Respondents identified 49 herbal remedies and described using from one to nine different remedies simultaneously. These herbal remedies consisted of a variety of vegetable food products, herbs, teas, and commercially packaged products, some not available in the United States. Prickly pear cactus leaves (*nopale*), aloe vera (*salvia* or *sábila*), celery (*apio*), vegetable pear (*chayote*), cinnamon (*canela*), cat's claw (*uña de gato*), Herbalife, beets (*betabel* or *la remolacha*), bitter melon (*cundeamor* or *yerba mora*), *Nin* (English translation and ingredients unknown; participants stated that it was a blend of Mexican herbs), horsetail (*la cola de caballo*), oats (*aveno*), chamomile tea (*té manzanilla*), and lemon (*limón*) were the most frequently reported natural products used.

Various methods of herbal remedy preparation were described by participants. A *licuado*, was the most common preparation reported. Participants described making *licuados* with 20 different herbal products and mixing the herb/plant with juice, milk, fruit, or other vegetables. A tea was the second most common preparation, used in 19 herbal remedies. Participants also described cooking herbal remedies as food ($n = 13$), or consuming them fresh ($n = 3$), or mixing them into an *agua fresca* ($n = 4$). Four herbal products were consumed in a pill or capsule formula, and two were purchased as a premixed beverage. Arnica was reportedly used as a topical agent for diabetic ulcers or cuts.

Participants described using individualized dosing and frequency schedules, with no standardization for specific herbs/plants. The majority of herbal remedies ($n = 33$) were used daily, including prickly pear cactus (*nopale*), aloe vera (*salvia* or *sábila*), celery (*apio*), vegetable pear (*chayote*), cinnamon (*canela*), Herbalife, horsetail (*la cola de caballo*), coconotle cactus, and canary seeds (*alpiste*). Other herbal remedies ($n = 20$), including bitter melon (*cundeamor* or *yerba mora*), brickellia grandiflora (*la prodigiosa*), chamomile tea (*té manzanilla*), lemon/lemon root (*limón* and *raíz de limón*), and Blood Sugar Formula, were consumed weekly. A set of six herbal remedies were consumed monthly, and eight products only on an as needed basis of two to four times per year.

Participants described a variety of reasons for using herbal remedies for the management of diabetes (see Table 3). The most common reasons reported by the majority of participants for most herbal remedies were “lower sugar,” “for diabetes,” “for triglycerides or

cholesterol,” “to feel better,” and “for my kidneys.” Less commonly reported reasons for using herbal treatments for diabetes included “normal and traditional treatment in our country,” “for blood pressure,” “for relaxing,” “when I feel sick from diabetes,” and “for ulcers or cuts.” Despite efforts of the first author and research assistants to probe for more specific reasons, such as specific diabetes-related signs and symptoms or effects on daily life, participants only described the purpose of herbal remedies in a general manner. No respondent reported using herbal remedies due to the cost of prescribed diabetes medications or lack of health insurance.

Herbal remedies were obtained in a variety of ways. Most were purchased either from a local Latino/Hispanic market (*tienda*; $n = 23$) or local grocery store ($n = 19$). Sixteen of the participants who reported using herbal remedies described acquiring them ($n = 13$) from their home country. Other sources included health food stores, personal gardens, purchases over the internet or from a consultant, and a friend living in another state who sent the product in the mail.

The question “How much does this product help you?” was asked to assess the self-perceived effectiveness of herbal remedies for diabetes. Thirty herbal remedies were rated by 52 participants as helping “a lot,” and 21 products were noted as helping “a little” by 45 participants. Fourteen herbal remedies were rated by 19 people as “no change/did not help” and 2 persons reported feeling “worse,” one after using prickly pear cactus and another with cat’s claw. Participants did not describe specifically how these natural products helped their diabetes, even with probing questions about which symptoms improved. The herbs/plants most frequently rated as helping “a lot” were prickly pear cactus (*nopale*), aloe vera (*salvia* or *sábila*), celery (*apio*), vegetable pear (*chayote*), cinnamon (*canela*) and beets (*betabel* or *la remolacha*). Herbs/plants rated as “no change/did not help” included eggplant (*berenjena*), prickly pear cactus (*nopale*), Herbalife, aloe vera (*salvia* or *sábila*), and canary seeds (*alpiste*).

