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Health Beliefs and Medication Adherence in Blacks with Diabetes and Mild Cognitive Impairment

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Abstract

Objectives—To evaluate determinants of medication adherence and glycemic control in blacks with diabetes and Mild Cognitive Impairment (MCI).

Methods—Cross-sectional study of 143 participants with mean age of 68.8 (6.7) years; 66.4% were women.

Results—Eighty seven participants (60.8%) self-reported medication nonadherence; they had more negative beliefs about medicines, greater diabetes-related distress, and more difficulty with daily living activities and affording medications than adherent participants. There were no group differences in cognition, depressive symptoms, or glycemic control. Glycemic control negatively correlated with regimen distress, emotional burden, interpersonal distress, beliefs that physicians overprescribe medications, and beliefs that medications are harmful.

Conclusions—Beliefs about medications, diabetes-related distress, functional disability, and medication affordability are associated with medication nonadherence in blacks with diabetes and MCI. Interventions that respect personal health beliefs and compensate for impaired cognition may improve medication adherence and glycemic control in this population.

Keywords

Mild Cognitive Impairment; diabetes; medication adherence; health beliefs; blacks

Antihyperglycemic medications have not substantially improved glycemic control at the population level in recent years. Respective rates of adequate control (i.e., hemoglobin A1c levels less than 7.0%) have been 44.3% (1999 – 2002); 56.8% (2003 – 2006); and 52.2%

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(2007 – 2010).[1] These low rates reflect, in part, obstacles to taking medications and account for persistently high rates of diabetes complications and costs. These problems affect blacks more than whites due to differences in education, health beliefs, access to care, and socioeconomic resources.[2] There are now one million older blacks with DM in the U.S. and their number will double by 2030. This projected growth will increase the burden of diabetes in this population and necessitates culturally relevant treatment.

We are conducting a randomized controlled trial to test the efficacy of a home-based occupational therapy intervention to improve medication adherence and glycemic control in blacks with diabetes and mild cognitive impairment (MCI) [clinicaltrials.gov NCT02174562]. MCI is a transition state between normal cognitive aging and dementia that increases the risk for cognitive decline, and poorly controlled diabetes magnifies this risk.[3] Screening for the clinical trial involved assessment of medical, psychosocial, cultural, affective, and cognitive factors that might influence medication adherence. The current study compares the characteristics of participants who reported taking and not taking medications as prescribed to identify obstacles to treatment.

Methods

Sample

Participants were 143 blacks over age 65 years with type 2 diabetes, MCI, and HbA1c ≥ 7.5% who were recruited from primary care practices of Thomas Jefferson University from 2015–2017. Institutional review board approval was obtained for this study and all participants provided informed consent.

Study Measures

Race-concordant community health workers conducted in-home assessments to obtain the following data.

1) Personal Characteristics—Age, sex, marital status, and years of education.

2) Clinical Characteristics—HbA1c level, medical diagnoses, prescription and nonprescription medications. The Patient Health Questionnaire-9 was used to assess level of depressive symptoms.[4] The Activities of Daily Living–Prevention Instrument was used to assess self-reported level of difficulty completing 15 daily function activities (e.g., handling money, shopping); responses range from “no difficulty” (1) to “does not do this activity” (4).[5] The National Alzheimer's Coordinating Center's Uniform Data Set neuropsychological test battery was used to assess cognition, and includes the Mini-Mental Status Examination (MMSE); Wechsler logical memory, immediate and delay; digit span forward/backward; digit symbol substitution; trail making tests A and B; category fluency, and the Boston Naming Test.[6]

3) Medication Adherence—Self-reported adherence was assessed with the Morisky Medication Adherence Scale, which is a 4-item general medication adherence scale that includes the following questions scored as yes (1) or no (0): Do you ever forget to take your medicine? Are you careless at times about taking your medicine? When you feel better, do

you sometimes stop taking your medicine? Sometimes, if you feel worse when you take the medicine, do you stop taking it?.[7] Responses were dichotomized to distinguish adherent participants (score = 0, no nonadherence behaviors) and suboptimally adherent participants (score ≥ 1, one or more nonadherence behaviors). Participants were also asked whether they take medication less often than prescribed due to cost. Objective medication adherence to a single oral hypoglycemic or insulin was assessed using an electronic Medication Event Monitoring System (MEMS), which records the date and time of medication bottle openings. MEMS data were used to calculate the percent of doses taken as prescribed, and the percent of days that doses were taken as prescribed, over 2 weeks.

