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FACTORS ASSOCIATED WITH POOR GLYCEMIC CONTROL IN OLDER MEXICAN AMERICAN DIABETICS AGED 75 YEARS AND OLDER

Max E. Otiniano, MD, PhD[1], **Soham Al Snih, MD, PhD**[2,3], **James S. Goodwin, MD**[3], **Laura Ray, MPA**[4], **Majd Al Ghatrif, MD**[5], and **Kyriakos S. Markides, PhD**[4]

[1]Department of Family and Community Medicine, University of Texas Health Science Center at San Antonio

[2]Division of Rehabilitation Sciences/School of Health Professions, University of Texas Medical Branch

[3]Sealy Center on Aging, University of Texas Medical Branch

[4]Department of Preventive Medicine and Community Health, University of Texas Medical Branch

[5]Clinical Research Branch, National Institute on Aging

Abstract

Objective—This study examines the prevalence and correlates of poor glycemic control in Mexican Americans aged 75 years and older with diabetes.

Methods—Data are from the 5th wave (2004–05) of the Hispanic Established Population for the Epidemiological Study of the Elderly (H-EPESE). A total of 2,069 Mexican Americans aged 75 and over were interviewed. Six hundred eighty nine subjects (33.5%) reported having been diagnosed with diabetes and 209 (30.3%) subjects agreed to a blood test of their HbA_1c level.

Results—Of the 209 diabetic subjects with an HbA_1c test, 73 (34.9%) had good glycemic control (HbA_1c <7%) and 136 (65.1%) had poor glycemic control (HbA_1c >7%). Bivariate analysis revealed that subjects with poor control had longer disease duration, had lower education, used the glucometer more frequently, and had more diabetes-complications when compared to those in the good glycemic control group. Multivariable logistic regression analysis found the following factors associated with poor glycemic control: < 8 years of education, foreign-born, smoking, obesity, longer disease duration, daily glucometer use, and having macro-complications.

Discussion—Prevalence of poor glycemic control is very high in this population with very high and rising prevalence of diabetes. Further studies are needed to explore the effect of these and other characteristics on glycemic control among older Mexican Americans and to develop appropriate interventions to improve diabetes outcomes and increase life-expectancy.

Keywords

glycemic control; Mexican American elders; diabetes

Corresponding author: Max E. Otiniano, M.D., Ph.D. Department of Family and Community Medicine. University of Texas Health Science Center at San Antonio 7703 Floyd Curl Drive. San Antonio, Texas 78229-3900. otiniano@uthscsa.edu Voice: 210-358-3402. Fax: 210-223-6940. **Alternative corresponding author:** Soham Al Snih, MD, PhD. Division of Rehabilitation Sciences, School of Health Professions, University of Texas Medical Branch. 301 University Blvd., Galveston, TX 77555-0177. Tel: 409-266-9691. Fax: 409-772-8931. soalsnih@utmb.edu.

INTRODUCTION

Diabetes is an age related disease with almost 26.9 percent of Americans 65 years and older being affected in 2010, putting older people at a higher risk of diabetes related complications (Centers for Disease Control and Prevention, 2011). With a total estimated cost in 2007 of about $174 billion, diabetes is associated with high cost as well as other disease burdens; further, it was the seven leading cause of death in the United States in 2010 (Centers for Disease Control and Prevention, 2011; 2007).

In addition, diabetes is recognized as a significant threat to the health of the growing Hispanic population in the United States (Harris, 1998). Several epidemiological studies have demonstrated that Hispanics have significantly higher prevalence of Type 2 diabetes than Non-Hispanic Whites (Link & McKinlay, 2009; Cowie et al., 2006; Zhang et al., 2009; Flegal et al., 1991; Lindeman et al., 1998). Hispanics also have worse glycemic control when compared to non-Hispanic whites (Egede et al., 2011; Kirk et al., 2008; Weinstock et al., 2011; Boltri et al., 2005; Suh et al., 2008; Chiu & Wray, 2010; Harris et al., 1999; Wendel et al., 2006).