Respondents also described experiencing side effects from using herbal remedies. Bitterness ($n = 6$) was the most common side effect associated with the use of lemon, husk tomatoes, bitter gourd/melon, and *cuacia*. Other side effects included diarrhea ($n = 2$) from using canary seeds and Herbalife, muscle cramps from Noni ($n = 1$), blood glucose meter verified hypoglycemia from chia seeds ($n = 1$), stomach ache from Blood Sugar Formula ($n = 1$), and back/kidney pain from Herbalife ($n = 1$).

Two questions assessed the attitudes of all participants regarding the use of herbal remedies for the treatment of diabetes: “Which do you trust more for the treatment of diabetes?” and “Which do you think is safer to use?” Forty-five percent of the sample (34/75) reported trusting more a combination of herbal remedies and prescription diabetes medications for the treatment of diabetes, while 38.7% (29/75) trusted prescription diabetes medications alone and 5.3% (4/75) herbal remedies alone. The majority (52%; 39/75) of the sample considered prescription diabetes medications safer than a combination of herbal remedies and prescription diabetes medications (29.3%; 22/75) or herbal remedies alone (11%; 8/75).

Participants who reported taking herbal remedies for diabetes were asked about alterations in the dose of their prescribed diabetes medications on the days when they used herbal remedies. Forty participants out of 52 reported taking their prescribed diabetes medications as directed on the days they consumed herbal remedies; however, seven participants reported skipping the dose of prescribed diabetes medications and four others reported decreasing the dose of medications on days when they consumed herbal remedies (see Table 4). Further, 77% of participants using herbal remedies (40/52) said they had not disclosed the use of these remedies to their healthcare providers.

Discussion

This study explored the characteristics of herbal remedy use for diabetes self-care among Latinos/Hispanics. Those who chose to participate in the study were similar to Latino/Hispanic participants in other studies of diabetes and the use of alternative therapies.^{2–5,8,15} That is, they were primarily from Mexico, female, similar in mean age, and with limited English proficiency and low rates of health insurance and financial resources. A significant proportion of the participants had an A1C result greater than 7% and was overweight or obese. Despite having lived on average 16 years in the United States and 12 years in North Carolina, this sample of Latino/Hispanic immigrants used numerous culturally based herbal remedies for diabetes self-care. The participants described obtaining these products primarily from settings in their Latino/Hispanic communities in North Carolina. Some of the herbal remedies described, such as prickly pear cactus (*nopale*), aloe vera (*salvia* or *sábila*), and bitter melon/melon (*cundeamor* or *yerba mora*), have been reported in prior studies conducted with Latinos/Hispanics living in Mexico, Texas, and other southwestern areas of the United States.^{2,4,33} However, respondents described using a variety of herbs/plants not previously reported. These natural remedies included arnica, asparagus, Blood Sugar Formula, canary seeds, celery, chia seeds, cinchona bark, coconoxtle cactus, cranberry, *cuacia*, eggplant, *El Milagro de la Selva*, flax seeds, *fruta de zopilote*, green bell peppers, hibiscus tea, *horchata*, husk tomatoes, lemon root tea, *nin*, stevia rebaudina, and tamarind. In fact, the direct English translations and herbal compositions of several of these remedies are unknown.