4) Diabetes Self-Care—Self-care was assessed with the Diabetes Self-Care Inventory-Revised (DSCI-R), which measures self-reported adherence to 12 self-care behaviors (e.g., exercise, diet) from 1 = "never do this" to 5 = "always do this as recommended".[8]

5) Diabetes Distress—The 17-item Diabetes Distress Scale was used to assess four domains of diabetes-related emotional distress: emotional burden (e.g., "feeling overwhelmed by the demands of living with diabetes"); physician-related distress (e.g., "feeling that my doctor doesn't take my concerns seriously enough"); regimen-related distress (e.g., "feeling that I am not sticking closely enough to a good meal plan"); and interpersonal distress (e.g., "feeling that my friends/family don't appreciate how difficult living with diabetes is"). Items are rated from 1 ("no problem") to 6 ("serious problem").[9]

6) Beliefs about Medications—The 18-item Beliefs about Medicines Questionnaire (BMQ) is comprised of two belief subscales: Specific (i.e., beliefs about one's own medications) and General (i.e., beliefs about medicines in general).[10] The Specific BMQ taps Necessity (e.g., "My health at present depends on my medicines") and Concerns (e.g., "I sometimes worry about the long term effects of my medicines"). The General BMQ taps Harms (e.g., "Medicines do more harm than good") and Overuse (e.g., "Doctors use too many medicines"). Items are rated from 1 ("strongly disagree") to 5 ("strongly agree").

Statistical Methods

Continuous baseline demographic and clinical characteristics were summarized using means and standard deviations, and categorical variables using counts and percentages. ANOVA was used for group comparisons.

Results

The sample was comprised of 143 participants with a mean age of 68.8 (6.7) years; 95 (66.4%) were women. Fifty six participants (39.2%) endorsed no Morisky self-report medication adherence items and were considered adherent. Eighty seven participants (60.8%) endorsed at least one Morisky item and were considered suboptimally adherent. The number and percent of participants (in the entire sample) endorsing each item were: forgetting to take medication (72, 50.3%); being careless about taking medication; (40, 28.0%); stopping medications when feeling better (24, 16.8%); and stopping medications when feeling worse (13, 9.2%). Twenty two participants (15.4%) stated that they took less medication than prescribed due to cost.

The Table compares adherent versus nonadherent participants. Compared to adherent participants, nonadherent participants had significantly lower MEMS-measured adherence to a prescribed antihyperglycemic medication, scored lower on the DSCI-R (i.e., less adherent to overall diabetes self-care) and the ADL-PI (i.e., more difficulty with daily living activities), and scored higher on the BMQ-Specific Concerns subscale (i.e., beliefs about the dangers of the participant's medications), the BMQ-General Harm subscale (i.e., the general belief that medicines are harmful), and the Diabetes Distress emotional burden subscale (i.e., having diabetes is overwhelming). There were no group differences in MMSE or other neuropsychological test scores (data not shown), education, or depressive symptoms.

Hemoglobin A1c levels were similar in both adherent [9.2 (1.2)] and nonadherent participants [9.4 (1.7)] and did not significantly correlate with Morisky scores or the two MEMS adherence variables, likely because the range of hemoglobin A1c levels was constrained. Hemoglobin A1c levels did correlate with regimen distress ($r = .329$; $p < .001$); emotional burden ($r = .295$; $p < .001$); interpersonal distress ($r = .245$; $p < .003$); beliefs that physicians overprescribe medications ($r = -.189$; $p = .024$); beliefs that medications are harmful ($r = -.168$; $p = .045$); and DSCI-R scores (i.e., overall diabetes self-care) ($r = -.169$; $p = .043$). [N= 143 for all correlations].

Conclusions

The participants we studied are not representative of older blacks with diabetes because they had MCI and were recruited from an academic medical center. Although uncertain generalizability is a limitation of this study, all participants had comprehensive assessments of cognitive, psychosocial, cultural, and medical status and subjective and objective measurement of medication adherence.

We found that negative beliefs about medications, the emotional burden of living with diabetes, worse daily functioning, and ability to afford medications were related to suboptimal medication adherence. Glycemic control negatively correlated with regimen distress, emotional burden, interpersonal distress, beliefs that physicians overprescribe medications, and beliefs that medications are harmful.

In this MCI sample, only 50% of participants reported forgetting to take medications, which likely underestimates the actual rate. There were no differences in severity of cognitive impairment in adherent and nonadherent participants, however, highlighting the observed differences in health beliefs, diabetes distress, daily functioning, and medication affordability as determinants of adherence. This finding is important because these factors are more modifiable than cognitive impairment, and suggests that interventions that respect personal health beliefs and compensate for impaired cognition may improve medication adherence in blacks with MCI. A more pressing need is to prevent cognitive decline in the much larger population of blacks with diabetes and intact cognition. Poorly controlled diabetes damages the cerebral microvasculature and increases risk for cognitive decline due to cerebrovascular and/or Alzheimer's disease pathologies. Blacks have worse glycemic control than whites, which increases their risk of dementia.[2] The high risk for this comorbidity in blacks reflects the impact of cultural factors, including beliefs about

medications, and requires broadly applied culturally relevant treatment to improve glycemic control and prevent cognitive decline in this high risk population.