Hispanics are also more likely to suffer from diabetes-related complications, such as diabetic retinopathy and nephropathy, and to have higher age-adjusted mortality due to diabetes when compared to non-Hispanic Whites (Diehl & Stern, 1989; Hanis et al., 1993; Karter et al., 2002; Lanting et al., 2005; Zhang et al., 2010; Otiniano et al., 2003). This increase in diabetes related morbidity and mortality may be partially explained by higher rates of inadequate glycemic control (Tucker et al., 2000), delays in diagnosis, poor treatment compliance, communication problems between health care providers and patients, and a general lack of knowledge about the disease, its complications, and available treatments (Espino et al., 1993). It is uncertain whether Hispanics face greater challenges in succeeding with behavioral and self management strategies than Non-Hispanic Whites (von Goeler et al., 2003).

A number of studies have addressed factors associated with poor glycemic control in the general population (Kell et al., 1999; Lustman et al., 2000; Nichols et al., 2000; Shorr et al., 2000). Some studies found that older age was not associated with worse glycemic control (Shorr et al., 2000) while others did find it a predictor of good control (Nichols et al., 2000). These reports contradict previous ones that older diabetics are more likely to have worse glycemic control (Kell et al., 1999; Smith et al., 1999). Diabetic subjects receiving insulin or an oral hypoglycemic treatment were found to have worse glycemic control when compared to those without treatment (Smith et al., 1999; Meneilly & Tessier, 2001). Depression has been frequently found to worsen glycemic control (Lustman et al., 2000; Nichols et al., 2000). Some studies have examined these factors among Hispanics (Benoit et al., 2005; Tucker et al., 2000; Meneilly & Tessier, 2001; Lasater et al., 2001). Few studies have addressed glycemic control among older Mexican Americans, a group at a very high risk of diabetes and its complications. Below we examined correlates of poor glycemic control among older Mexican American diabetics aged 75 and older, a group that has experienced a significant increase in the prevalence of diabetes in recent years (Beard et al., 2009).

METHODS

Sample

Data were from the Hispanic Established Populations for Epidemiologic Study of the Elderly (H-EPESE), an ongoing longitudinal study of Mexican Americans aged 65 and over at baseline residing in Texas, New Mexico, Colorado, Arizona and California. Participants in the original sample were selected by area probability sampling procedures that involved

selecting counties, census tracts, and households within selected census tracts. Sampling procedures and sample characteristics have been reported previously (Markides et al., 1996; Markides KS et al., 1997). The original H-EPESE sample consisted of 3050 participants who were interviewed in 1993–1994 at baseline and continue to be followed. In 2004–2005, 1167 participants 75 years and older from the original cohort were re-interviewed. A new cohort of 902 respondents aged 75 years and older was added in 2004–2005, using sampling procedures similar to those used in 1993–1994. Both cohorts received identical evaluations at baseline and follow-up (sociodemographics, health conditions, psychosocial characteristics of the subject, blood pressure, anthropometric measures, and physical function measures) (Beard et al., 2009).

In-home interviews were conducted in Spanish (n=1661) or English (n=408) depending on the respondent's preference. The present study used data from the fifth wave. A total of 2,069 Mexican Americans aged 75 years old and over were interviewed. Six-hundred eighty-nine subjects, about 33.5% of sample, reported having been diagnosed with diabetes and 209 subjects, about 30.3% of the diabetics, agreed to perform a finger prick and supply a dry blood sample to test their HbA_1c level. The below analysis included participants with self-reported diagnosis of diabetes who also had the HbA_1c test (N=209). Characteristics of included and excluded participants are given in Table I. Ninety seven of all participants had insurance coverage.

Measures

Diabetes—Diabetes was assessed by asking subjects, "Have you ever been told by a doctor that you have diabetes, sugar in your urine or high blood sugar?" Participants who reported a diabetes diagnosis were asked about disease duration (categorized as < 15 years=0, and ≥ 15 years=1) and treatment received (categorized as unknown, oral hypoglycemic, insulin, or oral hypoglycemic/ insulin combination). Participants were asked if as a result of their diabetes, they have ever had any problems with their kidneys or eyes (micro-complications), or circulation or any amputations (macro-complications) (No=0, Yes=1).