Consistent with the findings of Poss et al.⁴ and Johnson et al.,² this sample of Latinos/Hispanics described consuming herbal remedies in various preparations, including *licuados*, teas, *aguas frescas*, fresh or cooked food, and pills/capsules. Several of these herbal remedies, such as *nopales* (leaves and fruit), *chayote*, and celery are also commonly eaten as a vegetable or side dish. However, participants clearly described using these natural products as a diabetes treatment and not as part of their diet. Participants reported using anywhere from one to nine herbal products simultaneously on a daily, weekly, monthly, or as needed basis. The frequency of herbal remedy use has not been previously reported. The individualized dosing schedules indicate a lack of standardization of products, which is similar to findings reported by Poss et al.⁴

Understanding how Latinos/Hispanics consume, prepare, and mix herbal remedies, along with the quantity used, is important since this consumption may affect the bioavailability and effects of phytochemicals found in these herbs/plants. For example, recent research with

prickly pear cactus, a widely used natural product for diabetes among persons of Mexican origin, has revealed that the hypoglycemic effects of this plant may be different when consumed raw or broiled.^{17,34} Further, current investigations of the mechanism of action of saponins, the bioactive phytochemicals found in bitter melon, indicate that the hypoglycemic effects may be influenced by the concentrations of saponin compounds and their ability to stimulate insulin secretion.³⁵

The reasons participants gave for using herbal remedies for diabetes self-care were only general in nature. Even with probing questions, respondents did not describe using herbal remedies for specific hyperglycemic or hypoglycemic signs or symptoms. Possibly, this vagueness indicates a lack of personal recognition of diabetes-related signs and symptoms or that Latinos/Hispanics may not attribute certain symptoms to diabetes or consider them to be important. Additionally, this may indicate that Latinos/Hispanics conceptualize diabetes differently than American healthcare providers and perceive diabetes-related signs and symptoms from a nonwestern, nonmedical paradigm. For example, Garcia,³⁶ in a sample of Mexican Americans in Texas, found that participants perceived only fatigue and blurred vision as important symptoms of diabetes and ignored all other symptoms. In another study, Lopez¹¹ found that Mexican Americans perceived their diabetes to be controlled as long as they were able to maintain their daily roles, not the medically recognized diabetes-related signs and symptoms. A better understanding of how Latinos/Hispanics conceptualize and self-treat diabetes is needed as this information may affect how diabetes educators and other healthcare providers present diabetes self-management information to clients as well as treatment options.

The perceived effectiveness of herbal remedies for diabetes and the development of side effects among Latinos/Hispanics was explored in this study. Participants perceived most herbal remedies as either helping their diabetes “a lot” or “a little.” However, it is not clear on what basis or change in personal condition that participants rated the self-perceived effectiveness of each product. Several persons described experiencing adverse reactions or side effects from herbal products, but it is unclear what participants meant by “back/kidney pain,” or the development of “muscle cramps” and “stomach ache,” or feeling “worse” with herbal remedies. Only one participant reported assessing her symptoms with a blood glucose meter to verify that she was experiencing hypoglycemia after the consumption of chia seeds. This participant explained that she decreased the “dose” of chia seeds based upon her blood glucose meter readings. Her experience of hypoglycemia with chia seeds is similar to the case study of a Mexican man who developed a hypoglycemic reaction to the combination of prickly pear cactus (*nopale*), glipizide, and metformin.³⁴ However, it is not clear if the side effects or adverse reactions in this current sample were related to herb-herb or herb-drug interactions or the effects of herbs on underlying health conditions of participants.

Latinos/Hispanics’ attitudes towards herbal remedies for diabetes in relation to prescribed diabetes medications were assessed. More participants reported trusting the combination of herbal remedies and prescribed diabetes medications than those who reported trusting prescribed diabetes medications alone. Only a few participants reported trusting herbal remedies alone for diabetes self-care. The high levels of trust in combination therapy reported among this sample may explain the high level of herbal remedy use. Additionally,

this “trust” may explain why most participants reported taking prescribed diabetes medications on the days when they used herbal remedies. Over 50% of participants rated prescription diabetes medications alone as safer than other remedies, but nearly a third of the sample rated the combination of herbal remedies and prescribed diabetes medications as safer. It is unclear whether participants’ trust or perceptions of safety affect their decision to continue, skip, or decrease the dose of diabetes prescribed medications on the days when they consumed herbal remedies.