Acknowledgments

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Highlights

- This is the first study to examine relationships between medication adherence, glycemic control, health beliefs, and cognition in blacks with diabetes and MCI.
- Beliefs about medications, diabetes-related distress, functional disability, and medication affordability are associated with medication nonadherence.
- Glycemic control negatively correlates with regimen distress, emotional burden, interpersonal distress, beliefs that physicians overprescribe medications, and beliefs that medications are harmful.
- Interventions that respect personal health beliefs and compensate for impaired cognition may improve medication adherence and glycemic control in blacks with diabetes and MCI.

Table

Bivariate Comparisons of Nonadherent versus Adherent Participants[a]

Variable	Nonadherent Participants (n = 87)	Adherent Participants (n = 56)	X^2/f-test	df	p
	N (%)	N (%)			
Background Characteristics:					
Female	55 (63.2)	39 (69.6)	.62	1	.429
Married	28 (32.2)	15 (26.8)	3.86	1	.570
Takes less medication than prescribed due to cost	18 (21.1)	4 (7.3)	4.87	1	.027
	Mean (SD)	Mean (SD)			
Age, years	68.2 (6.0)	69.7 (7.5)	1.78	1,141	.185
Education, years	12.4 (2.5)	12.3 (1.8)	.019	1,141	.891
Clinical Characteristics:					
Number of medical conditions	4.7 (2.5)	4.3 (2.0)	.76	1,141	.384
Number of prescription and non-prescription medications	9.3 (4.2)	9.7 (4.1)	.38	1,141	.530
Hemoglobin A1c	9.4 (1.7)	9.2 (1.2)	1.22	1,141	.271
Mini Mental State Exam[b]	25.5 (2.5)	25.5 (2.5)	0.00	1,414	.984
Patient Health Questionnaire[c]	8.7 (6.3)	6.7 (5.9)	3.32	1,141	.071
Activities of Daily Living-Prevention Instrument[d]	33.1 (7.9)	36.8 (6.2)	8.92	1,141	.003
Medical Outcomes Study – 6[e]	17.7 (5.9)	16.1 (4.8)	2.96	1,141	.088
Diabetes Self-Care Inventory[f]	54.6 (15.3)	61.6 (13.3)	7.81	1,141	.006
Beliefs about Medication:					
Specific Concerns[g]	16.3 (4.2)	14.1 (4.4)	9.59	1,141	.002

Variable	Nonadherent Participants (n = 87)	Adherent Participants (n = 56)	X^2/f-test	df	p
	N (%)	N (%)			
General Harm[h]	10.2 (2.9)	8.9 (2.4)	8.33	1,141	.005
Specific Necessity[i]	19.6 (3.6)	20.3 (3.4)	1.34	1,141	.249
Over Use[j]	12.9 (2.9)	12.0 (3.2)	3.02	1,141	.085
Diabetes Distress:					
Diabetes Burden[k]	3.3 (1.6)	2.5 (1.4)	8.01	1,141	.005
Physician-Related Distress[l]	1.7 (1.1)	1.6 (1.0)	.248	1,141	.619
Regimen-Related Distress[m]	3.5 (.7)	3.4 (.7)	1.00	1,141	.317
Interpersonal Distress[n]	2.3 (1.6)	2.0 (1.5)	1.12	1,141	.292
Objective Medication Adherence:					
Percent of doses taken as prescribed	66.2 (27.3)	76.3 (26.0)	4.86	1,141	.029
Percent of days taken as prescribed	48.7 (35.9)	62.5 (36.4)	5.04	1,141	.026

[a] Adherent participants have a Morisky Medication Adherence Scale of 0. Nonadherent participants have scores ≥ 1.

[b] Range from 0 to 30; higher scores indicate better global cognitive function.

[c] Range is 0 to 27; higher scores indicate more severe depression.

[d] Range is 25 to 60; higher scores are better function.

[e] Range is 6 to 30; lower scores are better function.

[f] Range is 0 to 48; higher scores are better diabetes self-management.

[g] Range is 5 to 25; higher scores reflect greater worry about medications.

[h] Range is 4 to 20; higher scores reflect stronger beliefs that medications are harmful.

[i] Range is 5 to 25; higher scores reflect stronger beliefs that medications are necessary.

[j]Range is 4 to 20; higher scores reflect stronger beliefs that physicians overprescribe medications.

[k]Range is 5 to 30; higher scores reflect greater feelings of burden.

[l]Range is 4 to 24; higher scores reflect greater levels physician-related distress.

[m]Range is 5 to 30; higher scores reflect greater levels of regimen-related distress.

[n]Range is 3 to 28; higher scores reflect greater levels of interpersonal distress.