Glucometer use and HbA_1c test—Information about glucometer use was obtained by asking the subjects about how often the participant or his/her family members check his/her blood glucose. Participants were categorized into those who used a glucometer on a daily basis versus those who did not (No=0, Yes=1). Participants were also asked about the frequency of having HbA_1c test performed by a health-care professional and were categorized into those who had a yearly HbA_1c versus those who did not (No=0, Yes=1).

Socio-demographics—Included age, gender (male=0, female=1), marital status (married=1, unmarried=0), education (< 8 years=1, ≥ 8 years=0), nativity (U.S born=0, foreign-born=1), language of interview (English=0, Spanish=1), and household income (<15,000=1, 15,000 to < 30,000=2, ≥ 30,000=3).

Smoking and alcohol consumption—Participants were asked if they currently smoke cigarettes now (Yes=1, No=0) and consumption in the past month of any beer, wine or liquor (Yes=1, No=0).

Medical conditions—Medical conditions were assessed with series of questions asking participants if they ever been told by a doctor that they had hypertension, heart attack, or stroke.

Depressive symptomatology—Assessed using the *Center for Epidemiologic Studies Depression Scale* (CES-D) (Radloff LS, 1977). This scale consists of 20 items that ask how

often specific symptoms were experienced during the past week; responses were scored on a 4-point scale (ranging from 0: rarely or none of the time to 3: most or all of the time) with potential total scores ranging 0–60. Alpha reliability with these data was 0.89. As is common in the literature, we consider persons scoring 16 or over to experience high depressive symptomatology (Radloff LS, 1977).

Body Mass Index (BMI)—BMI was computed as weight in kilograms divided by height in meters squared. Participants with BMI ≥ 30 Kg/m^2 were considered obese (National Heart & North American Association for the Study of Obesity (NAASO), 2000).

Health Care utilization—Physician utilization was assessed by the following question: "How many times in the past 12 months have you visited with a medical doctor" (0–1 visits=0, ≥ 2 visits=1). Hospital utilization was assessed by the following questions: "Did you experience an illness or injury that required staying overnight or longer in a hospital in the last year" (Yes=1, No=0).

Outcome—Poor glycemic control defined as a $HbA_1c \geq 7$ % according to the American Diabetes Association for medical care standard (American Diabetes Association, 2004; American Diabetes Association, 2011). Participants who responded positive for the diabetes question were given the option of receiving the HbA_1c kit to perform a finger prick test, placing two drops of blood on the test paper. After performing the test, participants were instructed to place the kit in a self-addressed envelope and mail it to Flex Site Diagnostics in Palm City, FL for processing.

Statistical Analysis

Chi-square and t-test statistics were used to examine the association between sociodemographics, smoking and alcohol consumption, medical condition, high depressive symptoms, BMI, and diabetes-related characteristics by HbA_1c (<7%=good control, >7%=poor control). Multivariate logistic regression analysis was used to examine the factors (demographics, smoking and alcohol consumption, medical conditions, high depressive symptoms, obesity, health care utilization, disease duration, treatment, and disease complications) associated with poor glycemic control (HbA_1c >7%). Language of interview and household income were not included in the multivariate analysis due to the high correlation with education. Also, we repeated the analysis using HbA_1c as a continuous variable. Significance was set at p-value < 0.05. PROC SURVEYMEANS PROC SURVEYFREQ, PROC SURVEYLOGISTIC and PROC SURVEYREG were used to account for design effects and sampling weight. All analyses were performed using the SAS System for Windows, version 9.2 (SAS Institute, Inc., Cary, NC).

RESULTS

Table I shows the descriptive characteristics of participants with diabetes who did and did not conduct the HbA_1c test. Of the 690 participants with diabetes, 30.3% had their HbA_1c level tested and 67.7% did not. There were no significant differences by socio-demographics, smoking and alcohol consumption, hypertension, heart attack, stroke, high depressive symptoms, BMI, physician visits, hospitalization, disease duration, disease treatment or disease complications. Participants who conduct the HbA_1c test were significantly more likely for not having a prior HbA_1c testing.