The majority of participants who used herbal remedies reported not telling their healthcare provider about this diabetes self-care modality. The lack of disclosure of herbal remedy use found among this sample is similar to that found among a sample of Hispanic and American Indian participants in a study in the southwestern United States.¹² Being unaware of herbal remedy use may contribute to misdiagnosing client symptoms and the development of herb-herb interaction, herb-drug interactions, and toxicities.

Several limitations of this study need to be considered when interpreting the results. This was a small convenience sample recruited in central and western North Carolina. Further, selection bias may have existed since the persons who consented to participate may have been more interested in discussing herbal remedies than those who declined to participate. Validity and reliability testing of the author-developed Traditional, Complementary, and Alternative Practices Questionnaire is currently lacking. Finally, since this was a cross-sectional study, causality cannot be established.

Implications

Despite its limitations, this study has important implications for healthcare provider education, clinical practice, and research. Diabetes educators and other healthcare providers must be knowledgeable about the herbal remedies used by Latinos/Hispanics for the management of type 2 diabetes. This will require education in the area of complementary and alternative modalities as well as increased cultural competence and communication skills. The National Institutes of Health National Center for Complementary and Alternative Medicine (<http://nccam.nih.gov/>) is an excellent resource of reliable information for health professionals. Client-provider dynamics that promote mutual respect and discussion and disclosure of culturally based herbal remedies have the potential to positively affect the health of Latinos/Hispanics with type 2 diabetes.³⁷

Increased knowledge of the potential for herb-herb and herb-drug interactions and toxicities may assist healthcare providers to inquire about the use of herbal remedies, better evaluate client complaints and symptoms, and prescribe safe treatments that are both culturally and medically based. With knowledge of the mechanism of actions of phytochemicals and cultural competence, healthcare providers can negotiate the cessation of unsafe herbal practices and support practices that promote health and prevent illness. Additionally, this information can be used to tailor diabetes education programs for this population.

Further research is needed to strengthen our knowledge of herbal remedies used for diabetes management among Latinos/Hispanics. Studies are needed to identify the chemical

structures of herbal remedies, the pharmacokinetics and pharmacodynamics of phytochemicals, dosing, efficacy, and toxicity characteristics. Investigations exploring how Latinos/Hispanics prepare, dose, and ingest herbal remedies may provide a foundation for diabetes educational programs and clinical practice. Additionally, healthcare providers should not assume that Latinos/Hispanics experience living with diabetes according to medically defined signs and symptoms. Consideration should be given that this population may conceptualize their experience of diabetes from a nonwestern, nonmedical paradigm and may present and talk about their condition differently. Qualitative research exploring why Latinos/Hispanics use specific herbal remedies for diabetes and what symptoms or events they are intended to affect may provide insight to improve outcomes for this growing population.

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Table 1

Biophysical Indicators (N = 75)

Variable	n (%)	Mean (SD)	Range
A1C level (%)		8.37 (2.18)	5.40–13.10 ^a
5.4% to 6.4%	17 (22.7%)		
6.5% to 7.0%	7 (9.3%)		
7.1% to 7.5%	7 (9.3%)		
7.6% to 8.0%	6 (8.0%)		
8.1% to 8.5%	8 (10.7%)		
8.6% to 9.0%	9 (12.0%)		
9.1% to 10.0%	6 (8.0%)		
10.1% to 11.0%	3 (4.0%)		
11.1% to 12.0%	4 (5.3%)		
12.1% to 13.0%	4 (5.3%)		
> 13.0%	4 (5.3%)		
Body mass index		32.21 (5.91)	20.94–54.58
Body mass index categories			
Normal weight (18.5 – 24.9 kg/m ²)	7 (9.3%)		
Overweight (25.0 – 29.9 kg/m ²)	20 (26.7%)		
Obese (> 30.0 kg/m ²)	48 (62.0%)		

Note. Percentages may not equal 100% due to rounding and missing values.

^a 4 participants had results > 13.0, the maximum range of the Bayer A1CNow+® machine. These results were entered as 13.10 in the data base and the sample mean is thus an underestimation of A1C.