Table II presents the descriptive characteristics of participants with diabetes by glycemic control (HbA_1c<7%=good control and $HbA_1c \geq 7$%=good control). Of the 290 participants with diabetes who took the HbA_1c test, 34.9 % had good glycemic control and 65.1% had

poor glycemic control. Participants with poor glycemic control were significantly more likely to have < 8 years of education, to have the interview in Spanish, and been US-born compared with those with good glycemic control. Participants with poor glycemic control were significantly more likely to have longer disease duration (≥ 15 years), to report daily glucometer use and have more complications (Table III).

Table IV shows the multivariate logistic regression analysis for poor glycemic control ($HbA_1c<7\%$). Education < 8 years, foreign-born, current smokers, obesity (BMI ≥ 30 Kg/m^2), longer disease duration (≥ 15 years), daily glucometer use, and macrocomplications (circulation or amputations) were factors significantly associated with poor glycemic control. When we repeated the analysis using HbA_1c as a continuous variable, we found foreign-born, current smokers, obesity, longer disease duration, and macrocomplications significantly associated with high levels of HbA_1c ($R^2=32\%$).

DISCUSSION

This study examined the factors associated with poor glycemic control ($HbA_1c >7\%$) among older Mexican American with diabetes, a population known to be at a higher risk of diabetes and its complications. We found that 65.1% of participants had poor glycemic control. Education, nativity, smoking, obesity, disease duration, daily glucometer use, and macrocomplications were factors associated with poor glycemic control.

Our findings on education are similar to those reported by Goudswaard and colleagues in which lower level of education was associated with poor glycemic control (Goudswaard et al., 2004) but different from those of Ross and colleagues who did not find an association of education with glycemic control among Mexicans and Mexican Americans with type 2 diabetes or Blaum and colleagues, who looked at mostly Non-Hispanic whites (Suh et al., 2008; Ross et al., 2011; Blaum et al., 1997). A pilot study has shown that applying culturally tailored diabetes-self management programs among less educated Mexican Americans may improve glycemic control and diabetes outcomes (Rosal et al., 2005). Previous findings from the H-EPESE showed that foreign-born Mexican Americans were at higher risk for incidence of macro and micro vascular complications that would explain the association with poor glycemic control (Kaushik et al., 2007). Another previous study showed an association between smoking and poor glycemic control (Gunton et al., 2002).

Our analysis showed an association between obesity and poor glycemic control. These findings are different from those reported by Suh and colleagues using the National Health and Nutrition Examination Surveys (NHANES) (1988–1994 and 1999–2004), as well as those of Harris and colleagues using the NHANES 1988–1994, and those reported by Blaum and colleagues, none of whom found an association between obesity and glycemic control (Suh et al., 2008; Harris et al., 1999; Blaum et al., 1997). Furthermore, other have found higher BMI associated with better glycemic control (Nichols et al., 2000; Koro et al., 2004). One explanation for this observation may be that improvement in diabetes control causes weight gain, rather than that weight gain improves diabetes control (U.K.Prospesctive Diabetes Study Group, 1998).

Our finding of longer disease duration associated with poor glycemic control contrast with previous studies in older adults which found no association between longer disease duration and poor glycemic control, suggesting that patients with diabetes may become more skilled in diabetes care the longer they have diabetes (Suh et al., 2008; Chiu & Wray, 2010; Nichols et al., 2000; Goudswaard et al., 2004; Koro et al., 2004). However, in this group of older Mexican Americans, a longer duration of diabetes makes glycemic control more difficult

because of the increased burden of comorbidities, drug resistance, and drug disease interactions.

In contrast to other reports showing better glycemic control with more frequent self measurement of blood glucose our analysis showed that those with HbA_1c of > 7% were more likely to check their blood glucose daily when compared to those with HbA_1c of < 7%. This fact may reflect not so much that poor glycemic control is a result of inadequate measurement of blood sugar levels, but rather the difficulty of achieving good glycemic control in this advanced age group, which demands closer monitoring. Our findings on diabetes complications are consistent with previous research that poor glycemic control is associated with risk of macrovascular complications (Stratton et al., 2000; Imran et al., 2006; Nather et al., 2008).