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Table 2

Alphabetical List of Herbal Remedies and Characteristics of Use

Common English Name	Common Spanish Name	Number of People Who Used Herb/Plant	Frequency of Use	Preparation	Self-Perceived Effectiveness	Where/How Obtained	Reported Side Effects
Aloe vera	Salvia or sábila	8	Daily (62.5%) Weekly (37.5%)	Licuado (50%) Agua fresca (25%) Tea (12.5%) Premixed beverage (12.5%)	A lot (50%) A little (37.5%) No change (12.5%)	Tienda (50%) Health food store (12.5%) Internet (12.5%) Consultant (12.5%) Grow it (12.5%)	None (100%)
Amica	Amica	1	PRN * (100%)	Topical (100%)	A lot (100%)	Home country (100%)	None (100%)
Artichoke extract	Extracto de alcachofa	2	Daily (100%)	Tablet/capsule (50%) Other (50%)	A lot (100%)	Grocery store (50%) Home country (50%)	None (100%)
Asparagus	Esparrago	1	Daily (100%)	Cooked (100%)	A lot (100%)	Grocery store (100%)	None (100%)
Beets	Betabel or la remolacha	4	Daily (50%) Weekly (50%)	Licuado (75%) Cooked (25%)	A lot (75%) No change (25%)	Tienda (50%) Grocery store (50%)	None (100%)
Bitter gourd/melon	Cundeamor or yerba mora	3	Daily (33.33%) Weekly (66.66%)	Licuado (33.33%) Cooked (66.66%)	A lot (100%)	Grocery store (33.33%) Home country (33.33%) Grow it (33.33%)	Bitterness (100%)
Blood Sugar Formula capsules (mixture of 21 different herbs & vitamins)	Blood Sugar Formula capsules	1	Weekly (100%)	Tablet/capsule (100%)	A lot (100%)	Health food store (100%)	Stomachache (100%)
Brickellia grandiflora	La Prodigiosa	2	Weekly (100%)	Tea (100%)	A little (100%)	Tienda (50%) Home country (50%)	None (100%)
Canary seeds	Alpiste	2	Daily (100%)	Licuado (100%)	A little (50%) No change (50%)	Tienda (50%) Mailed from CA (50%)	Diarrhea (50%) None (50%)
Cat's claw	Uña de gato	4	Daily (50%) Monthly (50%)	Licuado (25%) Tea (75%)	A little (25%) No change (25%) Worse (25%) Don't know (25%)	Tienda (100%)	None (100%)
Celery	Apio	7	Daily (42.86%) Weekly (57.14%)	Licuado (85.71%) Cooked (14.29%)	A lot (28.57%) A little (71.43%)	Tienda (28.57%) Grocery store (71.43%)	None (100%)
Chamomile tea	Te manzanilla	3	Weekly (33%) Monthly (66%)	Tea (100%)	A little (100%)	Tienda (100%)	None (100%)
Chia seeds	Salvia Hispania	1	Weekly (100%)	Cooked (100%)	A lot (100%)	Health food store	Low sugar verified with glucometer (100%)
Cinchona bark	La quina	1	Daily (100%)	Tea (100%)	A little (100%)	Tienda (100%)	None (100%)
Cinnamon	Canela	5	Daily (80%) Weekly (20%)	Tablet/capsule (40%) Licuado (20%) Tea (40%)	A lot (60%) A little (20%) No change (20%)	Tienda (40%) Grocery store (60%)	None (100%)
Coconoxtle cactus	Coconoxtle or Joconoxtle	2	Daily (100%)	Licuado (100%)	A lot (100%)	Tienda (100%)	None (100%)