Our study has several limitations. First, the assessment of diabetes mellitus was based on self-reported data with no clinical evaluation or pathological proof of complications due to diabetes, and no information of previous HbA_1c levels or glucose levels. Clinical observation may provide a different and more precise diagnosis. However, the self report approach has been documented to provide reliable information and a good agreement between self-reported diabetes mellitus and diabetes mellitus diagnosed by blood tests (Mokdad et al., 2001; Okura et al., 2004). Second, only one third of respondents agreed to perform a finger prick and supply a dry blood sample to test their HbA_1c level. Analysis of excluded and included participants showed no significant differences by socio-demographics, health behaviors, medical conditions, high depressive symptoms, BMI, health care utilization or disease characteristics. Third, because this was a cross-sectional analysis it was not possible to determine the temporal sequence of associated factors and glycemic control. Fourth, in 32 participants information of diabetes treatment was not available and this could underestimate the effect of diabetes treatment on glycemic control.

Despite the limitations identified above, the study yielded important results with implications for future programs addressed to older Mexican American diabetics. Our results show the importance of identifying factors associated with poor glycemic control in older Mexican Americans who have high prevalence and incidence of diabetes. Moreover, our results suggest a very high level of poor glycemic control in a population that has experienced a significant increase in diabetes prevalence in recent years.

In summary, education level, nativity, smoking, obesity, disease duration, daily glucometer use, and macrocomplications were factors associated with poor glycemic control in older Mexican Americans, even if they follow the appropriate diabetes care. A recent report showed that diabetes-free life expectancy has decreased in the US for both men and women, a decrease attributed to an increase in the incidence of diabetes among obese persons (Cunningham SA et al., 2011). As older Mexican American are characterized as having high prevalence of diabetes and obesity, further studies are needed to explore the effect of these and other characteristics on glycemic control with larger samples of older Mexican Americans over time and to develop appropriate interventions to improve diabetes outcomes and increase life-expectancy.

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Table I

Descriptive characteristics of participants with diabetes with and without HbA_1c test (N=690).

Variables	N	With HbA_1c N=209	Without HbA_1c N=481
Total	690	209 (30.3)	481 (69.7)
Age, Mean (SD)	690	81.1 (4.1)	81.0 (4.5)
Gender (female)	690	130 (60.8)	312 (63.8)
Education	453	133 (67.2)	320 (70.0)
< 8 years	170	57 (32.8)	113 (30.0)
≥ 8 years			
Language of interview	138	54 (28.1)	84 (23.9)
English	225	155 (71.9)	397 (76.1)
Spanish			
Marital status	304	96 (44.7)	208 (43.7)
Married	385	113 (55.3)	272 (56.3)
Unmarried			
Nativity	401	123 (59.9)	278 (60.1)
US-born	289	86 (40.1)	203 (39.9)
Foreign-born			
Income	270	80 (36.9)	190 (44.7)
< 15,000	259	86 (43.2)	173 (39.8)
15,000 < 30,000	79	30 (19.9)	49 (15.5)
≥ 30,000			
Current smokes	309	103 (46.3)	206 (45.7)
Yes	381	106 (53.7)	275 (54.3)
No			
Current drinker	361	124 (60.4)	237 (52.2)
Yes	329	85 (39.6)	244 (47.8)
No			
Hypertension	519	156 (76.5)	363 (74.1)
Yes	162	50 (23.5)	112 (25.9)
No			
Heart attack	132	50 (23.8)	82 (19.7)
Yes	553	156 (76.2)	397 (80.3)
No			
Stroke	119	45 (21.3)	74 (18.1)
Yes	567	162 (78.7)	405 (81.9)
No			
High depressive symptoms (CES-D ≥ 16)	136	48 (23.5)	88 (21.1)
Yes	502	156 (76.5)	346 (78.9)
No			
BMI (Kg/m^2)	127	45 (18.3)	82 (15.8)
18.5 – < 25	212	74 (31.3)	138 (31.5)
25 – 30	190	55 (32.5)	135 (21.1)
≥ 30	161	35 (17.9)	126 (25.6)
Missing or < 18.5	533	28.8 (4.6)	28.8 (5.3)
Mean (SD)			
Hospitalization in the past year	218	68 (33.3)	150 (31.2)
Yes	467	140 (66.7)	327 (88.8)
No			
Physician visits in the past year	58	18 (9.4)	40 (10.1)
0 – 1	622	190 (90.6)	432 (89.9)
≥ 2			
Duration of diabetes (years)	329	103 (48.8)	226 (47.3)
< 15	361	106 (51.2)	255 (52.7)
≥ 15	690	18.1 (0.8)	17.7 (0.8)
Mean (SE)			