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Common English Name	Common Spanish Name	Number of People Who Used Herb/Plant	Frequency of Use	Preparation	Self-Perceived Effectiveness	Where/How Obtained	Reported Side Effects
Corn silk tea	Barba de elote	1	Weekly (100%)	Tea (100%)	A lot (100%)	Tienda (100%)	None (100%)
Cranberry	Arándano	1	Daily (100%)	Licuado (100%)	A lot (100%)	Grocery store (100%)	None (100%)
Diabetisan (Blend of extracts of Pasuchasca and Cat's claw)	Diabetisan	1	Weekly (100%)	Tea (100%)	A lot (100%)	Tienda (100%)	None (100%)
Eggplant	Berenjena	1	Daily (100%)	Licuado (100%)	No change (100%)	Grocery store (100%)	None (100%)
Fenugreek	Fenugreco	1	Daily (100%)	Tablet/capsule (100%)	A lot (100%)	Health food store (100%)	None (100%)
Flax seed	Semillas de lino	1	Weekly (100%)	Cooked (100%)	A lot (100%)	Grocery store (100%)	None (100%)
Grapefruit	Toronja	1	Daily (100%)	Raw (100%)	A lot (100%)	Grocery store (100%)	None (100%)
Green bell pepper	Pimiento verde	1	Weekly (100%)	Cooked (100%)	A little (100%)	Grocery store (100%)	None (100%)
Green tea	Te verde	1	Monthly (100%)	Tea (100%)	A little (100%)	Tienda (100%)	None (100%)
Herbalife	Herbalife	4	Daily (75%) PRN* (25%)	Licuado (25%)Tea (75%)	A lot (25%) A little (50%) No change (25%)	Consultant (100%)	Diarrhea (25%) Back/kidney pain (25%) None (50%)
Hibiscus tea	Agua de Jamaica	1	Monthly (100%)	Agua fresca (100%)	A little (100%)	Tienda (100%)	None (100%)
Horchata beverage (mixture of milk, rice, cinnamon)	Horchata	1	Weekly (100%)	Cooked (100%)	A little (100%)	Grocery store (100%)	None (100%)
Horsetail	La cola de caballo	3	Daily (66.66%) PRN* (33.33%)	Tea (100%)	A lot (100%)	Tienda (33.33%) Home country (66.66%)	None (100%)
Husk tomato	Tomatillo verde	2	Daily (50%) Weekly (50%)	Licuado (50%) Tea (50%)	A little (100%)	Tienda (100%)	Bitterness (50%) None (50%)
Jungle Miracle (blend of herbs from Guatemala)	El Milagro de la Selva	1	§	Tea (100%)	A lot (100%)	Home country (100%)	None (100%)
Lemon	Limón	3	Daily (66.66%) Weekly (33.33%)	Licuado (33.33%) Agua fresca (66.66%)	A little (100%)	Tienda (66.66%) Grocery store (33.33%)	Bitterness (33.33%) None (66.66%)
Lemon root (roots of the lemon tree)	Raíz de limón	2	Daily (50%) Weekly (50%)	Tea (50%) Cooked (50%)	A little (50%) No change (50%)	Home country (50%) Grow it (50%)	None (100%)
Mint	Yerba buena	1	Daily (100%)	Tea (100%)	A lot (100%)	Home country (100%)	None (100%)
Noni	Noni	2	Daily (50%) PRN* (50%)	Agua fresca (50%) Premixed beverage (50%)	A lot (50%) Don't know (50%)	Tienda (50%) Grocery store (50%)	Cramps (50%) None (50%)
Oats (oatmeal)	Aveno	3	Daily (66.66%) Weekly (33.33%)	Licuado (66.66%) Cooked (33.33%)	A lot (33.33%) A little (66.66%)	Grocery store (100%)	None (100%)
Onion mixed with honey and lemon	Cebolla con la miel y limón	1	Daily (100%)	Licuado (100%)	No change (100%)	Grocery store (100%)	None (100%)
Oregano	Orégano	1	PRN* (100%)	Tea (100%)	A lot (100%)	Home country (100%)	None (100%)
Parsley	Perejil	1	Daily (100%)	Licuado (100%)	A little (100%)	Grocery store (100%)	None (100%)