Variables	N	With HbA_1c N=209	Without HbA_1c N=481
Use of Glucometer	290	89 (45.8)	201 (43.9)
> 1 time/day	400	120 (54.2)	280 (56.1)
All others			
Prior HbA_1c testing **	524	142 (62.0)	382 (74.3)
Never	155	65 (38.0)	90 (25.7)
>1 per year			
Current diabetes treatment	87	22 (11.5)	65 (16.4)
Unknown	448	145 (67.4)	303 (61.5)
Oral hypoglycemic	155	42 (21.0)	113 (22.1)
Insulin or/and oral hypoglycemic			
Diabetes complications	690	0.9 (0.)	1.0 (0.1)
Mean (SE)			
Kidney	89	28 (13.4)	61 (13.6)
Yes	590	179 (86.6)	411 (86.4)
No			
Eyes	290	89 (45.8)	201 (43.9)
Yes	400	120 (54.2)	280 (56.1)
No			
Circulation	246	80 (40.0)	166 (35.4)
Yes	427	127 (60.0)	300 (64.6)
No			
Amputation	266	90 (42.0)	176 (36.7)
Yes	400	114 (57.9)	286 (63.3)
No			

Note: “N” varies due missing data

* p-value <0.01

** p-value <0.001

*** p-value <0.0001

Table II

Descriptive characteristics of participants with diabetes by glycemic control (N=209).

Variables	N	Good control $HbA_1c < 7\%$ N (%)	Poor control $HbA_1c \geq 7\%$ N (%)
Total	209	73 (34.9)	136 (65.1)
HbA1c level	209	6.4 (0.02)	8.6 (0.1)
Age, Mean (SD)	209	80.7 (3.9)	81.2 (4.2)
Gender (female)	130	43 (60.2)	87 (61.1)
Education **	133	40 (59.3)	93 (73.8)
< 8 years	57	28 (43.7)	29 (26.2)
≥ 8 years			
Language of interview **	54	24 (40.5)	30 (20.9)
English	155	49 (59.5)	106 (79.1)
Spanish			
Marital status	96	32 (43.5)	64 (45.4)
Married	113	41 (56.5)	72 (54.6)
Unmarried			
Nativity **	123	49 (72.7)	74 (52.6)
US-born	86	24 (27.3)	62 (47.4)
Foreign-born			
Income	80	20 (30.1)	60 (40.7)
< 15,000	86	33 (46.6)	53 (41.3)
15,000 < 30,000	30	13 (23.3)	17 (18.0)
≥ 30,000			
Current smokers	106	38 (59.6)	68 (50.3)
Yes	103	35 (40.4)	68 (49.7)
No			
Current drinker	85	24 (33.3)	61 (43.3)
Yes	124	49 (66.7)	75 (56.7)
No			
Hypertension	156	58 (80.6)	98 (74.2)
Yes	50	14 (19.4)	36 (25.8)
No			
Heart attack	50	18 (22.9)	32 (24.3)
Yes	156	53 (77.1)	103 (75.7)
No			
Stroke	45	19 (23.9)	26 (19.8)
Yes	162	53 (76.1)	109 (80.2)
No			
High depressive symptoms (CES-D ≥ 16)	48	13 (19.1)	35 (26.1)
Yes	156	60 (80.9)	96 (73.9)
No			
BMI (Kg/m^2)	45	13 (13.2)	32 (21.2)
18.5 – < 25	74	27 (35.4)	47 (28.9)
25 – 30	55	20 (31.3)	35 (33.3)
≥ 30	35	13 (20.3)	22 (16.6)
Missing or < 18.5	209	28.4 (4.9)	29.1 (4.2)
Mean (SD) **			
Hospitalization in the past year	68	22 (31.8)	46 (34.2)
Yes	140	50 (68.2)	90 (65.8)
No			
Physician visits in the past year	18	11 (7.5)	7 (12.7)
0 – 1	190	124 (92.5)	66 (87.3)
≥ 2			

Note: “N” varies due missing data

*
p-value <0.01

**
p-value <0.001

***
p-value <0.0001

CES-D= Center for Epidemiological Studies Depression Scale, BMI=Body Mass Index

Table III

HbA_1c measurements and diabetes-care related characteristics of older Mexican Americans with diabetes (N=209).

Variables	N	Good control HbA1c < 7% N (%)	Poor control HbA1c ≥ 7% N (%)
Total		73 (36.5)	136 (63.5)
Duration of diabetes (years) **	103	48 (64.4)	55 (39.8)
< 15	106	25 (35.6)	81 (60.2)
≥ 15	209	18.1 (0.8)	17.7 (0.8)
Mean (SE)			
Use of Glucometer *	89	23 (35.2)	70 (48.0)
> 1 time/day	120	50 (64.8)	66 (52.0)
All others			
Prior HbA_1c testing	142	50 (63.1)	83.1 (61.4)
Never	65	22 (36.9)	43 (38.6)
>1 per year			
Current diabetes treatment	22	12 (16.5)	10 (8.6)
Unknown	145	50 (68.7)	95 (66.7)
Oral hypoglycemic	42	11 (14.7)	31 (24.6)
Insulin or/and oral Hypoglycemic			
Diabetes complications ***	209	0.5 (0 – 3)	1.0 (0 – 3)
Median (range)			
Kidney	28	10 (10.9)	18 (14.8)
Yes	179	61 (89.1)	118 (85.2)
No			
Eyes	80	28 (41.6)	52 (39.0)
Yes	127	45 (58.4	82 (61.00)
No			
Circulation **	90	24 (30.3)	66 (51.3)
Yes	114	47 (69.7)	67 (48.7)
No			
Amputation	6	2 (1.4)	4 (1.4)
Yes	202	71 (98.6)	131 (98.6)
No			

Note: "N" varies due missing data

* p-value <0.01

** p-value <0.001

*** p-value <0.0001

Table IV

Logistic regression of factors associated with poor glycemic control (HbA1c ≥ 7%) in older Mexican Americans with diabetes.

Variables	OR 95 % CI N=185*
Age (each year increase)	1.00 (0.89 – 1.12)
Gender (female)	1.35 (0.42 – 4.30)
Education (< 8 years)	3.08 (1.20 – 7.92)
Marital status (married)	1.84 (0.71 – 4.76)
Nativity (foreign-born)	3.01 (1.09 – 8.32)
Current smoker	3.12 (1.16 – 8.38)
Current drinker	0.54 (0.22 – 1.30)
Hypertension or heart attack or stroke	0.69 (0.23 – 2.11)
High depressive symptoms (CES-D ≥ 16)	1.98 (0.52 – 7.51)
Obesity (BMI ≥ 30 Kg/m^2)	3.65 (1.08 – 12.36)
Hospitalization in the past year	0.87 (0.36 – 2.08)
Physician visits in the past year (<2)	1.42 (0.43 – 4.73)
Disease duration (≥ 15 years)	3.34 (1.15 – 9.76)
Daily glucometer use	3.13 (1.12 – 8.76)
Prior HbA1c testing	1.37 (0.52 – 3.59)
Current diabetes treatment	1.00
Unknown	1.19 (0.32 – 4.47)
Oral hypoglycemic	0.48 (0.06 – 3.68)
Insulin or/and oral hypoglycemic	
Diabetes complications	5.28 (1.75 – 15.87)
Macro (circulation or amputation)	0.29 (0.08 – 1.05)
Micro (eyes or kidney)	

Note: Participants with missing data on BMI were included into the equation

"N" varies due missing data

OR=Odds Ratio
CI=Confidence Interval
CES-D= Center for Epidemiological Studies Depression Scale
BMI=Body Mass Index