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Common English Name	Common Spanish Name	Number of People Who Used Herb/Plant	Frequency of Use	Preparation	Self-Perceived Effectiveness	Where/How Obtained	Reported Side Effects
Prickly pear cactus Leaves	Nopale, Nopales, Noplina, Nopalito	28	Daily (32.14%) Weekly (53.57%) Monthly (3.57%) PRN * (10.71%)	Licuado (57.14%) Cooked (39.29%) Raw (3.57%)	A lot (35.71%) A little (35.71%) No change (3.57%) Worse (3.57%) don't know (7.14%)	Tienda (86.84%) Grocery store (10.71%)	None (100%)
Fruit	Tuna	2	Daily (50%) Monthly (50%)	Raw (100%)	A lot (50%) No change (50%)	Tienda (100%)	None (100%)
Stevia rebaudina	Stevia	1	Weekly (100%)	Other ** (100%)	A lot (100%)	Grocery store (100%)	None (100%)
Tamarind	Tamarindo	1	Daily (100%)	Licuado (100%)	No change (100%)	Tienda (100%)	None (100%)
Vegetable pear	Chayote or patastillo	6	Daily (33%) Weekly (33%) PRN * (33%)	Licuado (16.67%) Cooked (83.33%)	A lot (33.33%) A little (50%) No change (16.66%)	Tienda (83.33%) Home country (16.67%)	Diarrhea (16.67%) None (83.33%)
?	Cuacia	1	Daily (100%)	Cooked (100%)	A little (100%)	Home country (100%)	Bitterness (100%)
?	El mulato or palo mulato	1	Daily (100%)	Tea (100%)	No change (100%)	Home country (100%)	None (100%)
?	Fruta de zopilote (seeds from a grass that grows during the dry season in Mexico)	1	Daily (100%)	Tea (100%)	A little (100%)	Home country (100%)	None (100%)
?	Nin	3	Daily (33.33%) PRN * (66.66%)	Licuado (33.33%) Tea (66.66%)	A lot (66.66%) Don't know (33.33%)	Tienda (33.33%) Home country (66.66%)	None (100%)

* PRN = 2–4 times per year as needed

? Exact English translation not available

** Sweetener from a plant source

§ Information is missing

Table 3

Reasons for using herbal remedies for the management of diabetes

“Lower sugar” or “For diabetes”	
• Aloe vera	• Flax seed
• Artichoke	• Fruta de zopilote
• Beets	• Green bell pepper
• Bitter gourd/melon	• Herbalife
• Blood Sugar Formula	• Hibiscus tea
• Brickellia grandiflora	• Horsetail
• Canary seeds	• Husk tomato
• Cat’s claw	• Jungle Miracle
• Celery	• Lemon
• Chamomile tea	• Lemon root
• Chayote	• Mint
• Cinchona bark	• Nin
• Cinnamon	• Noni
• Coxonoxtle	• Oats
• Cuacia	• Onion mixture
• Diabetisan	• Parsley
• El mulato or palo mulato	• Prickly pear cactus (leaves & fruit)
• Fenugreek	• Tamarind
“For my kidneys”	
• Asparagus	
• Cranberry	
• Horchata	
• Horsetail	
“For triglycerides or cholesterol”	
• Celery	
• Corn silks	
• Eggplant	
• Prickly pear cactus	
• Oats	
“To feel better”	
• Chamomile tea	
• Green tea	
• Lemon	
• Prickly pear cactus	
“For relaxing”	
• Chamomile tea	
“When I feel sick from diabetes”	

- Prickly pear cactus

“For blood”

- Beets

“For blood pressure”

- Grapefruit

“For stomach problems”

- Oregano

“Normal and traditional treatment in our country”

- Lemon root
- Bitter gourd/melon

“Lose weight”

- Herbalife

“Source of omega 3”

- Chia seeds

“Sweetener from a plant source”

- Stevia rebaudina

“For ulcers or cuts”

- Arnica
-

Table 4

Alterations in Dosing of Prescribed Diabetes Medications When Using Herbal Remedies

Herbal Remedies and Alterations in Prescribed Medications	n (%)
Herbal Remedies (n=52)	
Take prescribed medications as directed that day	40 (76.92%)
Skip the dose of prescribed medications that day	7 (13.46%)
Decrease the dose of prescribed medications that day	4 (7.69%)
Increase the dose of prescribed medications that day	0

Note. Percentages may not equal 100% due to rounding and missing values.